Appendix A

Ballykeeran Gardens

BUILDING LEGEND (332 units)

- A - Semi-detached (3 bed) 106.4sqm
- B - Detached (3 bed) 118.3sqm 'single aspect'
- C - Semi-Detached (3 bed) 118.3sqm 'single aspect'
- D1 & D2 - Terrace of 4 (3 bed) 89.6sqm
- E - Detached (3 bed) 106.4sqm
- F - Terrace (3 bed) 118.3sqm 'single aspect'
- G1 & G2 - Terrace (3 bed) 106.4sqm & 110.9sqm Corner
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- K1 & K2 - Semi-Detached (3 & 4 bed) 106.4sqm & 151.2sqm Corner
- L - Semi-detached (4 bed) 133sqm
- M1 & M2 - Terrace (3 & 4 bed) 106.4sqm & 151.2sqm Corner
- N1 & N2 - Terrace (3 & 4 bed) 106.4sqm & 151.2sqm Corner
- O - Terrace of 8 (3 bed) 112.8sqm
- P1 & P2 - Terrace (3 & 4 bed) 94.6sqm & 143.4sqm Corner

- Duplex Block 1 (3 storey) Ground Floor 2 bed Apartments with 3 Bed Houses over.
- Duplex Block 2 (3 storey) Ground Floor 2 bed Apartments with 3 Bed Houses over.
- Duplex Blocks 3 & 4 (2 storey) Ground Floor 2 bed Apartment with 1 Bed Apartment over Including a Semi-D 3 bed house (106.4sqm)
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- Duplex Block 9 (2 storey) Ground Floor 2 bed Apartments with 1 Bed Apartments over.

- Apartment Blocks A & D
  26no. Apartments each
  4 storey
  Total building area = 2,831sqm each
  Total of 52no. Apartments
- Apartment Block B
  4 storey
  Total building area = 1,623sqm
  Total of 14no. Apartments
- Apartment Block C
  2 storey
  Total building area = 741sqm
  Total of 8no. Apartments
- CRECHE
  58 kid capacity
  2 storey
  Total building area = 450sqm

Residential Unit Types

- 1A - One bed FF Duplex Apt. (64.7sqm)
- 1B - One bed FF Duplex Apt. end unit (65.6sqm)
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MASTERPLAN LAYOUT
Scale 1:1,000 @A0

N

Notes:

DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.

ALL DIMENSIONS ARE IN MILLIMETERS

CONTRACTOR MUST CONFIRM SITE DIMENSIONS BEFORE STARTING WORK OR SHOP DRAWING.
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THIS DRAWING IS TO BE READ IN ACCORDANCE WITH ALL RELEVANT SPECIALISTS DRAWINGS AND SPECIFICATIONS.

County Development Plan 2021-2027 - Max. Car Parking Requirements			
Residential Dwelling	1	x 332 units	= **332**
Visitor Parking	1/3	332/3	= **110**
Max. parking spaces allowed			= **442**

Total Residential Parking Spaces Provided = **409no.**

- 332no. Dwelling spaces provided (32no. of which are Electric Charging spaces (20% of Communal spaces)
- 77no. Visitor Parking spaces provided (max.110 allowed) 8no. of which are Disabled Parking spaces (5% of common duplex + apartment parking spaces, 160no.)
- 9no. CRECHE parking spaces provided
- (Typical Parking spaces are either 5m x 2.5m or 6m x 2.5m)
- 21no. Motor Cycling parking spaces (2.5m x 1.5m)

General notes:

Proposed 332 residential units.

Application Site Area (Red line) = 12.28 ha.
Applicants Ownership area = 11.76 ha.

Developed Residential Site area = 9.49 ha.
Area Zoned Open Space = 1.721 ha.
Creche Site area = 0.144 ha.
Link road area = 0.923 ha.

Density 35 units/ha.

Materplan - Total of 332 units
172 Houses, 86 Duplexes & 74 Apartments

3no. 3 bed Detached units
12no. 4 bed Semi-detached units
40no. 3 bed Semi-detached units
8no. 4 bed End Terrace units
109no. 3 bed Terrace units

25no. 3 bed Duplex hse.
43no. 2 bed Duplex apt.
18no. 1 bed Duplex apt.

18no. 1 bed Apartments
56no. 2 bed Apartments

Unit mix % (332)

11% one bed units (36)
30% two bed units (99)
53% three bed units (177)
06% four bed units (20)

REVISION	AMENDMENT	DATE	DRAWN

project: PROPOSED RESIDENTIAL DEVELOPMENT at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath	drawn: M.H. checked:
	date: 13-03-23
drawing title: PROPOSED SITE MASTERPLAN	project no.: 2130
	scale: 1:1,000 @A0
	stage: PLANNING
Arnold Leahy architects — 1 Crescent Villas O'Connell Avenue Limerick Phone: (061) 315 080 Email: reception@ala.ie	sheet no. 100 revision

PLANNING USE ONLY
NOT FOR CONSTRUCTION

Ballykeeran Gardens

Notes:

Main Entrance into the Site

PEDESTRIAN ENTRANCE & EMERG
VEHICLE ACCESS TO SITE (Drop d
SUBJECT TO AGREEMENT.

PEDESTRIAN CONNECTION
SUBJECT TO FUTURE AGREEMENT

LINK ROAD TO NEIGHBOURING SITE SUBJECT TO FUTURE AGREEMENT

Play Area

Private Open Space

APT 'B' 14 units
4 storey Block (14 units)
139-152

Apartment Block A
4 Storey
APT 'A' 26 units
113-138

Bin collection point

KICK ABOUT AREA

ESB SUBSTATION

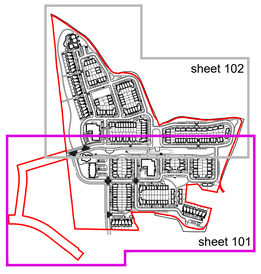
(ZONED - OPEN SPACE)

FUTURE SCHOOL

(ZONED - COMMUNITY & INSTITUTIONAL)

(ZONED - MIXED USE)

SITE LAYOUT PLAN 1 of 2
Scale 1:500 @A0



KEY PLAN

WAYELEAVE

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N

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REVISION	AMENDMENT	DATE	DRAWN

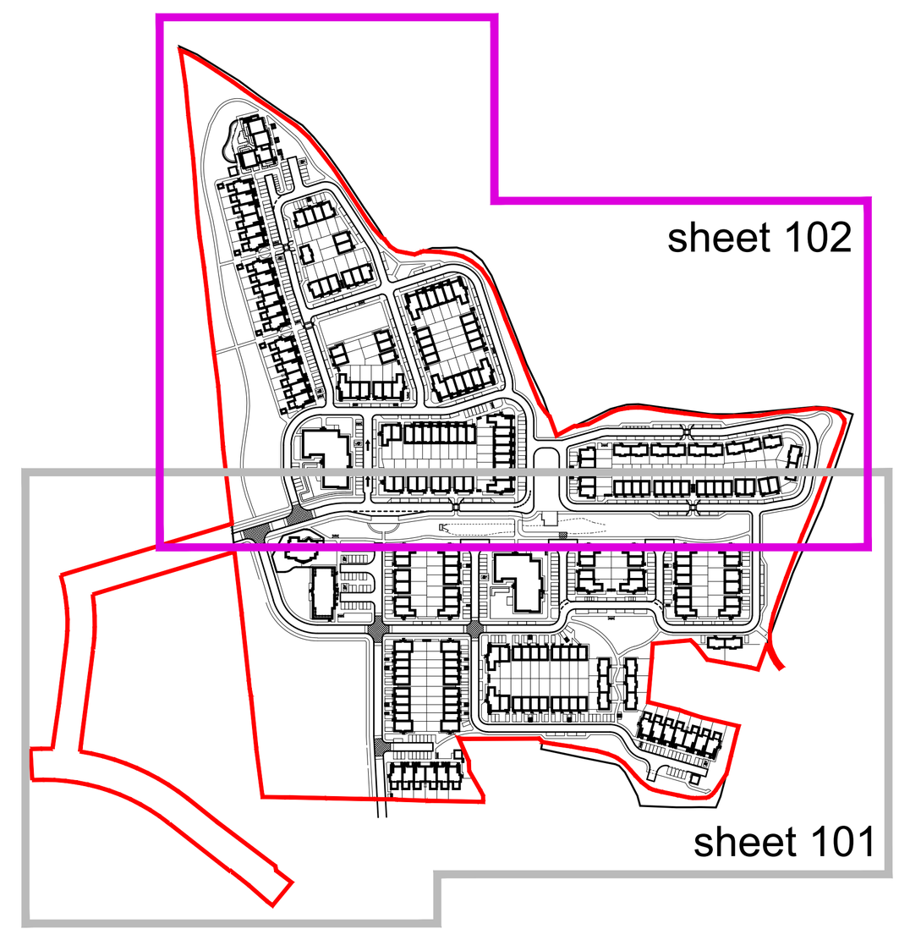
project: PROPOSED RESIDENTIAL DEVELOPMENT at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath

drawing title: SITE LAYOUT PLAN 1 of 2

drawn: M.H. | checked:
date: 03-03-23
project no.: 2130
scale: 1:500 @A0
stage: PLANNING
sheet no. 101
revision

Arnold Leahy architects
1 Crescent Villas, O' Connell Avenue, Limerick
Phone: (061) 315 989
Email: reception@ala.ie

Ballykeeran Gardens



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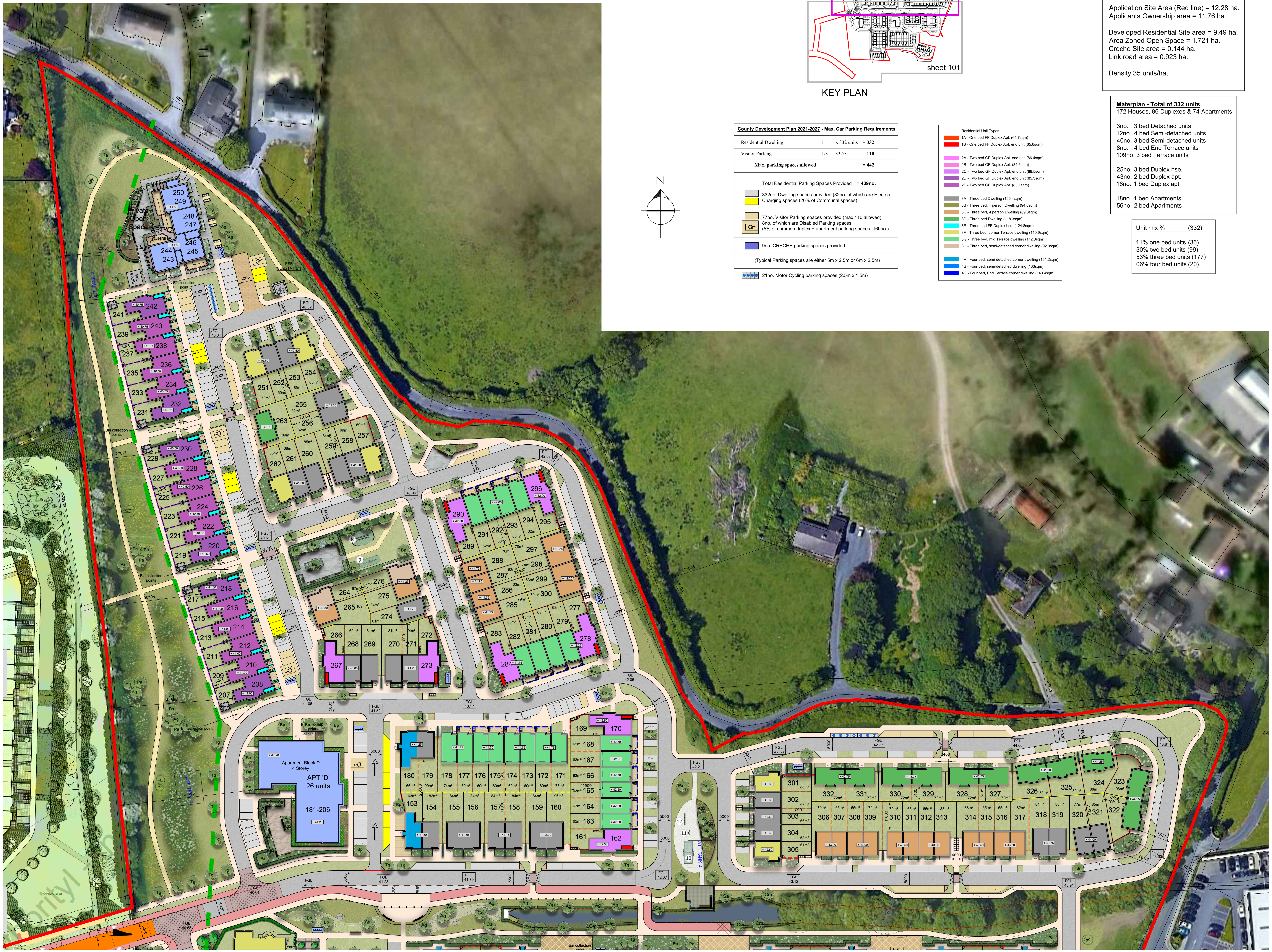

SITE LAYOUT PLAN 2 of 2
Scale 1:500 @A0

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REVISION	AMENDMENT	DATE	DRAWN

project: PROPOSED RESIDENTIAL DEVELOPMENT
at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath

drawing title: SITE LAYOUT PLAN 2 of 2

drawn: M.H. | checked:
date: 03-03-23
project no.: 2130
scale: 1:500 @A0
stage: PLANNING
sheet no. 102 | revision

Arnold Leahy architects
1 Crescent Villas
O' Connell Avenue
Limerick
Phone: (061) 315 989
Email: reception@ala.ie

Ballykeeran Gardens

N

KEY MAP

CRECHE

APT 'B'
14 units
139-152

APT 'A'
26 units
113-138

APT 'D'
26 units
181-206

PHASING PLAN
Scale 1:2,000 @A3

Construction Phase '1'
(units 01 to 152)

Construction Phase '2'
(units 153 to 300)

Construction Phase '3'
(units 301 to 332)

REVISION	AMENDMENT	DATE	DRAWN

project: PROPOSED RESIDENTIAL DEVELOPMENT
at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath

drawing title: Proposed Phasing Plan

date: JAN 2023 | checked:
drawn: M.H.
project no.: 2130
scale: 1:2,000 @A3
stage: PLANNING
sheet no. 103 | revision

Arnold Leahy architects
1 Crescent Villas
O' Connell Avenue
Limerick
Phone: (061) 315 989
Email: reception@ala.ie

This drawing is to be read in conjunction with the respective arboricultural schedules and reports relevant to this project.

Where contradictions between this drawing and any other design information becomes apparent, the respective authors should be contacted immediately.

It is the responsibility of the main site contractor to check and verify all information and measurements onsite and confirm prior to the commencement of works, and to ensure that all site operatives work in accordance with respective arboricultural reports and BS5837:2012, Trees in relation to design, demolition and construction.

BS5837:2012 Tree Categorisation

Category A
Trees of high quality with an estimated remaining life expectancy of at least 40 years

Category B
Trees of moderate quality with an estimated life expectancy of at least 20 years

Category C
Trees of low quality with an estimated life expectancy of at least 10 years, or young trees with a stem diameter below 150mm

Category U
Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years

Key

Tree, Shrub or Hedgerow Group.

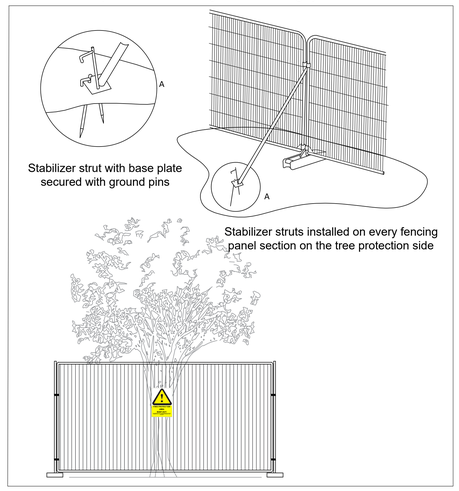
T800 — Reference Number for Tree, Group or Hedgerow.

Area of no-dig construction. Refer to construction detail for example.

Tree Protection Zone - Protective fencing to be installed as per Specification. Designated Construction Exclusion Zone.

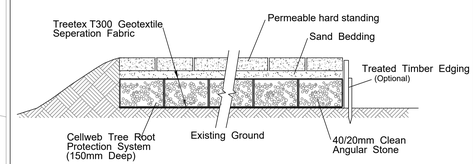
Site Boundary.

Tree Protection Specification - Above ground stabilizing system



BS5837:2012 Figure 3

Construction Detail - Example of no-dig construction



0 10m 20m 40m 60m 80m 100m

Revision	Date	Description

Title: Tree Protection Plan

Project: Lands at Ballykeeran and Cornamaddy

Client: Akiyda Ltd.

Date: June 2022	Scale: 1:750 @ A0	Status: Planning	
Drawn by: CMcC	Dwg ref: 220530-P-12	Rev: -	
Checked by: CMcC			

CHARLES MCCORKELL
ARBORICULTURAL CONSULTANCY

T; 085 843 7015 / E; charles@cmarbor.com / W; www.cmarbor.com

Appendix B

SCHOOLS, CHILDCARE & SOCIAL INFRASTRUCTURE ASSESSMENT

In respect of

LANDS AT CORNAMADDY & BALLYKEERAN ATHLONE

Prepared by

GENESIS PLANNING CONSULTANTS

On behalf of

AKIYDA LIMITED

FEBRUARY 2023

Office UK: Dean Swift Building, Armagh Business Park, Hamiltonsbawn Road, Armagh, BT60 1HW
Email: info@genesisplanning.co.uk

Tel: (+44) 28 30493 001
Tel: (+353) 45 571 682

Document Control Sheet

Job Title: Athlone LRD

Job Number: 2022-25

Report ref: Schools, Childcare & Social Infrastructure

Author: N Carr & R Woods

Date: February 2023

Client: Akiyda Limited

Document Status				
Rev	**Purpose of Document**	**Authored by**	**Reviewed by**	**Review Date**
1	Draft	N Carr	R Woods	18/06/22
2	Final	R Woods	R Woods	16/02/23

Approval for Issue		
Ronan Woods		-

The report has been prepared for the exclusive use of our client unless otherwise agreed in writing.

The report has been compiled using the resources agreed with the client and in accordance with the scope of work agreed with the client. No liability is accepted by Genesis planning consultants for any use of this report, other than the purpose for which it was prepared.

Genesis planning consultants has used reasonable skill, care and diligence in compiling this report. Genesis planning consultants disclaims any responsibility to the client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms and agreement with the client. Genesis planning consultants accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

TABLE OF CONTENTS **PAGE NO**

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1 INTRODUCTION

1.1 Overview

1.1.1 This schools, childcare and social infrastructure assessment has been prepared by Genesis Planning Consultants on behalf of Akiyda Ltd as part of the LRD application. This report provides a detailed review of the strategic, statutory and policy context supporting the development proposal for lands at Cornamaddy with an emphasis on existing education, childcare and social infrastructure facilities located in the area.

1.1.2 The purpose of this report is in response to chapter 4 of the guidelines 'Sustainable Residential Development in Urban Areas' (2009) which require an assessment of existing schools capacity in tandem with such developments incorporating more than 200 residential units. Also Policy SC8 of the Westmeath County Development Plan 2021-2027 (LCDP) sets out a requirement for proposals to demonstrate how residential developments are catered for in terms of social and community infrastructure.

1.1.3 This report also outlines the existing range of educational services on offer in the study area and offers insights into the future capacity of the existing education and also sets out how the proposal is consistent with the guidelines 'Childcare Facilities: Guidelines for Planning Authorities.'

1.2 Methodology

1.2.1 The capacity assessment was based on the following steps. Specifically a set of inventories of local education facilities was created. These facilities and services have been identified on a map relating to the area within a 6km radius from the site. In summary the report seeks to:

- establish the resident population's profile;
- provide an assessment of existing educational and childcare infrastructure within the study areas;
- comment on future requirements.

1.2.2 The assessment uses policy recommendations on school provision, data and statistics from the Central Statistics Office and Higher Education Authority (HEA) to establish a comprehensive picture of infrastructure in the area and how that aligns with the populations and demand side considerations.

1.3 Categories

1.3.1 Educational and childcare infrastructure must take account of a wide range of services and facilities that cater to various cohorts of society. The demand and supply side of service provision is therefore analysed across three tiers:

- Preschool / Creche
- Primary School
- Post Primary School

1.4 Report Structure

1.4.1 The report addresses the various relevant aspects of school, childcare and social infrastructure capacity assessment in the sections outlined below:

- Section 2 looks at the site location and placement within the wider context;
- Section 3 reviews the changing demographic profile in the area;
- Section 4 reviews the current planning policy requirements;
- Section 5 sets out the current position with respect to education infrastructure provision across the study area and establishes a needs profile with respect to various tiers of education service provision;
- Section 6 provides an overview of the analysis and determines school capacity for development in the area.
- Section 7 provides an overview of social infrastructure in the area.

1.5 The Proposed Development

1.5.1 The development will consist of a residential development of 332 residential units, a childcare facility together with all associated and ancillary infrastructure and open space provisions. The residential aspect of development will comprise in summary:

- A total of 332no. residential dwellings which will consist of the following unit mix:

  -The provision of a total of 172no. residential dwellings which will consisting of 152no. 3 bed units and 20no. 4 bed units;
  -The provision of a total of 160no. apartments/duplex units consisting of 36no.1 bed units, 99no. 2bed units and 25no. 3bed units.

Figure 1 Site layout plan for reference purposes

2 AREA CONTEXT

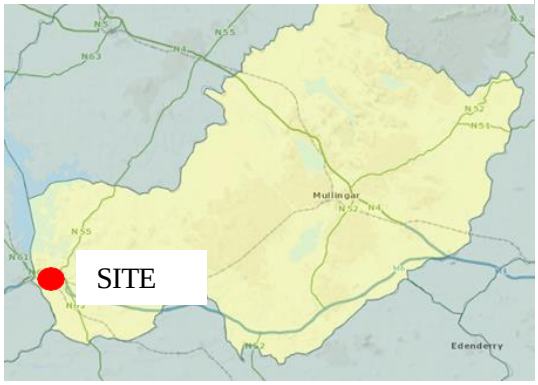
2.1 The Study Area

2.1.1 In terms of demographic context Athlone has a population of circa 17,500 and is an economic hub for the midlands region. There are a large number of multi-national companies across a range of sectors and in conjunction with the economic growth of the town there has been a steady increase in the local population.

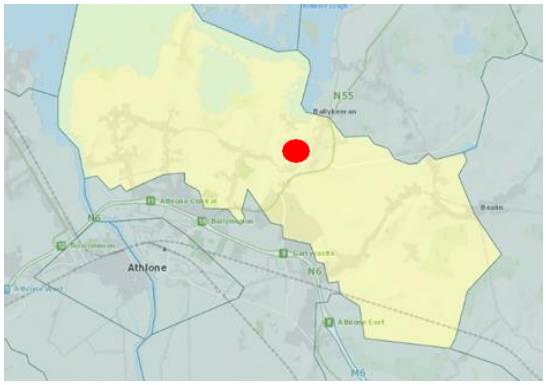
2.1.2 As will be shown in section five of this report Athlone already has a wide variety of schools and childcare services located across the town which are readily accessible given the extensive local, regional and national road networks.

2.1.3 For the purposes of this study in terms of childcare assessment both Athlone and Moydrum Electoral Districts are examined, as the subject site is located in the Moydrum ED but as will be set out in section four the majority of local childcare facilities proximate to the subject site are located in both these ED's and therefore most relevant to gain an understanding of existing childcare capacity in the area.

County Westmeath



Moydrum Electoral District



Figures 2 & 3 Electoral areas from CSO SAPS database used for the study

2.1.4 Also in respect of an analysis of school capacity in the area the methodology used was based on the Department of Education and Skills (DES) forecasts for the area, in that a wholistic approach was adopted to identify all available schools in the Athlone area, and then reliance placed on the DES forecasts to ensure there is adequate capacity in the area for schools.

3 POLICY CONTEXT

3.1 Overview

3.1.1 For the purpose of this report a review has been carried out of national-level planning policy relating to childcare and schools, along with the relevant Westmeath County Development Plan 2021-2027 and the Athlone Development Plan. The key points relating to this study as derived from each policy are outlined below.

3.2 Department of Education and Skills: Action Plan for Education 2018

3.2.1 Goal 4 of the Department of Education and Skills (DES) 2018 'Action Plan for Education' seeks to *'build stronger bridges between education and the wider community*'. A fundamental part of this goal is the provision of increased choices in school type, affording parents of children with greater options. Action 66 aims to *'make progress towards increasing the diversity of school type, in order to offer parents more choice'*. As an indicator of whether this action has been achieved a target of 400 multi-non-denominational schools by 2030 is set.

3.2.2 Goal 5 seeks to 'improve national planning and support services' and one of the methods through which this can be achieved is via the delivery of appropriate infrastructure for learning environments. Action 105: '*Support infrastructural development within the school's sector, through the rollout of the 2016-2021 Construction Programme'*. Indicators for this action will require the meeting of demographic demand through the provision of additional permanent primary and post-primary school places. This sees targets of 9,000 additional primary school places and a further 8,000 additional permanent post-primary school places. Furthermore, new/replacement primary and post-primary schools will be built.

3.3 Design Standards for New Apartments (DSNA) – Guidelines for Planning Authorities (Department of Housing, Planning and Local Government, 2020 & 2022)

3.3.1 Section 4.7 of the Guidelines references the provision of childcare facilities in new apartment developments. It states the following:

'Notwithstanding the Planning Guidelines for Childcare Facilities (2001), in respect of which a review is to be progressed, and which recommend the provision of one child-care facility (equivalent to a minimum of 20 child places) for every 75 dwelling units, the threshold for provision of any such facilities in apartment schemes should be established having regard to the scale and unit mix of the proposed development and the existing geographical distribution of childcare facilities and the emerging demographic profile of the area. One-bedroom or studio type units should not generally be considered to contribute to a requirement for any childcare provision and subject to location, this may also apply in part or whole, to units with two or more bedrooms.'

3.3.2 This provides an element of flexibility in the provision of childcare facilities as it requires that the inclusion of such a facility is justified in terms of the sufficient demographic or/and geographical context.

3.3.3 Of note it also stipulates that one-bedroom apartments do not need to be included in any count that estimates the number of children in a development.

3.4 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas – Department of Environment, Heritage and Local Government (2009)

3.4.1 Under the chapter entitled 'planning for sustainable neighbourhoods' the provision of certain key community facilities is discussed, with both schools and childcare forming essential elements. As new residential developments can lead to a demand for school places, it is vital that the '*timely provision of new school buildings'* is planned for.

3.4.2 Furthermore it is stated that

'*no substantial residential development should proceed without an assessment of existing school capacity or the provision of new school facilities in tandem with the development'*.

3.4.3 Regarding childcare facilities the guidelines note that when assessing development applications, particularly for larger developments it is recommended that there is a '*provision of one childcare facility (equivalent to a minimum of 20 child places) for every 75 dwelling units'*.

3.4.4 The guidelines continue to state that the provision of such should have regard to the '*existing geographical distribution of childcare facilities and the emerging demographic profile of areas'*.

3.5 The Provision of Schools and the Planning System: A Code of Practice (2008)

3.5.1 The Code of Practice stipulates the methodology for forecasting future education demand. Identification of future primary school demands should be based upon:

- The anticipated increase in overall population for the city/county plan area over the next nine years (as set out in relevant development or local area plans);
- The current school-going population based on school returns;
- The increase in school going population, assuming that an average of 12% of the population are expected to present for primary educations; and,
- The number of classrooms required in total derived from the above.

3.6 Childcare Facilities: Guidelines for Planning Authorities (2001)

3.6.1 The guidelines instruct Local Authorities to set out objectives in Development Plans that relate to the provision of childcare facilities. A focus should be placed on promoting childcare facilities, as part of the development of sustainable communities, in locations such as: residential areas; places of employment; educational establishments; city, town, neighbourhood and district centres and locations convenient to public transport nodes.

3.6.2 Additionally the guidelines state the following in relation to new housing developments:

'Planning authorities should require the provision of at least one childcare facility for new housing areas unless there are significant reasons to the contrary for example, development consisting of single bed apartments or where there are adequate childcare facilities in adjoining developments. For new housing areas, an average of one childcare facility for each 75 dwellings would be appropriate. The threshold for provision should be established having regard to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas. Authorities could consider requiring the provision of larger units catering for up to 30/40 children in areas of major residential development on the basis that such a large facility might be able to offer a variety of services – sessional/drop in/after-school, etc'.

3.6.3 Section 3.3.1 elaborates further by stating that *'a standard of one childcare facility providing for a minimum 20 childcare places per approximately 75 dwellings may be appropriate'* for new residential developments. However it clarifies that this *'will depend on the particular circumstances of each individual site'.*

3.7 Westmeath County Development Plan 2021-2027

3.7.1 The current Westmeath County Development Plan (LCDP) covers the period between 2021 and 2027. It stipulates several requirements for development to ensures balanced and sustainable communities. Policies of particular relevance are noted below.

- *CPO4.24 Encourage and support the provision of childcare facilities, with consideration given to proper siting and design, in appropriate locations including residential areas, town and local centres, areas of employment and close to public transport throughout the County and in accordance with the needs identified by Westmeath County Childcare Committee (WCC). All planning applications for childcare facilities shall be assessed in consultation with Westmeath County Childcare Committee.*

- *CPO4.25 Support the provision of childcare facilities and new and refurbished schools on well located sites within or close to existing built-up areas, that meet the diverse needs of local populations.*

- *CPO4.28 Ensure the needs of communities including education facilities are appropriately provided for in newly developed areas.*

3.8 Circular PL3/2016

3.8.1 In March 2016, the Government issued a circular in relation to childcare facilities under the early Childhood Care and Education (ECCE) Scheme. In accordance with the stated aspiration to increase access to childcare nationally the circular requests that local planning authorities:

- Expedite all pre-planning application consultation requests from childcare facility providers in relation to proposals to extend opening hours, to increase capacity or to provide new facilities.

- Expedite, insofar as is possible, consideration of all planning applications or Section 5 declaration submissions in respect of childcare facilities in order to facilitate the expansion of required capacity as appropriate.

3.9 Universal Design Guidelines for Early Learning and Childcare Settings (2019)

3.9.1 On 10th June 2019, the Minister for Children and Youth Affairs, Dr Katherine Zappone, launched the Universal Design Guidelines for Early Learning and Care Settings. These guidelines are an important step in making all Early Learning and Care services accessible to all children. This publication offers guidance on the refurbishment, renovation and building of centres for Early Learning and Care in Ireland. The guidelines apply to both new-build and retrofit projects and provide a flexible Universal Design framework to ensure that settings are accessible, understandable and easy to use for all children, staff, families and visitors.

3.9.2 In summary The Universal Design ELC setting comprises four quality features:

- Site Location, Approach, Entry and Site Layout
- Entering and Moving about the ELC setting
- Key Internal and External Spaces
- Elements and Systems

4 APPROACH

4.1 Having regard to the planning policy outlined in the previous section it is evident that an assessment of the existing school and childcare facilities in the study area is required. A baseline is required which would then allow future demand estimations to be made based on demographic change and the associated impact of the proposed development.

4.2 Therefore a methodology for the assessment of school and childcare facilities has been developed in accordance with the directions provided in the aforementioned planning policies and involves the following steps:

- Determining the extent and provision of existing school and childcare facilities within the wider study area;
- Undertaking a study of the current and potential future demographic make-up of the study area's population; and
- Estimating the level of demand for childcare facilities that may arise from the development proposal.
- Reliance placed on the Department of Education and Skills forecasts for the area which identify the Athlone area as having adequate primary and post primary school places available going forward.

4.3 The following sections will utilise this methodology as a structural framework with the currently existing supply of facilities first established, followed by a demographic analysis. The demographic analysis will provide valuable insight into the characteristics of the study area's population, before finally determining the potential demand created by the proposed development.

5 CHILDCARE & SCHOOL SUPPLY

5.1 Overview

5.1.1 In order to establish a baseline of the existing capacity in the study area it was necessary to first identify each of the existing school and childcare facilities. This was undertaken through a comprehensive desktop research exercise which used publicly available information and sources. For the purposes of this study Pobla is considered to provide the most appropriate source of information on childcare facilities as it works on behalf of Government to support communities and local agencies toward achieving social inclusion and development.

5.2 Existing Childcare Provision

5.2.1 While the various policies referenced make certain provisions for determining the requirements for childcare facilities in neighbourhoods, there is no reference to the most appropriate distances families should travel, or the quantum of facilities that are appropriate in a given area. Therefore for the purpose of this study it was deemed appropriate identify all facilities within a 6km radius and then specifically to audit all facilities within a 3km catchment of the subject site.

5.2.2 Figure 4 below provides the locations of all 34 childcare facilities in the area registered with Pobla, within both the 6km and 3km catchment areas denoted. For reference the purple and green symbols correspond to each childcare facility.

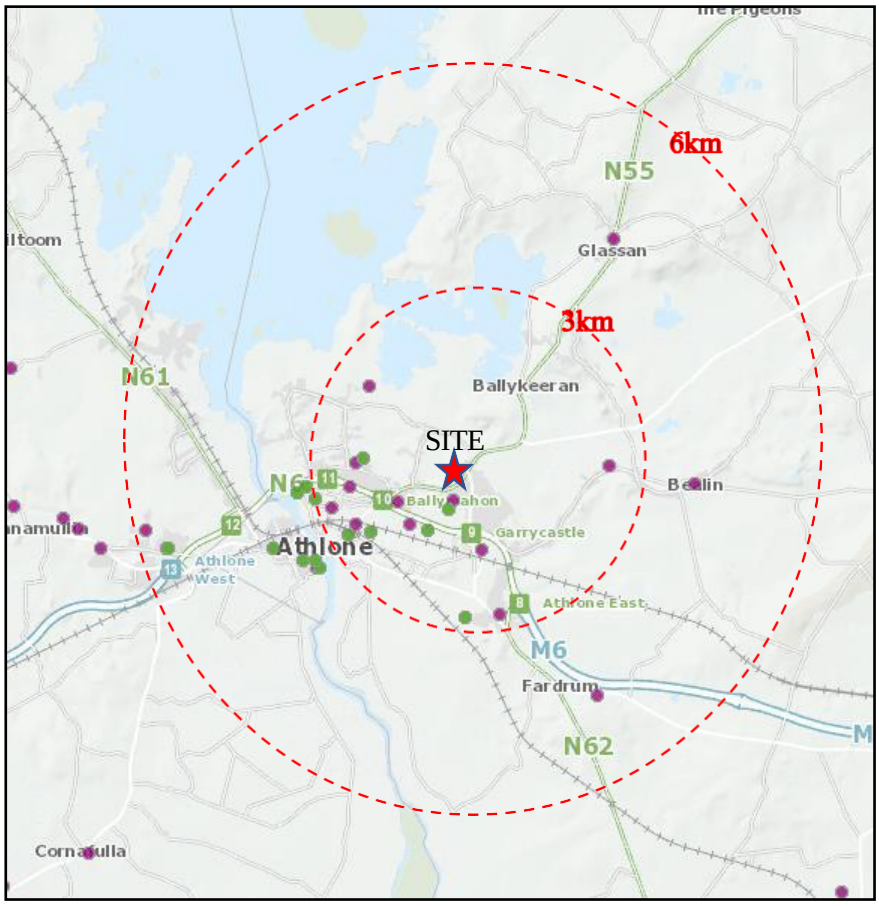


Figure 4 Existing childcare facilities in the Athlone area (source www.pobal.ie)

5.3 Population Demographics

5.3.1 The proposed development site is location within the Moydrum ED which has a population 2,922. As noted above, the study will also include County Westmeath to examine the demographics and its provision of schools and childcare.

Breakdown of 0-18 year age cohort for County Westmeath			Breakdown of 0-18 year age cohort for Moydrum ED	
2016 population	2016 population	% of total cohort	2016 population	% of total cohort
Age (0-4)	6464	25.1%	238	28.3%
Age (5-9)	6948	27%	210	25%
Age (10-14)	6363	24.7%	199	23.7%
Age 15-19)	5978	23.2%	193	23%
Total	25753	100%	840	100%

Table 1 Breakdown of Age Cohort

5.3.2 As per the table above the school age of the Moydrum ED (comprising persons aged 5-18 years) was 602no. persons at the time of the 2016 census, or 20.6% of the total population of the area.

5.4 School demand generated by the proposed development

5.4.1 The proposed development will comprise 332no. units, of which there will be 36no. 1 bed apartment units, 99no. 2 bed apartment units, 177no. 3 bed units and 20 4 bed units which can accommodate families. Discounting the 1 bed units this equates to 296 units which can accommodate families/unit(s) that include for children.

5.4.2 We note the average household size recorded by the 2016 census was 2.76no. persons per unit, which generates a total indicative population of 916 no. persons when applied to the entire development. Therefore for those units that can accommodate families (296units) an indicative total population of 817 no. persons is also estimated.

5.4.3 Also the average number of children per family recorded in the state in census 2016 was 1.38 children. Applying this 1.38 children per family to the family units (296 units) generates an indicated population of 409 children (between the ages of 0-18 years) when applied to the number of units that can accommodate families within the proposed development.

5.4.4 In terms of school-going age children (5-18 years) the CSO stats detail circa 72% of children fall into this bracket, which equates to an estimated 295no. school age children when the proposal is fully occupied. This figure is broadly split 50/50 between primary and secondary school children.

5.5 Existing Primary Schools

5.5.1 The Department of Education and Skills (DES) provide details on enrolment figures for all primary schools on an annual basis. DES have also created their own units of analysis, 'School Planning Areas' (SPA), through which they compile data on schools and decision-making is based off.

5.5.2 On referencing a 5km buffer zone DES records show a total 10no. existing primary schools in the Athlone area.

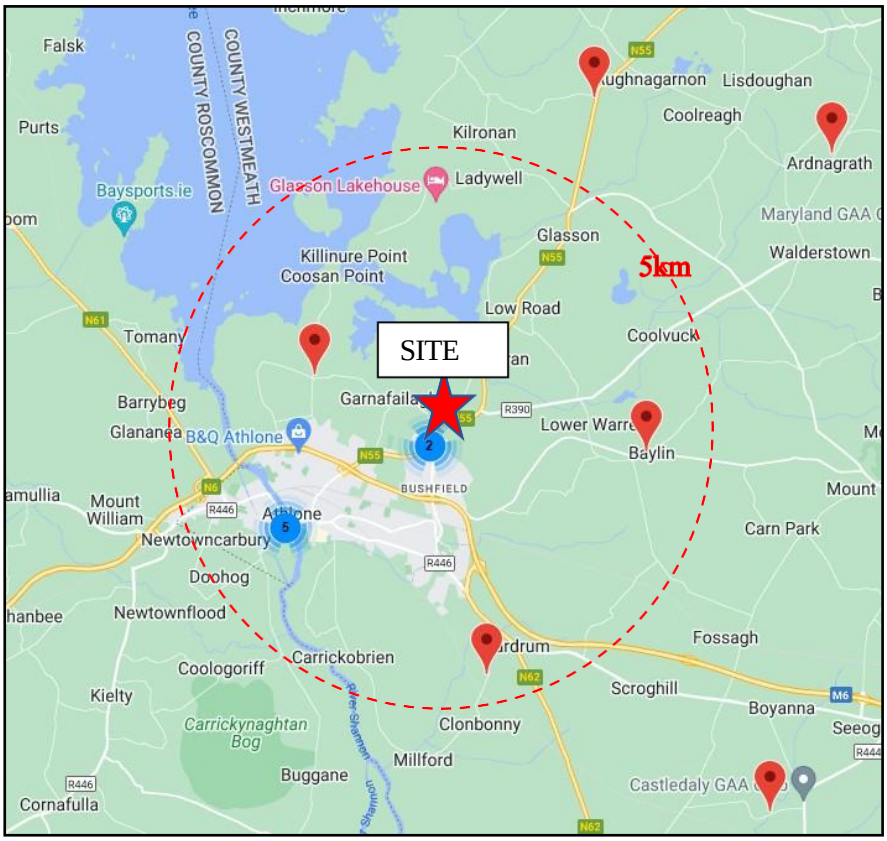


Figure 5 Existing primary schools in the Athlone area (source www.education.ie)

5.6.3 We have audited the enrolment and capacity of these primary schools as per the table below.

Primary School	Enrolment 2012-22	Remaining Capacity
CORNAMADDY NATIONAL SCHOOL	289	0
COOSAN NATIONAL SCHOOL	423	0
SCOIL NA GCEITHRE MÁISTRÍ	271	54
ATHLONE MIXED NS	60	15
ST MARYS NS	446	28
ST. PETER'S NS	137	10
ST PAUL'S NATIONAL SCHOOL	131	54
DEAN KELLY NATIONAL SCHOOL	102	16
BAYLIN NATIONAL SCHOOL	199	0
CLONBONNY NATIONAL SCHOOL	123	0
Total	**2181**	**177 (current school year)**

Table 2 Primary schools in the area

5.6.4 Of note no additional schools are to be delivered under the school building programme, and this indicates the DES is satisfied there is adequate capacity in the Athlone area going forward in terms of primary school provision.

5.6 Existing post-primary Schools

5.6.1 In terms of post-primary schools, or secondary schools, in the study area, DES records a total of 3no. schools. These schools are a mix of national and grammar schools and cater for all genders.

5.6.2 Again of note no additional schools are to be delivered under the school building programme, and this indicates the DES is satisfied there is adequate capacity in the Athlone area going forward in terms of secondary school provision and relevant population forecasts for the area.

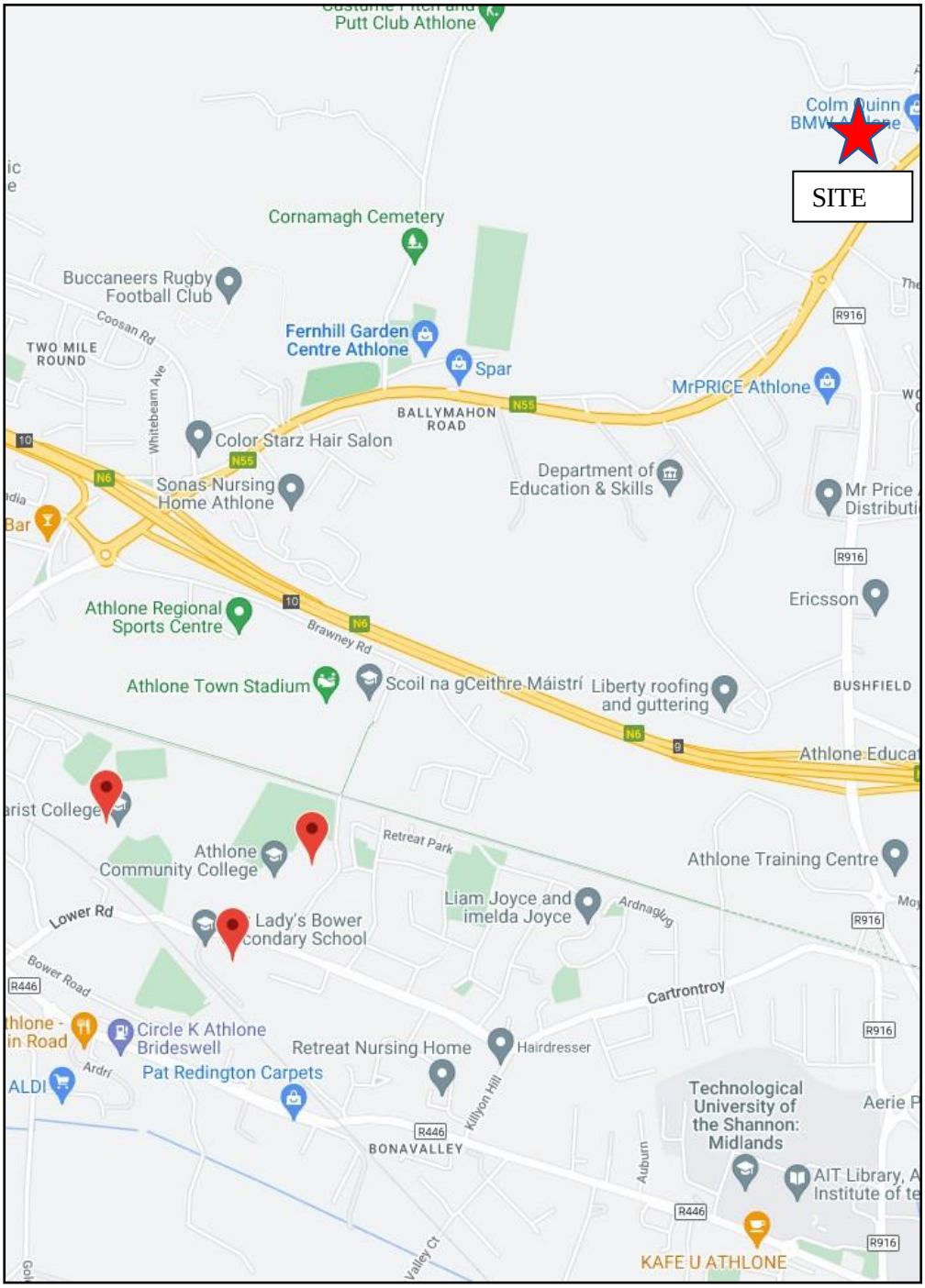


Figure 6 Existing secondary schools in the Athlone area (source www.education.ie)

5.6.3 We have also audited the enrolment and capacity of these primary schools as per the table below.

Post-primary School	Enrolment 2021-22	Remaining Capacity
Athlone Community College	1173	7
Marist College	516	14
Our Lady's Bower	687	28
Total	**2,376**	**49 (current school year)**

Table 3 Primary school capacity

5.6.4 Also in terms of the wider catchment and capacity it is important to note that there is 1no. post-primary school located 6.5km from the proposed development, being Colaiste Chiaráin (created in 2017 from an amalgamation of two local schools). In the year 2019/20, the schools enrolment was 515no. students with a capacity of 1,000no. pupils meant there is remaining capacity of circa 485no. places.

5.6.5 On using the Department of Education & Skills projections it is noted the midlands has seen a 2.77% increase from 2019-2021. Applying this growth rate to Colaiste Chiaráin it is found there is a remaining capacity for circa 470no. students.

5.6.6 Therefore in terms of capacity in the area we submit Colaiste Chiarain must be therefore taken into consideration as the Department of Education & Skills notes that post-primary students are more likely to travel greater distances to access education.

5.7 Third Level Education Provision

5.7.1 The Athlone Institute of Technology-Business School and the Technological University of the Shannon: Midlands Midwest is located approximately 2.5 km south of the site and provides a broad range of third level courses.

5.8 Summary

5.8.1 With regard to the information set out in this section above it is considered that the demand for primary and post primary school places generated by the proposed development (estimated 696no. places including Colaiste Chiaráin) will likely be absorbed by the surrounding schools in the Athlone region.

5.8.2 Having examined the current remaining capacity in both primary and post primary (696 places in the current school year) to cater for an estimated 409 over a period of 7 years (averaging 59 total places per annum) should not cause additional demand that cannot be catered for.

5.9 Department of Education & Skills Projections

5.9.1 Of relevance we also highlight the Department of Education & Skill projections under the publication 'Regional Projections of full-time enrolments Primary and Second Level, 2021–2036', which provides several scenarios for the estimated future enrolment figures based on the study of present trends.

5.9.2 In summary the Department's report builds on the State projections of enrolments published in 2019 and was modelled on the Central Statistics Office (CSO) Regional Projections published in June 2019. The report is therefore considered to contain the most accurate and up-to-date projections for future primary and post-primary school demand.

5.9.2 In relation to specifics the report details that in 2021/2022 there were 37,780 enrolments in primary schools and there is a projected decrease by 2036/2037 of 35,864 which represents a decrease of 5.1%. In terms of the state-wide figures it is further projected that primary school enrolments will decrease by 19.9%.

5.9.3 Within the report details for the Midlands region are relevant to the proposed development. In terms of post-primary school projections, the report details that the midlands region is to decrease by 10%.

5.9.4 On review we note it is important to note that projection figures may differ from the actual outcome, as can be seen in the projections released by the Department of Education and Skills in previous years when compared to actual figures, however the data contained in the report assists in developing a holistic overview for the purposes of this assessment.

5.10 Future Demographics and School Places

5.10.1 Also relevant to note the Department of Education and Skills (DES) review and provide details on enrolment figures for all primary schools on an annual basis. DES have also created their own units of analysis, 'School Planning Areas' (SPA), through which they compile data on schools and decision-making is based on.

5.10.2 The Department of Education and Skills (DES) regularly release enrolment projection reports which are the basis for their determination of whether new school infrastructure is required. In July 2018 they released the most recent report which analyses projections of full-time enrolment for the 2018 to 2036 period.

5.10.3 Using three migration assumptions and two fertility assumptions the DES created six scenarios to model projected enrolments over that period. Of note the DES state that 2018 will prove to be the year when 'peak' primary school enrolments occur, totalling 567,800 pupils and gradually reducing after this, as per the figures below.

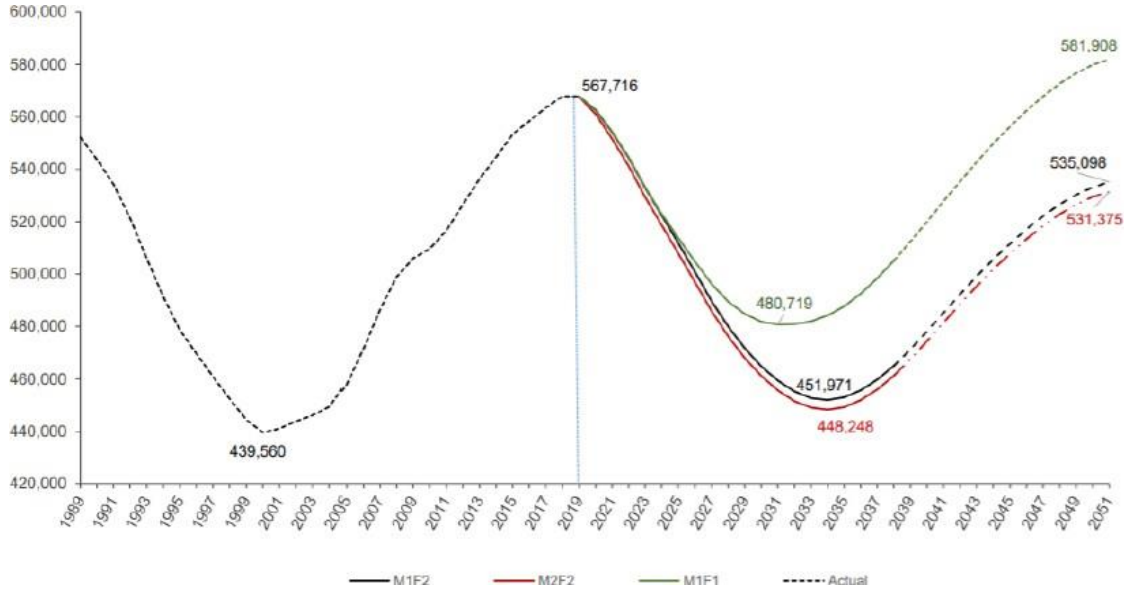


Figure 7 Projected primary school enrolment to 2036 (Source: DES)

5.9.4 Also it is noted post-primary school peak enrolments will not be reached until 2024, and it is anticipated that post-primary school enrolments will decrease annually thereafter under the M1F2 and M2F2 scenarios until 2042.

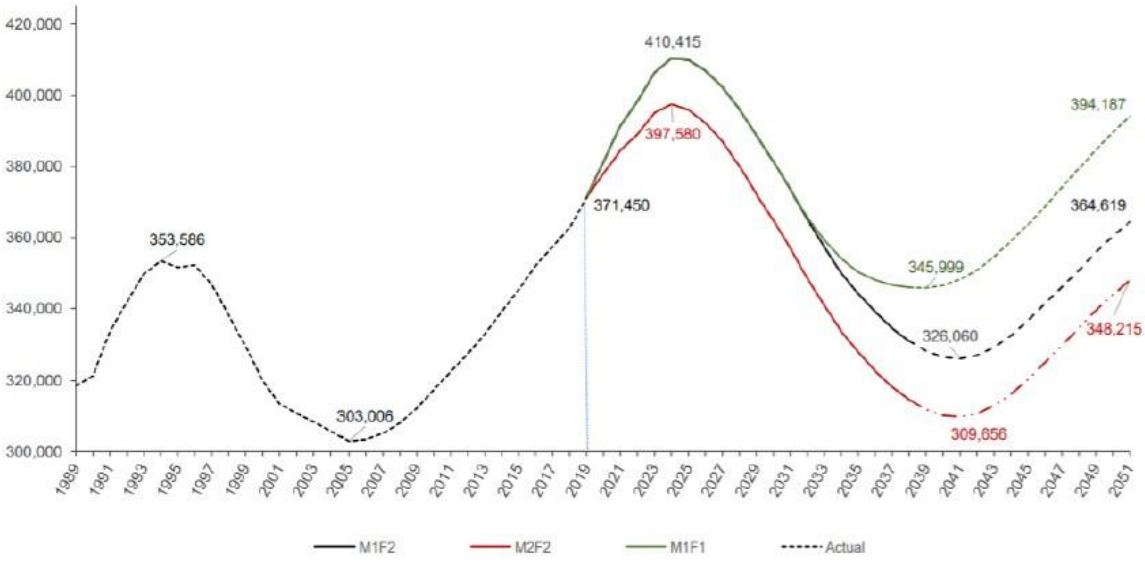


Figure 8 Projected secondary school enrolment to 2036 (Source: DES)

5.9.5 In summary on referencing the above projections and with enrolments figures peaking in 2019 for primary school children, and 2024 for secondary school pupils, the requirement for additional school facilities will be reduced in the near future.

5.9.6 We submit this is evident therefore in the analysis by DES of existing schools in the Athlone area in that no additional schools are to be delivered under the school building programme, and this indicates the DES is satisfied there is adequate capacity in the Athlone area going forward to cater for the proposed development in terms of both primary and post primary school provision.

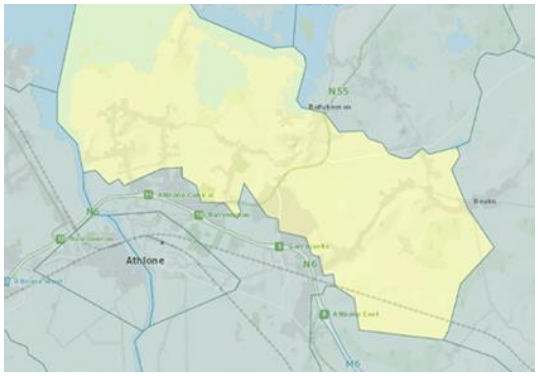
6 CHILDCARE DEMAND

6.1 Demographics and childcare facilities

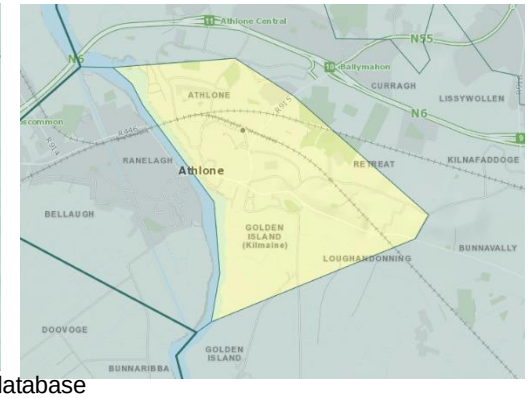
6.1.1 For the purposes of this study Athlone rural Electoral District and Moydrum Electoral District are both examined, as the subject site is located in the Moydrum ED but as set out previously the majority of local childcare facilities proximate to the subject site are located in both these ED's and therefore most relevant to gain an understanding of existing childcare capacity in the area.

6.1.2 Specifically this study will use available statistics on these two ED's based on census 2016 data to estimate demand for childcare facilities in the area against existing childcare provision in these areas.

Moydrum Electoral District



Athlone East Urban Electoral District



Figures 9 & 10 Electoral areas from CSO SAPS database

6.1.3 In terms of demographics, the Moydrum ED has a population of 2922 of which 238 are aged between 0-4 (preschool age).

6.1.4 The most recent CSO Quarterly National Household Survey[1] (Q3 update) identifies that the percentage of pre-school children that are minded by a parent is 62% with only 19% of pre-school children availing of non-parental childcare that includes services such as crèches/Montessori/playgroup or afterschool facilities. On analysis it is found this equates to 46 children attending childcare facilities in the Moydrum ED.

6.1.5 According to our research[2] there are nineteen registered childcare facilities in this area offering various services and based on the most recent available reports by Tusla these facilities can cater for 666 child places.

6.1.6 Also, as can be noted from the above map the ED of Athlone East Urban extends to lands in Athlone Town Centre, but has also been included to demonstrate accessibility to childcare in the surrounding area. This selection of childcare facilities takes account of journey to work patterns and what is considered to be a realistic option for childcare for future residents of the proposed development at Cornamaddy.

6.1.7 Specifically this ED has a total population of 4,382 of which 251 persons are aged between 0-4 years. Based on the findings of the Quarterly National Household Survey 48 (19%) of these children will potentially use a formal crèches/Montessori/playgroup or afterschool facility.

6.1.8 On referencing the map database published by Pobal it is found there are a total of eight registered childcare facilities in this ED area and on referencing the most recent available

[1] Census 2016 Q3 update
[2] www.pobal.ie

reports by Tusla and from direct contact with other providers the data indicates a total capacity of 430 childcare places in the Athlone East Urban ED.

6.1.9 Furthermore, at a more local level childcare facilities within 3km of the site fall within parts of both the Moydrum ED and Athlone East Urban ED. As part of our research details of facilities within this 3km radius were provided by Westmeath County Childcare Committee as below.

Childcare facility	Max capacity	Type of childcare provided		
		Full time	Part-time	Sessional
Naionra na Cre Duibhe	22			x
Breise	25	x		
Réalta Geal Montessori School	55		x	
Chatterboxes Childcare Ltd	44	x		
Paisti Beaga	N/A	x	x	x
Brawny Community Centre	30			x
Naionra Lios na Nog	22		x	x
Busy Kids Athlone	105	x	x	x
Scallywags	50	x	x	x
Sarsfield Pre-School	22		x	x
Grovelands Childcare	147	x	x	x
Willow Park After School Service	30			x
St. Mary's After School (Harmony CDP)	30		x	x
Na Fea Montessori Preschool	22		x	x
St. Kierans Childcare Centre	40	x	x	x
Treasures Island Preschool	22			x
Coosan Childcare Centre	N/A	x	x	x
Réalta Geal Montessori School	55			x
Little Scholars PreSchool	30		x	
Total capacity	**666**			

Table 4 Childcare facilities within 3km of the subject site

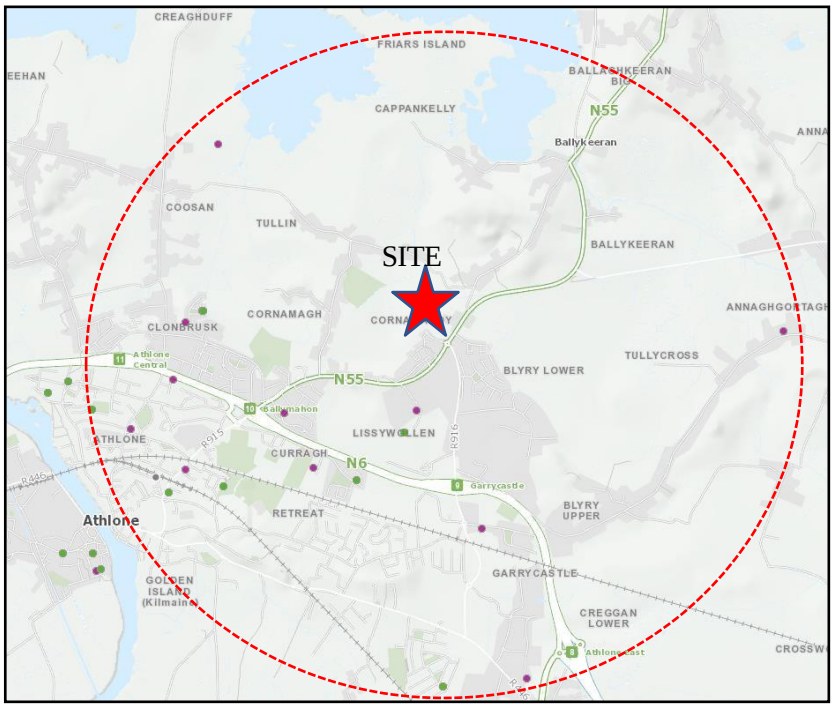


Figure 11 Approximate 3km radius from application site (source: www.pobal.ie)

6.1.10 Specifically, on review of the above it is found the existing childcare facilities within a 3km radius of the site have capacity for a total of 666 child places, against what the demographics and census data for the area indicate as a total demand of 94 places for this radius (ie. The relevant demographic data for both Moydrum and Athlone Rural ED's as per census data and childcare being availed of by 19% of survey respondents as per CSO data).

6.1.11 On this basis it is submitted that there is sufficient capacity in the area for existing childcare demand based on the take-up rates of childcare places as recorded in the quarterly household survey. Accordingly, we submit the proposed childcare facility does not need to cater for any existing surplus demand outside of the site area itself.

6.2 Planned Facilities

6.2.1 In addition to the existing childcare services located in the study area, it is noted that an SHD application located to the south-west of the subject site, adjacent to Athlone Rugby Club, has recently been granted permission by An Bord Pleanála (An Bord Pleanála Ref. 307508). This permitted development, known as Dún an Rí, includes for a childcare facility of approximately 545m2 (up to 50 childcare spaces). This childcare facility will further add to the existing supply of childcare facilities in the area.

6.2.2 Furthermore, the recently granted SHD application (An Bord Pleanála Ref. 309513) will provide for 2no. further childcare facilities with a combined capacity for circa 145 no. childcare places.

6.2.3 In summary these planned facilities will add an additional 195no. childcare spaces for the town.

6.3 Childcare demand generated by the proposed development

6.3.1 The proposed development will consist of 332 residential units, of which there are 36no. 1 bedroom units and the remainder being a mixture between 2-4 bedroom units.

6.3.2 Having regard to the dwelling mix proposed the majority of the development is likely to accommodate families and as a result is likely to generate additional childcare demand.

6.3.3 According to the 2016 census single person households now account for 24% of all households. Applying this ratio to the proposed development it is therefore assumed that of the 332 residential units proposed at least 252 will be occupied by 2 or more persons.

6.3.4 Also based on the assumption that 296no. residential units will be occupied by families and assuming the average family contains 1.38 children (census 2016) (i.e. persons aged between 18 and under) of which 30 per cent are children between 0-4 years old, then the proposed development will potentially yield a potential population of 409no. children of which approximately 123no. (30%) would be of pre-school going age i.e. aged between 0-4.

6.3.5 On applying the most recent Quarterly National Household Survey module on childcare (Q3 2016 update) we note it identifies that the percentage of pre-school children that are minded by a parent is 62% with only 19% of pre-school children availing of non-parental childcare that includes services such as crèches/Montessori/playgroup or after-school facilities. Therefore presuming that only 19% of pre-school children will use a formal childcare service such as a crèche/Montessori/playgroup/after-school facility this would result in a demand of just 24no. childcare places.

6.3.6 However, this figure of just 24no. childcare places this does not take into consideration the use of a crèche/montessori/playgroup/after-school facility by primary school children, of which 8% use such a facility (Q3 Census 2016 update).

6.3.7 Also the Childcare Facilities Guidelines outline the preferred location for childcare facilities and the level of provision recommended is at a rate of 20 places per 75 dwellings. Appendix 2 of the Guidelines states that:

'planning authorities should require the provision of at least one childcare facility for new housing areas and other areas of residential development unless there are significant reasons to the contrary. For housing, a benchmark provision of one childcare facility per 75 dwellings is recommended". The Guidelines elaborate on the level of provision that may be required stating,

'the threshold for provision should be established having had regard to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas.'

6.3.8 Further section 3.3 of the Guidelines outlines specific locations where childcare facilities would be preferable. The proximity to public transport is also stated as a deciding factor to encourage sustainable modes of transport. We further note both new residential areas and employment areas are listed as suitable locations for childcare facilities.

6.3.9 Also, having regard to the extension of the Early Childhood Care and Education (ECCE) Scheme in 2016, which provides free childcare from age three until children go to primary school, and the roll out of the National Childcare Scheme from October 2019, the Government encourages an increase in capacity to facilitate the expansion that will be required to cater for the predicted demand for this service.

6.3.10 It is therefore submitted that the location of a childcare facility within the proposed development will be adequately sized if it provides for a total of 40no. places. This is calculated on the following summary basis.

<u>Unit mix proposed</u>

-1 bed units (36no.) should be discounted from the calculation;
-2 bed units (99no.) should be provided for at a rate of 50% which equates to 50;
-3bed units (177no.) should be provided for at a rate of 50% which equates to 88;
-4bed units (20no.) should be provided for at a rate of 50% which equates to 10.

6.3.11 In summary 148 units require provision of childcare. On the basis that 20 child places are required per 75no. dwellings then it considered an appropriate design response for a total of 40no. child places to be provided within the creche, as a minimum.

6.3.12 In terms of the design response based on the average requirement of 3sq.m. per child the proposed creche can readily accommodate 48no. childcare spaces, which is considered adequate to meet the requirement generated by the proposed development, along with additional headroom of 20% if required to serve the wider area.

7 SOCIAL INFRASTRUCTURE ASSESSMENT

7.1 Policy SC8 of the Westmeath County Development Plan 2021-2027 (LCDP) sets out a requirement for proposals to demonstrate how residential developments are catered for in terms of social and community infrastructure.

7.2 It is generally recognised that proposals for large-scale residential development should be accompanied by proposals for associated community infrastructure and /or an assessment of existing community infrastructure which demonstrates that there is sufficient existing infrastructure to meet the expected demand generated by a new development.

7.3 The Westmeath CDP defines community facilities to include for schools, community centres, health centres and childcare facilities, religious meeting places, cemeteries, sports and recreation areas, sports facilities, parks, open spaces and walking routes.

7.4 Set out below is a map detailing how the site is well provided for in terms of social and community infrastructure within a 3km radius.

7.5 As can be noted the proposed development will be located in a well-provided for neighbourhood and within a short distance of a wide range of services for future residents.

7.6 In this context the development will provide a range of residential types which create a sustainable community and support the existing services in the area.

Figure 12 Social infrastructure within a 3km radius of the site

7.7 As can be noted from the particulars above (3km radius) there is a good mix of social infrastructure facilities in the immediate area.

7.8 Health care, Sports and Recreation, Community, education, and other facilities are all well-represented within the wider area and cater for the existing and proposed new residential community as per the table below.

Number	Name	Type of Facility
1	Athlone Town Football Club	Football Club
2	Athlone Regional Sports Centre	Sports Centre
3	Sheraton Fitness Athlone	Gym
4	Crossfit Croí Athlone	Gym
5	JG Elite Gym	Gym
6	CrossFit Cu Chulainn Athlone	Gym
7	AIT Sport	Sports Centre
8	Athlone Boat Club	Water Sports
9	Westside Thai Boxing & Martial Arts Club	Martial Arts
10	Sasta fitness centre	Gym
11	Unique Health and Fitness Club	Gym
12	St Peter Astro pitch	Football Facilities
13	Garrycastle GAA	GAA Club
14	Southern Gaels GAA Club	GAA Club
15	Smart Fitness Athlone	Gym
16	Na Fianna Martial arts and Fitness Centre	Martial Arts
17	Olive Keyes Pilates	Gym
18	Athlone GAA Club	GAA Club
19	Saint Joseph's Football Club	Football Club
20	Buccaneers Rugby Football Club	Rugby Club
21	AC Celtic Football Club	Football Club
22	St Francis FC Athlone	Football Club
23	Gentex Football Club	Football Club
24	St. Peter's FC Athlone	Football Club
25	Athlone Minotaurs	American Football
26	Athlone Sub-Aqua Club	Water Sports
27	Willow Park Football	Football Club
28	Athlone Tennis Club	Tennis Club
29	Custume Pitch & Putt Club	Golf
30	Athlone Taekwondo	Martial Arts
31	Fusion Training Centre	Gym

Table 5 Social infrastructure within the wider Athlone Area

7.9 Also at a site level the proposed development also includes passive and active open spaces as well as pedestrian links throughout the site and the inclusion of a creche, which can also be utilized as a neighbourhood centre when the creche is closed.

7.10 Finally in the wider Athlone area overall our analysis finds there are approximately eighty-one separate social amenities and facilities within the surrounding area of the subject site.

Number	Name	Type of Facility
1	Town Centre Surgery	Medical Centre
2	Newtown Medical Centre	Medical Centre
3	Dr. John J. Keane Eye Specialist	Opticians
4	Saint Vincent's Health Centre	Medical Centre
5	Clonbrusk Primary Care Centre	Medical Centre
6	Tom Boland & Associates	Dental Practice
7	Fitzgerald's Dental Surgery	Dental Practice
8	Bonavalley Medical Centre	Medical Centre
9	Renew Health	Medical Centre
10	Boland Dental Surgery	Dental Practice
11	Emer Dunne Physical Therapy	Physiotherapy Clinic
12	DBC Chartered Physiotherapy	Physiotherapy Clinic
13	Midland Physiotherapy Clinic	Physiotherapy Clinic
14	Campbell's Dental	Dental Practice
15	Westside Dental Athlone	Dental Practice
16	Meares Dental Surgery	Dental Practice
17	Dental Excellence Athlone	Dental Practice
18	Shannon Orthodontics	Dental Practice
19	Clonbrusk Resource Centre	Medical Centre
20	Midoc Athlone	Medical Centre
21	Civil Registration Service Primary Care Centre	Medical Centre
22	Midlands Counselling Clinic	Counselling Clinic
23	The Dancing Soul	Family Counselling
24	Paul Gill Hypnotherapy Athlone	Hypnotherapy Clinic
25	Olivia Feehan Counselling	Psychotherapy
26	Michelle Mulligan Counselling	Psychotherapy
27	Athlone Foot Clinic	Podiatrist
28	Elliot Opticians	Opticians
29	Specsavers Athlone	Opticians
30	Athlone Opticians	Opticians
31	Cooney's Opticians	Opticians

Table 6 Medical/care facilities in the wider Athlone area

7.11 In summary this Social Infrastructure Assessment is put forward in support of the LRD application to:

- Review the existing planning policy context in relation to the provision of social and community infrastructure;
- Identify existing social and community infrastructure in Athlone;
- Consider the social and community infrastructure proposed as part of the subject development;
- Evaluate the if expected demand will be appropriately met by existing and proposed services.

7.12 Having regard to the above, it is considered that Athlone provides a wide-range of existing social and community infrastructure to support the development and this is a good location for the residential scheme, as recently determined by the Planning Authority on lands adjacent under permission 22/253.

8 SUMMARY & CONCLUSIONS

8.1 This study of schools, childcare and social infrastructure has been prepared to satisfy relevant policy requirements and demonstrate how the proposed development can be catered for both in terms of schools, childcare and social infrastructure facilities.

8.2 A desktop analysis of available data sources has been undertaken in order to understand both the demographic profile of the area to ensure there is adequate capacity for both schools and childcare provision as part of this planning application.

8.3 In this regard it is critical to have a clear understanding of the ability of education facilities to support the wider community, both now and in the future. We submit this study demonstrates that:

- The needs of the current population in the catchment area are adequately supported by the school infrastructure presently in existence.
- The Department of Education and Skills do not identify any need for additional schools to be provided in the Athlone area.

8.4 The key conclusions from this study are:

- **Childcare/creche provision:** our analysis on existing creche demand and spaces within the catchment area of 3km demonstrates that at present there are 45 creche spaces available for take up. On this basis the proposed childcare facility does not need to cater for any existing surplus demand outside of the site area itself at Cornamaddy.

- **Demand generated by the proposal for childcare:** On analysis of the proposed scheme against the relevant childcare guidelines, the demographics of the area and the projected population have demonstrated that the proposal will be adequately sized by providing space to accommodate 40 children (with capacity for 48) and therefore be consistent with the relevant guidelines in terms of provision.

- **Primary and post primary School Provision:** Having examined the current remaining capacity in both primary and post primary (99 places in the current school year) to cater for an estimated 302 over a period of 7 years (averaging 44 total places per annum) should not cause additional demand that cannot be catered for. Also the analysis by DES of existing schools in the Athlone area has determined that no additional schools are to be delivered under the school building programme; this indicates the DES is satisfied there is adequate capacity in the Athlone area going forward to cater for the proposed development in terms of both primary and post primary school provision.

8.5 Also section 7 demonstrates that Athlone provides a wide-range of existing social and community infrastructure to support the development and this is a good location for the residential scheme, as recently determined by the Planning Authority on lands adjacent under permission 22/253.

8.6 It is therefore concluded that the existing school provision in the area is sufficient to cater for the needs of the current and future population of the area and the proposed development will be adequately catered for both in terms of schools, childcare and social infrastructure provision.

Ronan Woods
Director

Appendix C

digital dimensions

Daylight & Sunlight Assessments of a Proposed Large-scale Residential Development at Cornmaddy, Athlone, Co. Westmeath.

Date: **23rd February 2023**

Prepared by John Healy
MSc Environmental Design of Buildings

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1. Introduction

The development will consist of the provision of 332 residential units, in a mix of 172 houses, of 2/3 storeys 86 duplex units of 2/3 storeys and 74 apartments in four blocks of 2/4 storeys. There is a creche, car and cycle parking, bin stores, substations, pedestrian and vehicular accesses and open spaces and all associated works, as described in the statutory notices.

1.1 Executive Summary

This report assesses the impact of the proposed development for Daylight and Sunlight on the neighbouring buildings and the quality of daylight and sunlight within the proposed development. This analysis is carried out based on the drawings of Arnold Leehy Architects.

Impact on adjacent properties

The results find that any impact on the adjacent residential structures would be minimal and imperceivable. All areas assessed continue to meet or exceed the recommendations of the BRE guidelines.

Assessment of the quality of the proposed development.

BR209:2022 recommends assessment methods set out in BS EN 17037 for daylight provision. BS EN 17037 contains a National Annex (A1) which sets out minimum daylight levels to be achieved in the UK and channel Islands. Ireland has a similar climate to the UK. The National Annex in BS EN 17037 states that the target values set out in Table A1 may be hard to achieve in the UK and as a result sets alternative minimum values for rooms to dwellings.

100% of the Living, Dining, Kitchen and Bedroom spaces to the apartments and duplexes achieve the target values set out in BS EN 17037:2018+A1:2021 section NA.1. 100% of the rooms assessed achieve the minimum illuminance levels set out in BS EN17037:2018+A1:2021 for Bedrooms 100lux (DF0.7%), Living Rooms 150lux (1%DF) and Kitchens and living spaces containing a Kitchen 200lux (1.3%DF). This is the minimum rooms specific values to be achieved in dwellings.

IS EN 17037 set out Minimum and Target levels daylight levels to be achieved. The Target and Minimum levels set out in IS EN17037:2018 do not take into account room use or make allowance for rooms that have a lesser requirement for daylight. The assessment was carried out for daylight provision in accordance with Table A1. The results indicate a high level of compliance for Minimum Illuminance with over 98.1% and Target Illuminance with over 96% of the spaces exceeding the minimum level for each metric.

The results indicate that the rooms will achieve high levels of daylight and they will be bright and pleasant apartments and duplexes.

This scheme is well designed for sunlight, with 82.5% of units meeting the minimum recommended 1.5 direct sunlight hours. This meets the recommendations of the BRE guidelines (2022).

The proposed development offers a variety of amenity spaces, all are well oriented for sunlight and will have in excess of 2 hours sunlight, over 50% of the area, on the 21st March. The proposed development meets the recommendations of the BRE guidelines (2022) for gardens and open spaces.

1.2 Conclusions including Compensatory Measures

Overall the design team worked in response to the context to ensure the proposed development performed with regards to achieving the best possible daylight and sunlight quality. The majority of the apartment units also achieve the recommendations outlined under the BRE guidelines.

Also of note with regards to internal daylighting section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments December 2020, and as per section 6.7 of the 2022 Apartment Guidelines, states the following:

> *'Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific (sic). This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution.'*

Furthermore Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities (2018) states the following:

> *'Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution.'*

In this context compensatory measures have been incorporated into the design:

- Providing in excess of 50% of units of dual aspect as required for such a suburban location.
- Providing in excess of the required communal space areas.
- All living spaces being in excess of the requirements in terms of sizes.
- Providing in excess of the required private amenity spaces for apartment units.
- Providing unit sizes that exceed the minimum guideline requirements.

2. Methodology

2.1 Notes on the use of BRE guidance document BR209 (2022 3rd edition) - Site Layout Planning for Daylight and Sunlight.

Building Research Establishment (BRE) BR209: 2022 “Site Layout Planning for Daylight and Sunlight” (Third edition) was released in June 2022 and supersedes BR209: 2011 (Second edition). It is intended to be used with the interior daylight recommendations of BS EN 17037 British Standard Daylight in Buildings. BR209: 2022 is a comprehensive revision of the 2011 edition of Site Layout Planning for Daylight and Sunlight.

BR209: 2022 sets out that “The guidance here is intended for use in the United Kingdom and in the Republic of Ireland, though recommendations in the Irish Standard IS EN 17037 may vary from those in BS EN17037.”

EN 17037 is a unified daylighting standard published by the European Committee for Standardization (CEN) in 2018. It is applicable across all countries within the EU including Ireland with the Irish edition IS EN17037:2018. The standard is enacted in Britain under BS EN 17037:2018+A1(December 2021) with a UK National Annex for regional assessments. The daylight and sunlight assessment methods referenced in BR209: 2022 (third edition) for internal daylight and sunlight provision are common to both the Irish Standard Version and the UK version.

The UK National Annex (NA) provides further recommendations for daylight provision in the UK and Channel Islands. NA.1 states that the UK committee supports the recommendations for daylight in buildings given in BS EN17037:2018. The annex states that the daylight target levels in Clause A.2 may be hard to achieve in buildings in the UK and in particular dwellings in urban areas with significant obstructions or tall trees outside. NA.2 sets out minimum daylight provision to be achieved in UK dwellings.

BR209: 2022 updates guidance in two areas and they are summarised below:

Impact on daylight and sunlight to adjacent buildings.

This is broadly in line with the previous version of the BRE guidelines (2011) and the assessment methods are contained within BR 209:2022. The metrics are the same for assessing impact in the areas of Daylight (VSC) and Sunlight (APSH) to adjacent buildings. Sunlight to adjacent amenity space is assessed through the measurement of sunlight availability on the 21st March. Clarity has been provided in a number of areas on the appropriate use of each assessment.

Interior daylight and sunlight to proposed buildings.

The BRE guidelines (2022) recommend the use of BS EN 17037:2018 for assessing the quality of interior spaces in proposed developments, this supersedes BS 8206-2:2008. BS EN 17037 sets out assessment methods for daylight provision and access to sunlight. The use of the Average Daylight Factor (ADF) assessment is no longer recommended. BS EN 17037 is based on the European standard EN 17037 and uses assessment methodologies not directly comparable to BS 8206-2.

The UK National Annex A1 sets out room specific minimum values to be achieved in the UK and Channel Islands. All the rooms achieve the minimum DF factor levels set out in A1 for Bedrooms (DF0.7%), Living Rooms (1%DF) and Kitchens and living spaces containing a Kitchen(1.3%). The Daylight Factor percentage values are derived from minimum room specific illiminance levels set out in NA+1 and the Median External Diffuse Illuminance ($E_{v,d,med}$) for Dublin from Table A.3 EN17037:2018. The illuminance levels and corresponding DF% are given in Table 5 below.

This Daylight and Sunlight assessment demonstrates compliance with the following documents:

- BR209 2022: Site Layout Planning for Daylight and Sunlight (Third edition).
- BS EN 17037:2018+A1 Daylight in Buildings
- IS EN 17037:2018 Daylight in Buildings

The BRE guidelines (2022) state at the outset that “It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location.”

This is accordance with the most relevant S.28 Ministerial Guidelines including Section 6.6 of the Sustainable Urban Housing: Design Standards for New Apartments (2022), and Section 3.2 of the Urban Development and Building Heights Guidelines for Planning Authorities (2018).

Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2022) states that:

> *Planning authorities should avail of appropriate expert advice where necessary and have regard to quantitative performance approaches to daylight provision outlined in guides like A New European Standard for Daylighting in Buildings IS EN17037:2018, UK National Annex BS EN17037:2019 and the associated BRE Guide 209 2022 Edition (June 2022), or any relevant future standards or guidance specific to the Irish context, when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision.*

That the recommendations of the BRE guidelines (2022) are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas.

2.2 Daylight to existing dwellings

For loss of daylight and sunlight to existing buildings BRE guidance document (2022) "Site layout planning for daylight and sunlight" is used. The site is analysed in plan, section and building use. Windows and amenity areas are selected to test for impact from the proposed development.

A proposed development could potentially have a negative effect on the level of daylight that a neighbouring property receives, if the obstructing building is large in relation to their distance from the existing dwelling. To ensure a neighbouring property is not adversely affected, the Vertical Sky Component (also referred to as VSC) is calculated and assessed. VSC can be defined as the amount of skylight that falls on a vertical wall or window.

BRE guidelines (2022) recommend that: *"Loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window."*
The diffuse light of the existing building may be adversely affected if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25º to the horizontal. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

For loss of light the BRE guidelines (2022) recommends calculation of the Vertical Sky Component. This is the ratio of direct sky illuminance falling on the outside window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE Overcast Sky is used and the ratio is usually expressed as a percentage. The maximum value is just under 40% for a completely unobstructed vertical wall. The Vertical Sky Component on a window is a good measure of the amount of daylight entering it.

The BRE guidelines (2022) recommend one of two criteria is met when assessing for the Vertical Sky Component:
a) Where the Vertical Sky Component at the centre of the existing window exceeds 27% with the new development in place then enough sky light should still be reached by the existing window.

b) Where the Vertical Sky Component with the new development in place is both less than 27% and less than 0.8 times its former value, then the area lit by the window is likely to appear more gloomy, and electric light will be needed more of the time.

The BRE guidelines (2022) state that if the VSC is:
- At least 27%, then conventional window design will usually give reasonable results;
- Between 15% and 27%, then special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight;
- Between 5% and 15%, then it is very difficult to prove adequate daylight unless very large windows are used;
- Less than 5%, then it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed

This report assesses the percentage of direct sky illuminance that falls on the centre point of neighbouring windows that could be affected by the proposed development, The Vertical Sky Component (VSC) as per the methodologies contained in the BRE guidelines BR209:2022 (third edition).

2.3 Sunlight to existing buildings

The BRE guidelines (2022) recommend assessing the main living rooms and conservatories if they have a window wall facing within 90° of due south. Kitchens and bedrooms are less important but care should be taken not to block too much sun. If the proposed development is fully north of the existing window then sunlight need not be assessed.

The Annual Probable Sunlight Hours (APSH) is used to assess the quantity of sunlight for a given location. This is the total amount of sunshine for a given location on an unobstructed horizontal surface taking cloud cover into account. Statistical data from the Irish Meteorological Service is used to assess the APSH and the Winter Probable Sunlight Hours (taken to fall between the 21st of September and the 21st of March). Table 1 shows the average sunlight hours for each month and the maximum possible without any cloud cover. This gives the factor of possible sunlight hours for each month.

Met Éireann Sunlight Hours Data Set 1981-2010													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average Sunlight Hours/ Day	1:54	2:45	3:36	5:32	6:44	6:40	5:17	5:13	4:16	3:17	2:10	1:44	
Average Sunlight Hours/ Month	58:54	77:00	111:36	166:00	208:44	200:00	163:47	161:43	128:00	101:47	65:00	53:44	1496.25
Total Available Sunlight Hours	252	265	358	412	488	485	496	451	375	320	250	248	4383
Probable Sunlight Hours Ratio	23.37%	29.06%	31.17%	40.29%	42.77%	41.24%	33.02%	35.86%	34.13%	31.81%	26.00%	21.67%	34.14%

Table 1: Average monthly sunlight hours recorded at Dublin Airport - Data set 1981-2010

The BRE guidelines (2022) recommend that the centre of a window or 1.6m above ground for a door be assessed and receive at least 25% of the APSH and at least 5% during the period of 21st September to 21st March. If the available APSH is less than this then it should not be reduced below 0.8 times its former value or noticeable loss of sunlight may occur.

2.4 Daylight in the Proposed Development.

BR209 (2022) Appendix C sets out interior daylight recommendations. The guideline sets out the that: "BS EN 17037 supersedes BS8206 Part 2 'Code of practice for daylighting' which contained a method of assessment based on Average Daylight Factor, which is now no longer recommended."

BS EN 17037:2018+A1 sets out two methods for assessing daylight provision in proposed buildings. One method is called the **Illuminance method**. This is based on Target illuminances for daylight to be achieved across specified fractions of a reference plane at working plane height (0.85m) for half the daylight hours in a year. The Illuminance Method requires the use of a suitable weather file local climate conditions and takes into account the orientation of the space.

The alternative method is called the **Daylight Factor Method.** This method is based on calculating the daylight factors achieved over specific fractions of a reference plane. The Daylight factor is the illuminance at a point on a reference plane in a space, divided by the illuminance on an unobstructed horizontal surface outdoors. This method uses an overcast sky for calculation and the assessment of the space is orientation independent. BS EN 17037 gives the Median External Diffuse Illuminance ($E_{v,d,med}$) for the capital cities throughout Europe to account for external local illuminance levels.

The UK National Annex (NA) sets out additional minimum room specific target Illuminance levels for the UK where the target values in Annex A.2: Table A.1 are hard to achieve. NA.2 sets out illuminance values to be exceeded over at least 50% of the points on a reference plane 0.85m above the floor for at least half the daylight hours. The UK committee formed the opinion that the Target Illuminance recommendations in Clause A.2 of BS EN 17037 may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions.

BR209 (2022) recommends surface reflectances should represent real conditions and where reflectance values have not been measured or specified default values are set out in Table C4 of the guidance document. The surface reflectances have been specified and are set out in Table 2 below. This table also shows the input values for material used and additional assessment model input parameters

Input Values for Assessment Model			
Surface Reflectance			
Element	Reflectance	Transmittance	Material Description
Internal walls	80%	0%	White Painted Walls
Internal ceiling	80%	0%	White Painted Ceiling
Floor - light wood	40%	0%	Light wood Flooring
External walls - proposed development	50%	0%	Light yellow Brick
External walls - outside site	50%	0%	CIBSE
External ground	20%	0%	CIBSE
Glass		68%	Triple glazed clear glass
Maintenance Factor for Glass		Assessment Plane	
Suburban Vertical no overhang	0.96	Sensor Grid spacing	0.3m
Suburban Vertical sheltered by balcony or overhang	0.88	Sensor grid inset	0.35m
Framing Factor: Patio Doors	0.77	Minimum inset	0.3m
		Work plane offset	0.85m

Table 2: Surface reflectance parameters and input values for model calculations

The EN17037:2018 Standard deals exclusively with new developments and does not give guidance or metrics on loss of light or sunlight to existing properties. It sets out values for Minimum and Target levels of Daylight Provision to be achieved, with a minimum, medium and high compliance level for each. The guideline recommends that the minimum level should be achieved but does not give guidance on the number of units or fraction within a multiple residential unit development that should achieve these values. Additionally it does not differentiate between room use and weighted targets for rooms which would have a lesser requirement. The UK National annex sets out factors for UK specific settings where it is difficult to achieve natural daylighting.

The compliance calculation is based on an annual, climate-based simulation of interior illuminance distributions, BR209 refers to this method as the Illuminance Method. For each hour of the year, the percentage of the floor area achieving minimum and target illuminance thresholds are measured on a room-by-room basis. Two target types are set with the following criteria:

- Target Illuminance: 300 lux over 50% of floor area for at least 50% of daylight hours.
- Minimum Illuminance: 100 lux over 95% of floor area for at least 50% of daylight hours.

BS EN 17037 gives three levels of recommendation for daylight provision in an interior space: minimum, medium and high. BR209 (2022 3rd edition) Section C3 recommends for compliance with the standard a space should achieve the minimum level.

Daylight hours are defined as the 4380 hours with the most diffuse horizontal illuminance in the weather file. In addition to this baseline (Minimum) requirement, rooms can achieve Medium and High levels of compliance by meeting higher illuminance thresholds, as outlined in the table below:

Target Illuminance from Daylight over at least half the daylight hours		
Level of recommendation	Target illuminance E_T(lx) for half of the assessment grid	Target illuminance E_{TM}(lx) for 95% of the assessment grid
Minimum	300 lux	100 lux
Medium	500 lux	300 lux
High	750 lux	500 lux

Table 3: IS / BS EN 17037:2018 Target Illuminance from Daylight over at least half the daylight hours.

Target Daylight Factor (D) for Dublin		
Level of recommendation	Target daylight factor D for half of the assessment grid	Target daylight factor D for 95% of the assessment grid
Minimum	2%	0.7%
Medium	3.5%	2%
High	5%	3.5%

Table 4: IS / BS EN 17037:2018 Target Daylight Factor (D) for Dublin.

Target Minimum Daylight Factor (D) for Dublin based UN National Annex		
Room Type	Target illuminance E_T(lx) for half of the assessment grid	Target daylight factor D from Table A.3 EN17037 $E_{v,d,med}$ for Dublin -14,900
Bedroom	100	0.7%
Living Room	150	1%
Kitchen	200	1.3%

Table 5: BS EN 17037:2018+A1:2021 Target Illuminance levels and Daylight Factor (D) for Dublin.

2.5 Sunlight to proposed developments

The BRE guidelines (2022) recommend that for large residential developments the overall sunlight potential can be initially assessed by counting the number of windows facing south, east and west and the aim should be to minimise the number of living rooms facing solely north, north-east or north-west unless there is some compensating factor such as an appealing view to the north. The guideline acknowledges in large developments it may not be possible to have every living room facing within 90° of south, it recommends maximising the number of units with a southerly aspect.

The BRE guidelines (2022) states that BS EN 17037 should be used to assess for interior access to direct sunlight. BS EN 17037 sets recommendations for access to sunlight in a range achieving compliance from Minimum to High. In dwellings at least one habitable room, preferably a living room should achieve the minimum of 1.5 direct hours on a specified date between 1st February and 21st March be used for assessment with 21st March being the preferred date to use with a cloudless sky. The guidelines recommends a time step of 5 minutes or less for the assessment interval. The minimum level to achieve is 1.5, the medium level is 3 hours and the high level is 4 hours direct sunlight.

2.6 Sunlight to gardens and open spaces

For calculations of sunlight analysis it is general practice to use March 21st. The BRE guidelines (2022) states:

> *"It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March."*

2.7 Calculations of Trees & Hedges

Trees are not usually included in the assessments of impact, unless specified otherwise. In relation to the effects of trees and hedges the BRE guidelines (2022) states:

> *"It is generally more difficult to calculate the effects of trees on daylight because of their irregular shape and because some light will generally penetrate through the crown. Where the effects of a new building on existing buildings nearby is being analysed, it is usual to ignore the effects of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf."*

BR209:2022 recommends that sometimes trees should be taken into account for the proposed development where the new development is proposed near large existing trees. This needs to be done by modelling a representative of the existing trees. Reflectance and transparency should be taken into account. Table G1 in BR209:2022 gives values for transparencies of tree crowns in summer and winter for deciduous trees, dense evergreen can be assessed as opaque. Table G2 gives general reflectance values for shades of trees.

2.8 BRE Guidelines (2022) Appendix H: Environmental Impact Assessment

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters set out below.

> *"Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.*
>
> *Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:*
> - *only a small number of windows or limited area of open space are affected*
> - *the loss of light is only marginally outside the guidelines*
> - *an affected room has other sources of skylight or sunlight*
> - *the affected building or open space only has a low level requirement for skylight or sunlight*
> - *there are particular reasons why an alternative, less stringent, guideline should be applied.*
>
> *Factors tending towards a major adverse impact include:*
> - *a large number of windows or large area of open space are affected*
> - *the loss of light is substantially outside the guidelines*
> - *all the windows in a particular property are affected*
> - *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, eg a living room in a dwelling or a children's playground.*
>
> *Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space.*
>
> *Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."*

A flexible approach should be taken when assessing the impact with daylight and sunlight being one of many factors that influence the environment when planning a new development.

3. Daylight to adjacent buildings.

3.1 Site Overview

This is a greenfield site is located in Cornamaddy, within Athlone Urban Boundary. It is predominantly flat. It is bounded by the Glasson Road and The Bullet Road to the East, a local road through Garnafailagh to the North, a watercourse and natural hedgerows to the West and South.

Currently there are only two residential sites that have a boundary with the proposed development, May Blossom Cottage, at eircode N37 NX74 to the North and a site with two houses to the South at Eircode N37 F6H6 and N37 T6X4.

Figure 1: Aerial view of site, taken from Google maps.

3.2 Preliminary assessment of adjoining dwellings

The BRE guidelines recommend that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. The zone of influence 3 times the height of the proposal is plotted in Figure 2 in yellow.

Within the zone of influence, the location of the walls with windows in residential properties facing the proposed development are indicated in blue in Figure 2. Only one plane is within the zone of influence, at location A (see Detail Area 1). A section through location A is plotted in Figure 4.

Figure 2: Proposed site plan showing the zone of influence (3 times the height of the proposed building) and direction of the window wall of adjacent residential properties.

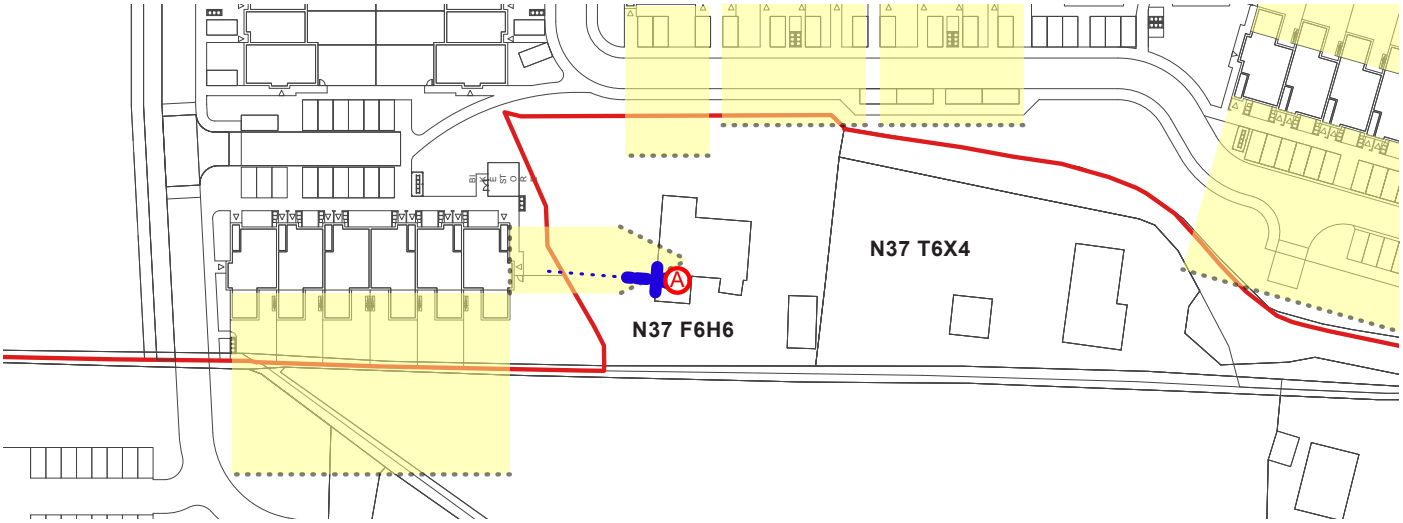
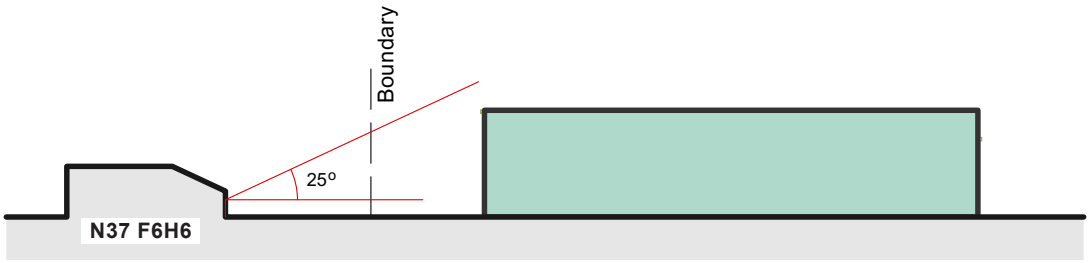


Figure 3: Site plan - Detail area 1 indicating the window wall of the closest residential properties.

The BRE document states that if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25º to the horizontal, then the diffuse light of the existing building may be adversely affected.

The potential zone of influence, within 3 times the height of the apartment blocks, is shown in Figures 2 & 3. There is only one house within this zone, identified at Location A. This house at Eircode N37 F6H6 has been subjected to sectional analysis.



Section through window wall at location A

Figure 4: Sections perpendicular to window wall at locations indicated in Figure 3.

3.3 Comment on the assessment of daylight in adjacent dwellings.

Location A: The 25º line is not subtended by the proposed development, indicating any reduction in available daylight is negligible and no further assessment required

3.4 Conclusion

None of the adjacent properties have the potential to experience a reduction in sunlight or daylight due to the proposed development. The proposed development meets the recommendations of the BRE guidelines.

4. Daylight to proposed apartment and duplex buildings

All habitable rooms within the apartment and duplex buildings were assessed for daylight provision by illuminance method. The Illuminance method assesses the daylight levels over at least 50% daylight hours in the year and uses a weather file data set. These methods take into account the orientation of the space. They provide an accurate representation of the daylight provision to a specific room in the context of the proposed environment.

Compliance is demonstrated with a calculation of Daylight Provision with illuminance method under BS EN 17037:2018+A1:2021. A summary of the results are presented in Table 6 below. A complete set of room results are shown in both Appendix A reference.

Compliance is also demonstrated with a calculation of Daylight Provision with illuminance method under IS /BS EN 17037:2018. A summary of the results are presented in Table 7 below. A complete set of room results are shown in both Appendix B reference.

4.1 Assessment for Daylight Provision BS EN 17037:2018+A1:2021

The UK National Annex (A1) contains minimum room specific target values for dwellings in the UK. The UK committee fully supports the recommendations of EN17037:2018 but considers the target daylight levels may be hard to achieve in UK dwellings, in particular in urban areas and areas with mature trees. The Target and Minimum levels set out in IS / BS EN17037:2018 does not take into account room use or make allowance for room that have a lesser requirement for daylight. The UK National Annex A1 in BS EN17037:2018+A1:2021 sets out room specific minimum values to be achieved in the UK and Channel Islands. These target values are set to achieve similar minimum daylight levels as the superseded Average Daylight Factor method (ADF) in BS8206-2 2008.

Minimum daylight provision UK NA.1 - BS EN 17037:2018+A1:2021					
	Room Use	Total Number of rooms	Target illuminance E_T(lx) for half of the assessment grid	Number of room achieving target	Percentage of rooms achieving Target
All Apartment and Duplex Units	LKD /KD	160	200	160	100.0%
	Liv	4	150	4	100.0%
	Bedrooms	321	100	321	100.0%
Overall Total		489		489	100.0%

Table 6: Summary of room for Target Illuminance compliance with BS EN 17037:2018+A1:2021. Individual room results can be viewed in Appendix A

4.2 Conclusion

BR209:2022 recommends assessment methods set out in BS EN 17037 for daylight provision. 100% of the Living, Dining, Kitchen and Bedroom spaces to the apartments and duplexes achieve the target values set out in BS EN 17037:2018+A1:2021 section NA1. The is the minimum rooms specific values to be achieved in dwellings. The results indicate that the rooms will achieve high levels of daylight and they will be bright and pleasant apartments and duplexes.

4.3 Assessment for Daylight Provision IS / BS EN 17037:2018

A summary of Minimum and Target Illuminance level compliance with Annex A Table A1 as set out in Table 7.

Daylight provision Illuminance Method IS EN 17037:2018 / BS EN 17037:2018						
		Below Target	Minimum	Medium	High	Percentage of rooms achieving Target
All Apartment and Duplex Units	Target Illuminance	4.0%	36.9%	38.4%	20.7%	96.0%
	Minimum Illuminance	1.9%	38.7%	39.1%	20.3%	98.1%

Table 7: Summary of room for Target Illuminance compliance with IS/BS EN 17037:2018. Percentage of rooms at each compliance level. Individual room results can be viewed in Appendix B

The results indicate a high level of compliance for Minimum Illuminance with over 98.1% and Target Illuminance with over 96% of the spaces exceeding the minimum level for each metric. The recommendations for Daylight provision in Table A1 are not specific for dwellings and do not make allowance for room use. BS EN 17037:2018+A1:2021 has addressed this with the National Annex NA.1. This sets out room specific targets for dwellings and compliance for this is presented in section 4.1.

5. Sunlight hours in all apartment and duplex units.

5.1 Sunlight Hours

BR209:2022 (third edition) and BS EN 17037 set out recommendations for sunlight hours to be achieved preferably in a main living space. The guidelines recommends the sunlight hours should be assessed preferably on the 21st March over the course of the day. The guidelines sets three levels. Minimum 1.5h, Medium 3h and High 4h. The BRE guidelines does not set the percentage of units that need the achieve the recommendations but does give an example of a well designed floor layout where 4 out of 5 (80%) units in an apartment building would achieve the target sunlight.

Appendix C details the results, indicating if this unit has a LKD or other room with a south facing window. A summary of these results are displayed in the table below.

Sunlight Hours Summary Table								
	Total	Units that have a LKD with a window within 90° South		Fail <1.5 hours	Minimum >1.5 hours	Medium >3 Hours	High >4 Hours	Ratio complies
		No.	Ratio					
Primary living space	160	118	73.8%	28	16	21	95	82.5%

Table 8: Summary of results of assessment of Sunlight Hours

5.2 Comment on EN 17037 Sunlight Hours

The BRE Guidelines recommend maximising the amount of units that have a window within 90° due South but does not have set targets. The guidelines acknowledges that for large developments with site constraints its not possible to achieve south facing windows to all main living spaces. In this development there are 160 apartments and duplex units. Of these 118 (73.8%) have window to a Living room or Kitchen/ Dining room which face within 90° South.

Often windows with an aspect of greater than 90° due South, to the North West or North East, will still receive sunlight, but it is likely to be lesser amounts especially in the winter period. In this development the livingspaces of 132 units (82.5%) achieve the minimum recommended 1.5 direct sunlight hours.

The BRE guidelines recommends the sunlight hours is preferable to a living space. However is acceptable that occupants can gravitate to sunlight in another room if they desire. Most of these units are dual aspect and would achieve high levels of sunlight in a secondary room.

5.3 Conclusion

This scheme is well designed for sunlight, the livingspaces of 132 units (82.5%) achieve the minimum recommended 1.5 direct sunlight hours. This meets the recommendations of the BRE guidelines (2022).

6. Sunlight to gardens and open spaces

The BRE document indicates that for an amenity area, such as a garden, to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st March. It also states that front gardens need not be assessed for sunlight. The amenity space is assessed for the amount of direct sunlight received by the space in 5 minute intervals between 8am and 6pm on the 21st March over an analysis grid with a 300mm grid size and the average is calculated.

6.1 Private amenity space to neighbouring properties.

There are no areas of private amenity in the neighbouring dwellings that could be impacted by the proposed development.

6.2 Sunlight to amenity within the proposed development

The amenity within this proposal have been assessed with a calculation of Sun on the Ground on the 21st March. A location plan with generated analysis are shown in Figure 5 and the results are set out in Table 9 below.

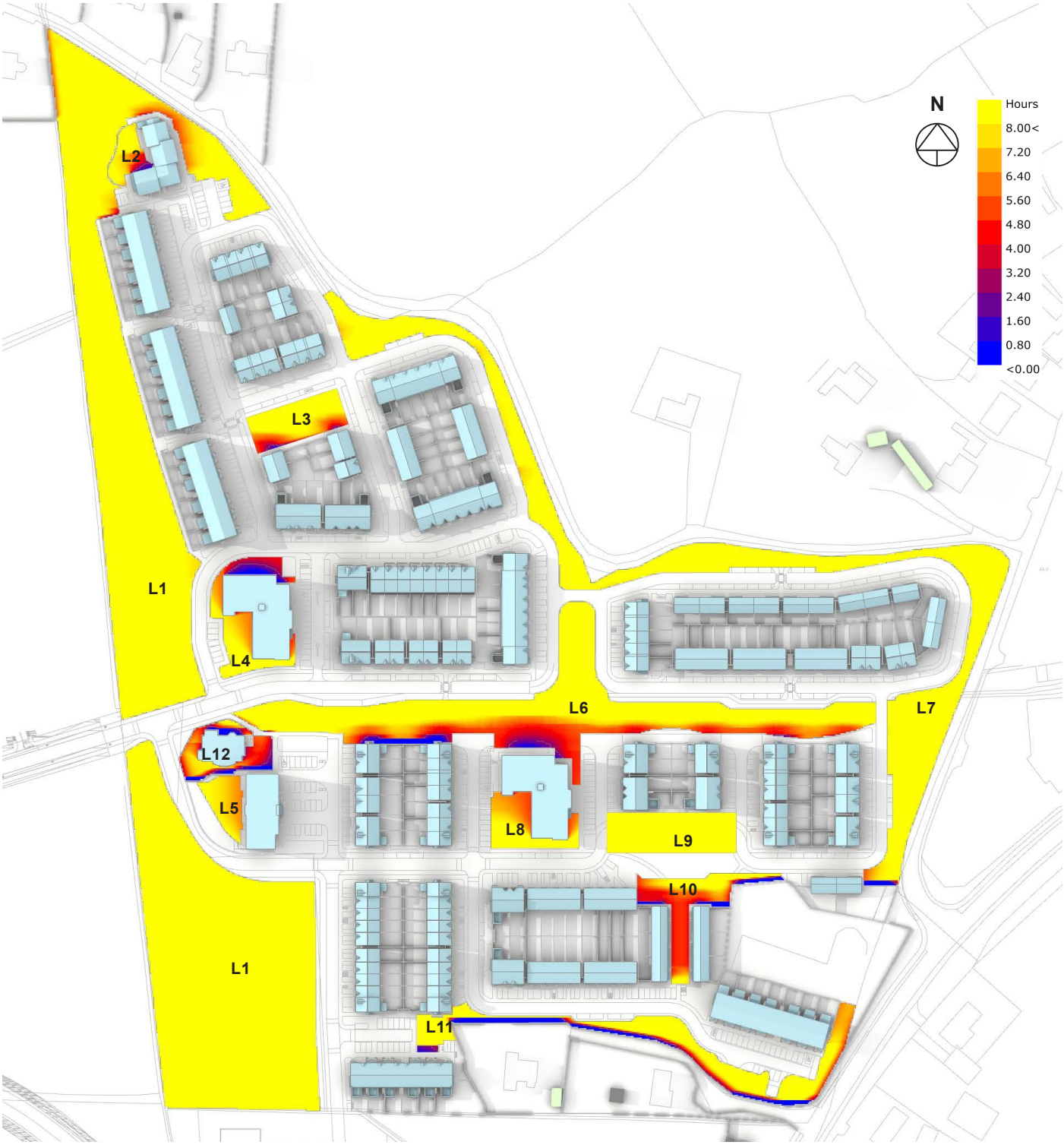


Figure 5: Proposed Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hours.

Sunlight on the ground - within development			
Location ID	Location	Proposed	Meets criteria if >50% area receiving 2 hours sunlight on 21st March
		% Area receiving 2 hours sunlight on 21st March	
L1	Open-space Corridor	100.0%	Meets Criteria
L2	Block C	94.4%	Meets Criteria
L3	Amenity	98.5%	Meets Criteria
L4	Block D	88.3%	Meets Criteria
L5	Block B	90.8%	Meets Criteria
L6	Central Zone	96.9%	Meets Criteria
L7	Perimeter amenity	100.0%	Meets Criteria
L8	Block A	100.0%	Meets Criteria
L9	Amenity	100.0%	Meets Criteria
L10	Amenity	90.8%	Meets Criteria
L11	Amenity	91.7%	Meets Criteria
L12	Crèche	78.8%	Meets Criteria

Table 9: Calculation of Sun on the Ground to amenity area within the proposed development.

6.3 Conclusion

The proposed development offers a variety of amenity spaces, including ecological corridors with mature trees and more intimate spaces relating to the blocks themselves. All amenity spaces are well oriented for sunlight and will have over 2 hours sunlight on the 21st March. The proposed development meets the recommendations of the BRE guidelines for gardens and open spaces.

7. Shadow Diagrams

7.1 BRE Guidance on Shadow Studies

Shadow diagrams are a visual aid to understand where possible shading may occur. The BRE guidelines recommend using the March Equinox due the equal length of the day and night time. It states:

"If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required."

The shadows cast on the September equinox are the same as the March Equinox. They are included here with the Daylight Saving Time (UTC+1) applied, as with the Summer Solstice diagrams.

June 21st and December 21st are provided below for information but it should be noted that the summer solstice is the best case scenario with shadows at their shortest. In Winter even low buildings will cast long shadows and it is common for large areas of the ground to be in shadow throughout the day especially in a built up area and sun barely rises above an altitude of 10° during the course of the day. The guidelines recommends that Sunlight at an altitude of 10° or less does not count. Below are the times for the Equinox and Solstice that the sun is above 10° altitude rounded to the nearest half hour.

Equinox: between 8:30 and 17:30
Summer Solstice: Between 6:30 and 20:00
Winter Solstice: Between 10:30 and 14:00

Section 7.2 shows the existing and proposed shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 7.3 shows the existing and proposed shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 09:00 and 19:00.
Section 7.4 shows the existing and proposed shadow diagrams for the Equinox on the 21st September at 2 hourly intervals during the day between 09:00 and 17:00.
Section 7.5 shows the existing and proposed shadow diagrams for the Winter Solstice on the 21st December at 2 hourly intervals during the day between 09:00 and 15:00.

The site is a greenfield site, there is no shadows cast from any structures on the site at present. Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

7.2 Shadow Casting diagrams March Equinox

N

Existing

Proposed

Figure 6: Shadow diagrams 21 March 09:00 UTC

N

Existing

Proposed

Figure 7: Shadow diagrams 21 March 11:00 UTC

N

Existing

Proposed

Figure 8: Shadow diagrams 21 March 13:00 UTC

N

Existing

Proposed

Figure 9: Shadow diagrams 21 March 15:00 UTC

N

Existing

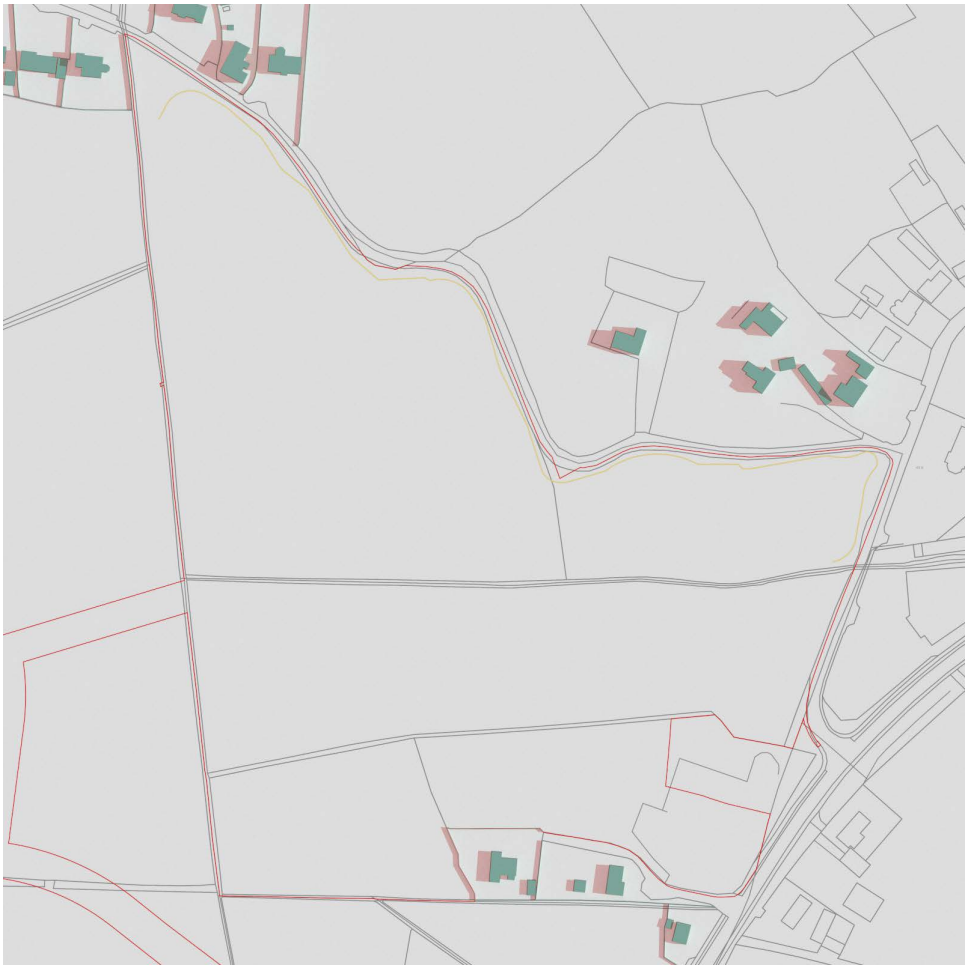
Proposed

Figure 10: Shadow diagrams 21 March 17:00 UTC

7.3 Shadow Casting diagrams June Solstice

N

Existing

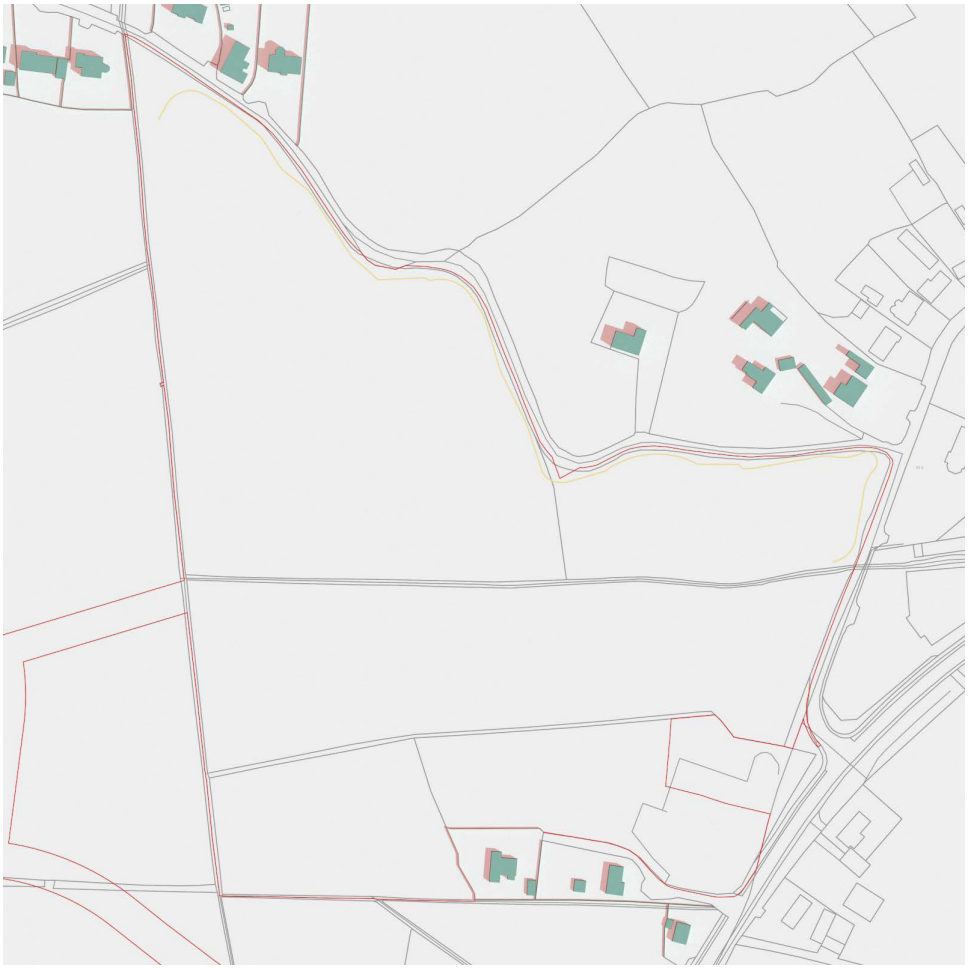


Proposed

Figure 11: Shadow diagrams 21 June 09:00 UTC+1

N

Existing



Proposed

Figure 12: Shadow diagrams 21 June 11:00 UTC+1

N

Existing

Proposed

Figure 13: Shadow diagrams 21 June 13:00 UTC+1

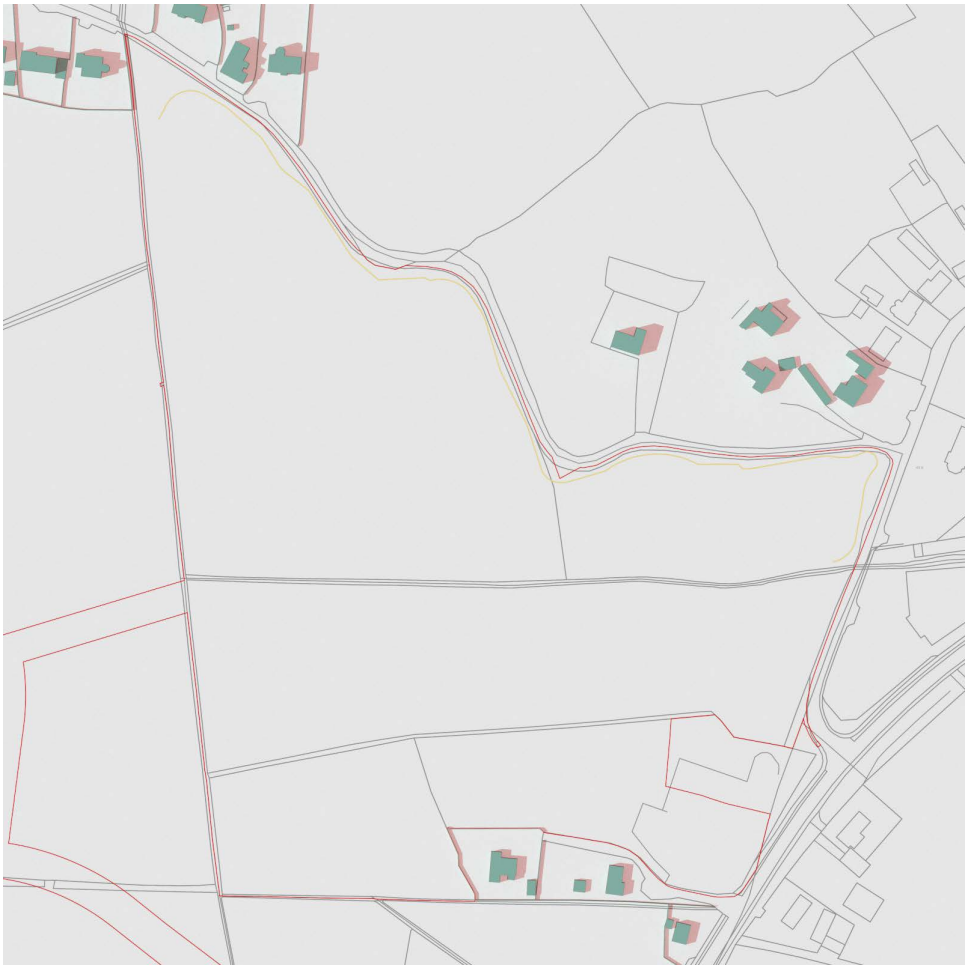
N

Existing

Proposed

Figure 14: Shadow diagrams 21 June 15:00 UTC+1

N



Existing

Proposed

Figure 15: Shadow diagrams 21 June 17:00 UTC+1

N

Existing

Proposed

Figure 16: Shadow diagrams 21 June 19:00 UTC+1

7.4 Shadow Casting diagrams September Equinox

N

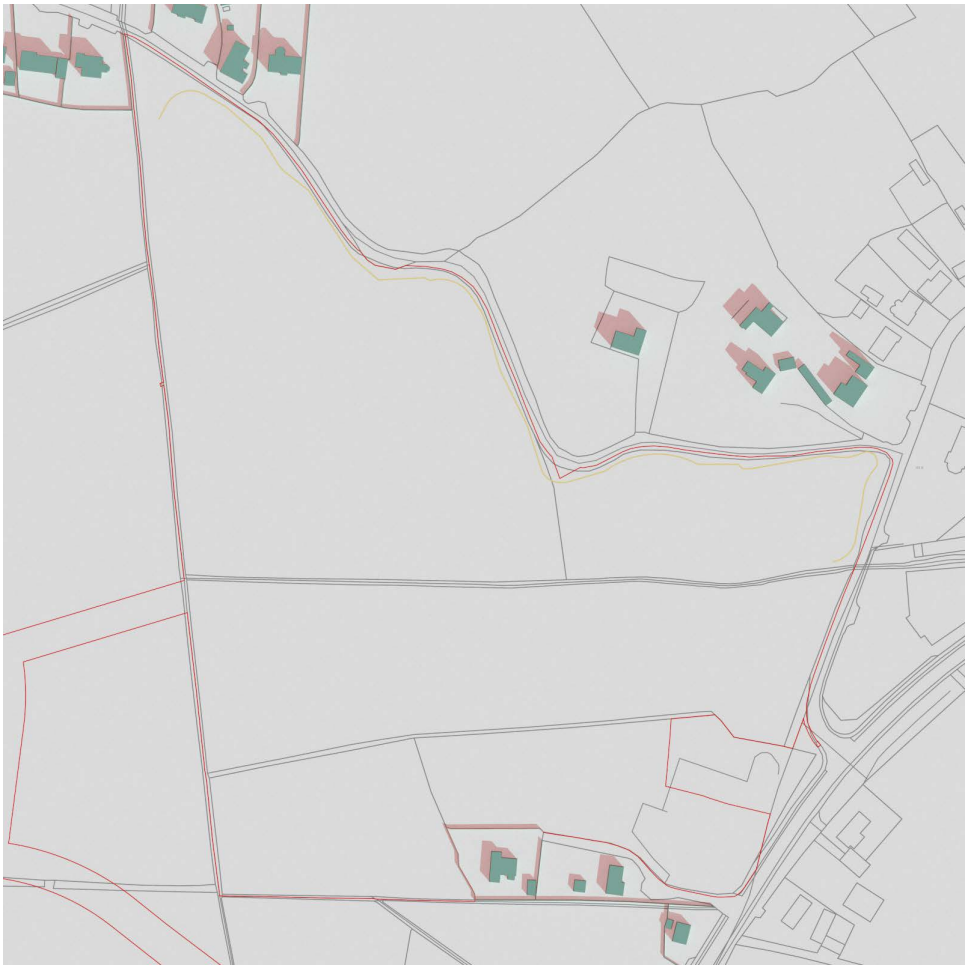
Existing

Proposed

Figure 17: Shadow diagrams 21 September 09:00 UTC+1

N

Existing



Proposed

Figure 18: Shadow diagrams 21 September 11:00 UTC+1

N

Existing

Proposed

Figure 19: Shadow diagrams 21 September 13:00 UTC+1

N

Existing

Proposed

Figure 20: Shadow diagrams 21 September 15:00 UTC+1

N

Existing

Proposed

Figure 21: Shadow diagrams 21 September 17:00 UTC+1

7.5 Shadow Casting diagrams December Solstice

N

Existing

Proposed

Figure 22: Shadow diagrams 21 December 09:00 UTC

N

Existing

Proposed

Figure 23: Shadow diagrams 21 December 11:00 UTC

N

Existing

Proposed

Figure 24: Shadow diagrams 21 December 13:00 UTC

N

Existing

Proposed

Figure 25: Shadow diagrams 21 December 15:00 UTC

Appendix A -BS EN17037:2018+A1:2021 Minimum room specific Daylight Provision in accordance with UK National Annex Table NA.1.

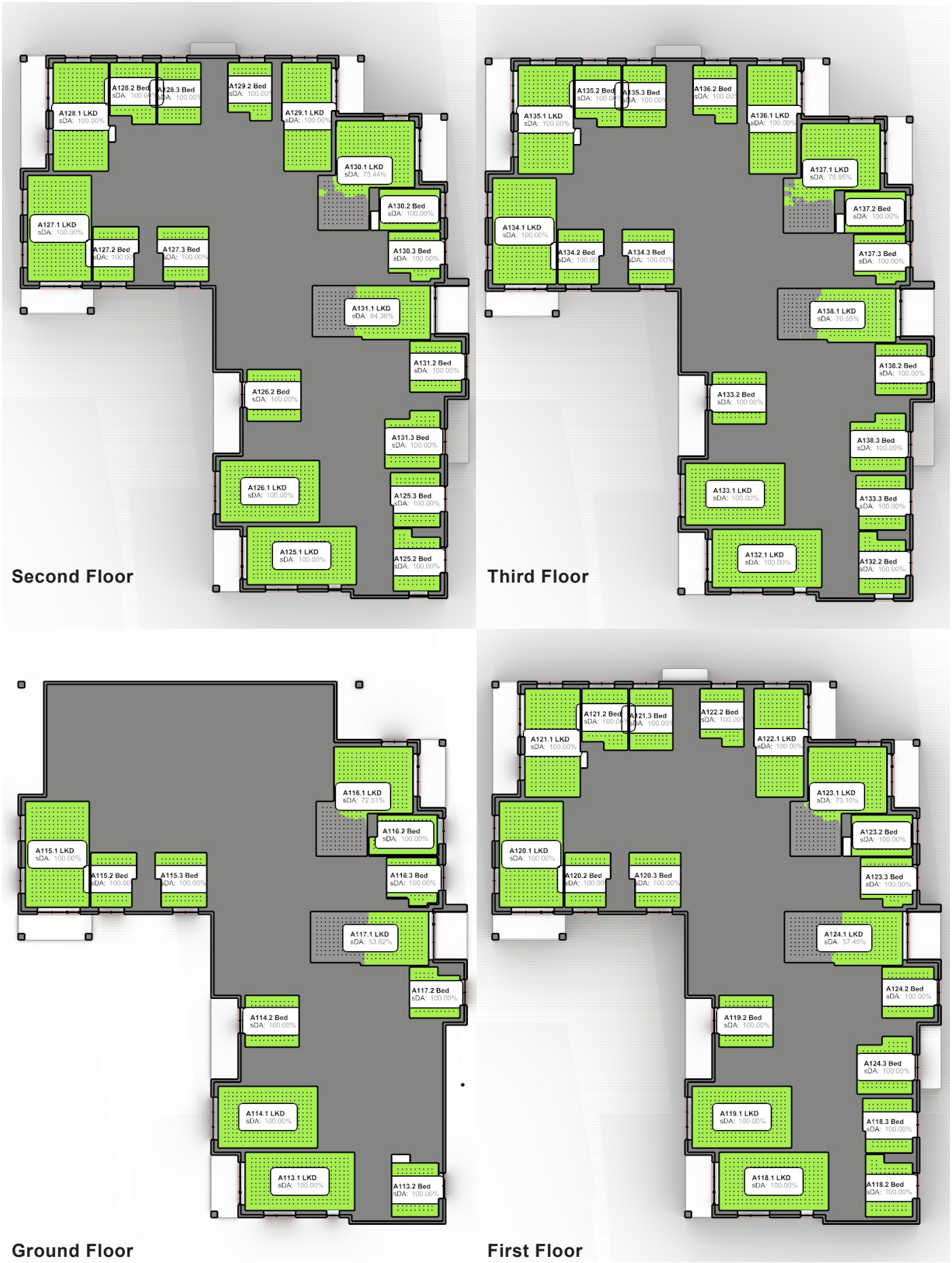
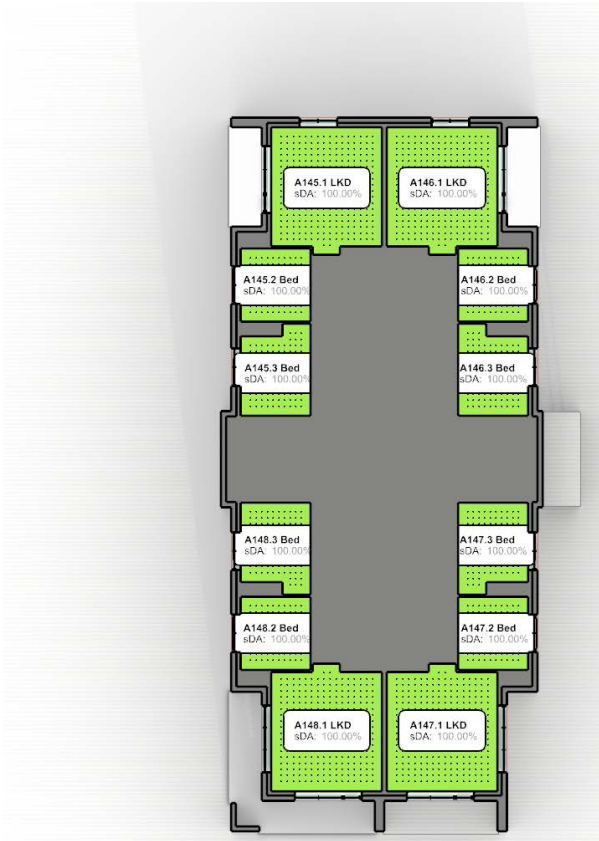


Figure 26: Apartment Block A -
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

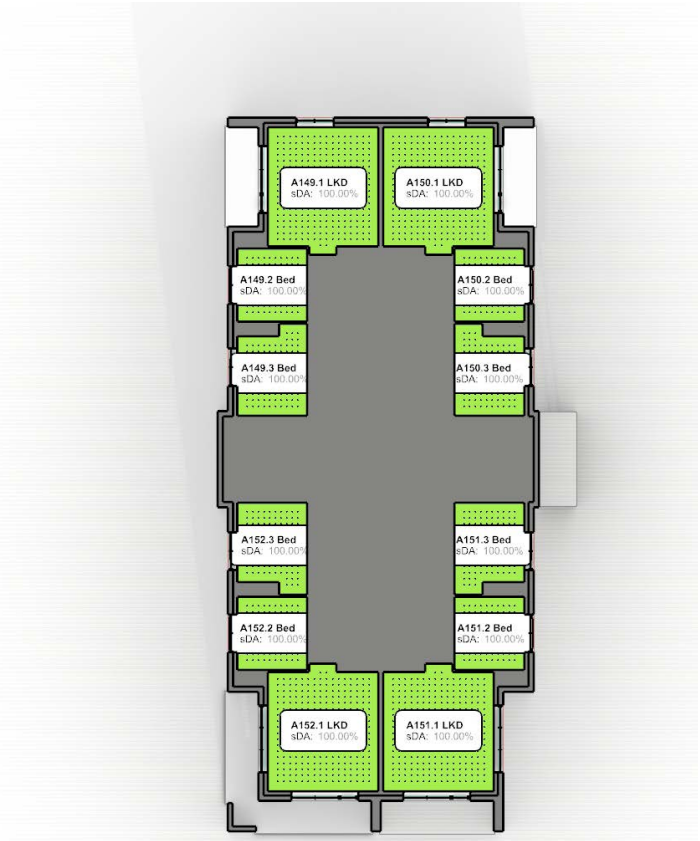
Apartment Block A - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A113.1	LKD	31.6	288	200	1555	100.0%	Y
A113.2	Bed	12.5	99	100	1595	100.0%	Y
A114.1	LKD	30.4	286	200	767	100.0%	Y
A114.2	Bed	13.9	121	100	583	100.0%	Y
A115.1	LKD	33.5	299	200	1475	100.0%	Y
A115.2	Bed	11.8	92	100	1315	100.0%	Y
A115.3	Bed	13.1	114	100	1083	100.0%	Y
A116.1	LKD	37.9	342	200	584	72.5%	Y
A116.2	Bed	13.3	110	100	930	100.0%	Y
A116.3	Bed	11.7	97	100	1018	100.0%	Y
A117.1	LKD	30.8	275	200	380	53.8%	Y
A117.2	Bed	11.9	90	100	1149	100.0%	Y
A118.1	LKD	31.6	288	200	1666	100.0%	Y
A118.2	Bed	13.3	103	100	1693	100.0%	Y
A118.3	Bed	13.2	105	100	1255	100.0%	Y
A119.1	LKD	30.4	286	200	933	100.0%	Y
A119.2	Bed	13.9	121	100	562	100.0%	Y
A120.1	LKD	33.5	299	200	1563	100.0%	Y
A120.2	Bed	11.8	92	100	1463	100.0%	Y
A120.3	Bed	13.1	114	100	1199	100.0%	Y
A121.1	LKD	29.8	264	200	1027	100.0%	Y
A121.2	Bed	13.2	107	100	694	100.0%	Y
A121.3	Bed	13.3	117	100	674	100.0%	Y
A122.1	LKD	26.2	240	200	683	100.0%	Y
A122.2	Bed	11.8	97	100	766	100.0%	Y
A123.1	LKD	37.9	342	200	603	73.1%	Y
A123.2	Bed	12.5	104	100	1125	100.0%	Y
A123.3	Bed	11.7	97	100	1189	100.0%	Y
A124.1	LKD	30.8	275	200	374	57.5%	Y
A124.2	Bed	13.1	110	100	1225	100.0%	Y
A124.3	Bed	14.7	120	100	1144	100.0%	Y
A125.1	LKD	31.6	288	200	1754	100.0%	Y
A125.2	Bed	13.3	103	100	1742	100.0%	Y
A125.3	Bed	13.2	105	100	1296	100.0%	Y
A126.1	LKD	30.4	286	200	978	100.0%	Y
A126.2	Bed	13.9	121	100	600	100.0%	Y
A127.1	LKD	33.5	299	200	1666	100.0%	Y
A127.2	Bed	11.8	92	100	1622	100.0%	Y
A127.3	Bed	13.1	114	100	1300	100.0%	Y
A128.1	LKD	29.8	264	200	1095	100.0%	Y
A128.2	Bed	13.2	107	100	727	100.0%	Y
A128.3	Bed	13.3	117	100	709	100.0%	Y
A129.1	LKD	26.2	240	200	717	100.0%	Y
A129.2	Bed	11.8	97	100	797	100.0%	Y
A130.1	LKD	37.9	342	200	641	75.4%	Y
A130.2	Bed	12.5	104	100	1186	100.0%	Y
A130.3	Bed	11.7	97	100	1248	100.0%	Y
A131.1	LKD	30.8	275	200	404	64.4%	Y
A131.2	Bed	13.1	110	100	1278	100.0%	Y

Apartment Block A - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A131.3	Bed	14.7	120	100	1165	100.0%	Y
A132.1	LKD	31.6	288	200	1800	100.0%	Y
A132.2	Bed	13.3	103	100	1755	100.0%	Y
A133.1	LKD	30.4	286	200	1008	100.0%	Y
A133.2	Bed	13.9	121	100	629	100.0%	Y
A133.3	Bed	13.2	105	100	1315	100.0%	Y
A134.1	LKD	33.5	299	200	1748	100.0%	Y
A134.2	Bed	11.8	92	100	1760	100.0%	Y
A134.3	Bed	13.1	114	100	1506	100.0%	Y
A135.1	LKD	29.8	264	200	1134	100.0%	Y
A135.2	Bed	13.2	107	100	748	100.0%	Y
A135.3	Bed	13.3	117	100	728	100.0%	Y
A136.1	LKD	26.2	240	200	755	100.0%	Y
A136.2	Bed	11.8	97	100	821	100.0%	Y
A137.1	LKD	37.9	342	200	666	78.9%	Y
A137.2	Bed	12.5	104	100	1220	100.0%	Y
A137.3	Bed	11.7	97	100	1293	100.0%	Y
A138.1	LKD	30.8	275	200	424	70.5%	Y
A138.2	Bed	13.1	110	100	1307	100.0%	Y
A138.3	Bed	14.7	120	100	1183	100.0%	Y

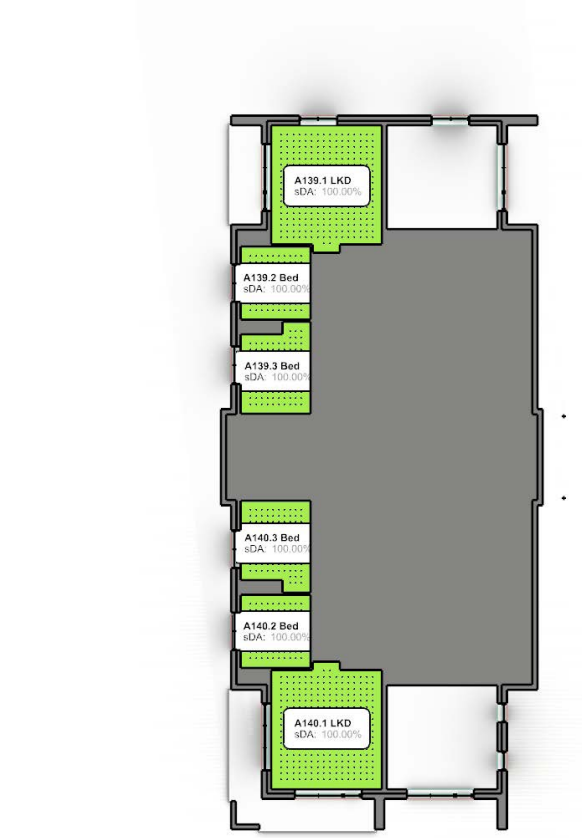
Table 10: Block A - Minimum Daylight Provision individual room compliance values for all habitable rooms BS EN 17037:2018+A1:2021 Table NA.1.



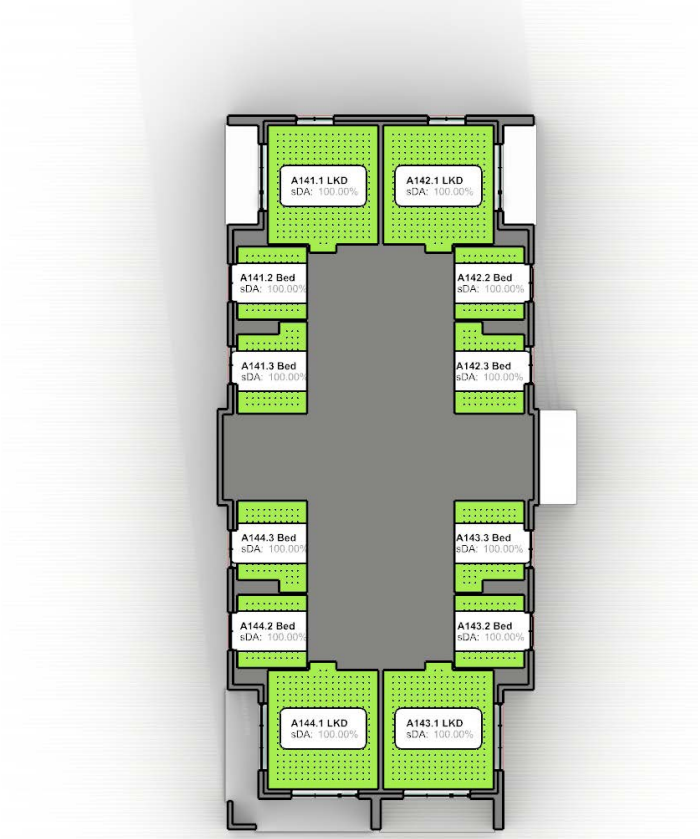
Second Floor



Third Floor



Ground Floor

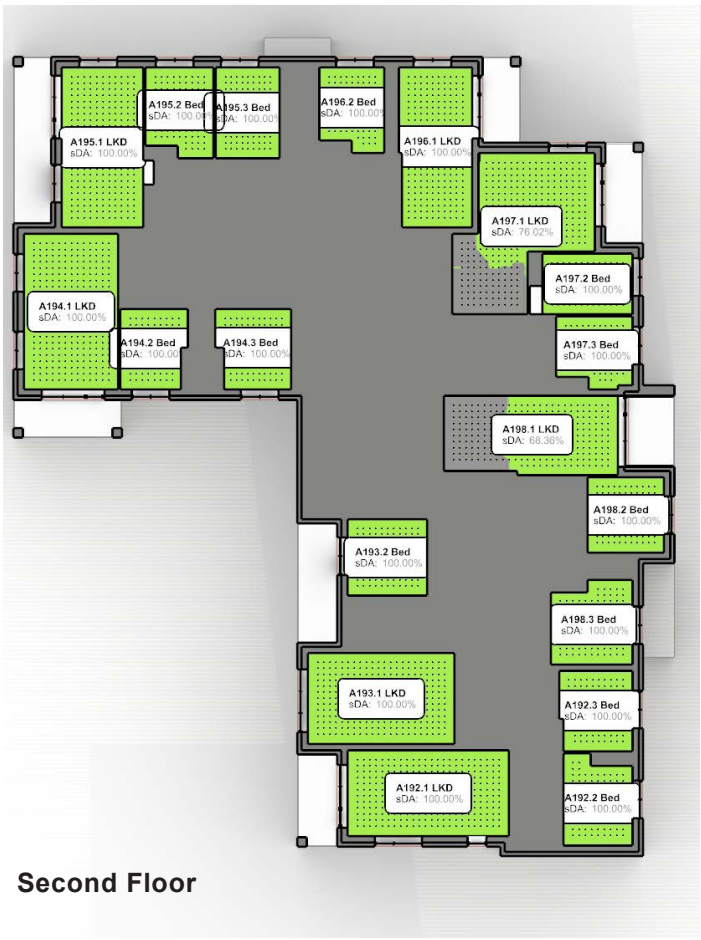


First Floor

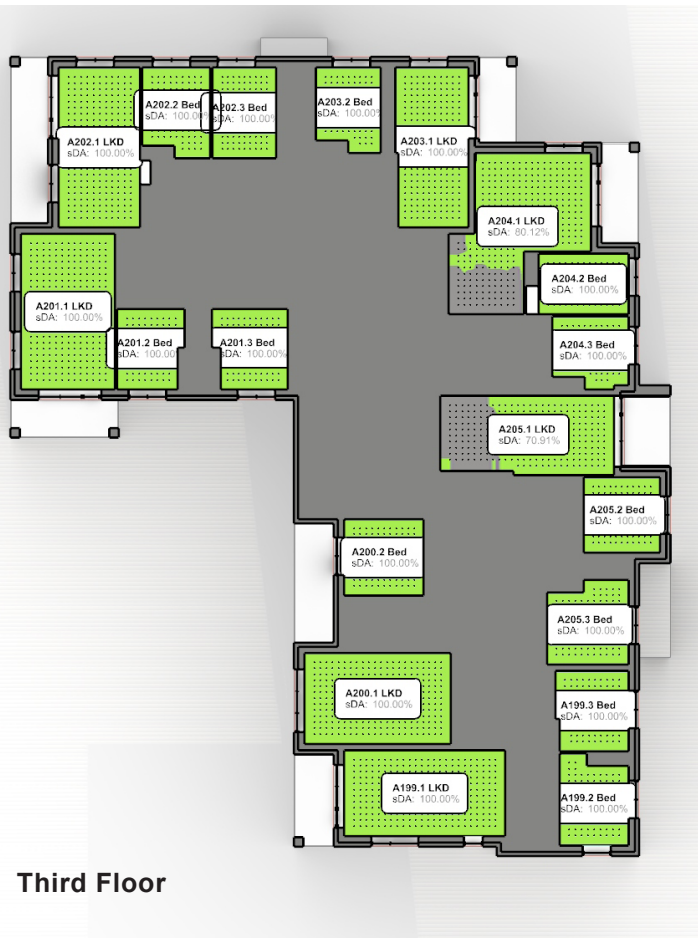
Figure 27: Apartment Block B -
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Apartment Block B - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Target Lux	Mean Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A139.1	LKD	30.7	290	200	757	100.0%	Y
A139.2	Bed	11.7	100	100	1152	100.0%	Y
A139.3	Bed	13.5	116	100	989	100.0%	Y
A140.1	LKD	30.7	290	200	1963	100.0%	Y
A140.2	Bed	11.7	100	100	1161	100.0%	Y
A140.3	Bed	13.5	116	100	1033	100.0%	Y
A141.1	LKD	30.7	290	200	853	100.0%	Y
A141.2	Bed	11.7	100	100	1158	100.0%	Y
A141.3	Bed	13.5	116	100	993	100.0%	Y
A142.1	LKD	30.7	290	200	879	100.0%	Y
A142.2	Bed	11.7	100	100	1194	100.0%	Y
A142.3	Bed	13.5	116	100	1028	100.0%	Y
A143.1	LKD	30.7	290	200	2133	100.0%	Y
A143.2	Bed	11.7	100	100	1198	100.0%	Y
A143.3	Bed	13.5	116	100	1071	100.0%	Y
A144.1	LKD	30.7	290	200	1969	100.0%	Y
A144.2	Bed	11.7	100	100	1163	100.0%	Y
A144.3	Bed	13.5	116	100	1037	100.0%	Y
A145.1	LKD	30.7	290	200	864	100.0%	Y
A145.2	Bed	11.7	100	100	1176	100.0%	Y
A145.3	Bed	13.5	116	100	1005	100.0%	Y
A146.1	LKD	30.7	290	200	913	100.0%	Y
A146.2	Bed	11.7	100	100	1237	100.0%	Y
A146.3	Bed	13.5	116	100	1069	100.0%	Y
A147.1	LKD	30.7	290	200	2162	100.0%	Y
A147.2	Bed	11.7	100	100	1235	100.0%	Y
A147.3	Bed	13.5	116	100	1107	100.0%	Y
A148.1	LKD	30.7	290	200	1984	100.0%	Y
A148.2	Bed	11.7	100	100	1166	100.0%	Y
A148.3	Bed	13.5	116	100	1050	100.0%	Y
A149.1	LKD	30.7	290	200	998	100.0%	Y
A149.2	Bed	11.7	100	100	1174	100.0%	Y
A149.3	Bed	13.5	116	100	1011	100.0%	Y
A150.1	LKD	30.7	290	200	1060	100.0%	Y
A150.2	Bed	11.7	100	100	1269	100.0%	Y
A150.3	Bed	13.5	116	100	1096	100.0%	Y
A151.1	LKD	30.7	290	200	2154	100.0%	Y
A151.2	Bed	11.7	100	100	1263	100.0%	Y
A151.3	Bed	13.5	116	100	1132	100.0%	Y
A152.1	LKD	30.7	290	200	2024	100.0%	Y
A152.2	Bed	11.7	100	100	1180	100.0%	Y
A152.3	Bed	13.5	116	100	1054	100.0%	Y

Table 11: Block B - Minimum Daylight Provision individual room compliance values for all habitable rooms BS EN 17037:2018+A1:2021 Table NA.1.

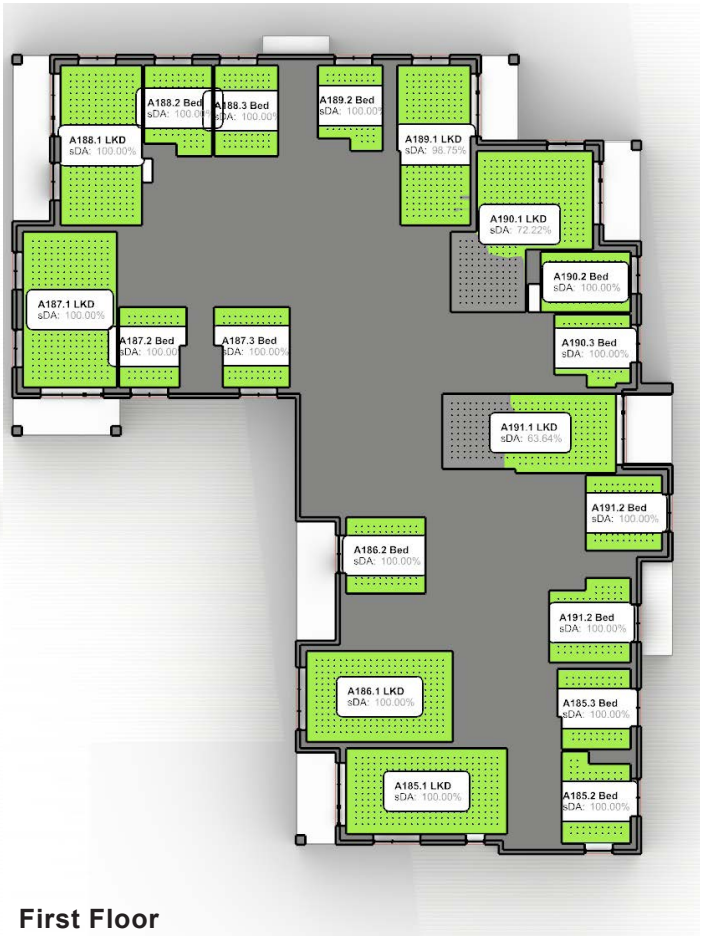


Second Floor



Third Floor

Ground Floor



First Floor

Figure 28: Apartment Block D -
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Apartment Block D - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A180.1	LKD	31.6	288	200	1757	100.0%	Y
A180.2	Bed	12.5	99	100	1615	100.0%	Y
A181.1	LKD	30.5	286	200	838	100.0%	Y
A181.2	Bed	13.9	121	100	644	100.0%	Y
A182.1	LKD	33.5	299	200	1655	100.0%	Y
A182.2	Bed	11.8	92	100	1388	100.0%	Y
A182.3	Bed	13.1	114	100	1157	100.0%	Y
A183.1	LKD	37.9	342	200	585	71.1%	Y
A183.2	Bed	12.5	104	100	1034	100.0%	Y
A183.3	Bed	11.7	97	100	1099	100.0%	Y
A184.1	LKD	30.8	275	200	410	58.9%	Y
A184.2	Bed	11.9	90	100	1158	100.0%	Y
A185.1	LKD	31.6	288	200	1753	100.0%	Y
A185.2	Bed	13.3	103	100	1687	100.0%	Y
A185.3	Bed	13.2	105	100	1244	100.0%	Y
A186.1	LKD	30.5	286	200	971	100.0%	Y
A186.2	Bed	13.9	121	100	594	100.0%	Y
A187.1	LKD	33.5	299	200	1646	100.0%	Y
A187.2	Bed	11.8	92	100	1505	100.0%	Y
A187.3	Bed	13.1	114	100	1246	100.0%	Y
A188.1	LKD	29.8	264	200	1070	100.0%	Y
A188.2	Bed	13.2	107	100	663	100.0%	Y
A188.3	Bed	13.3	117	100	646	100.0%	Y
A189.1	LKD	26.2	240	200	666	98.8%	Y
A189.2	Bed	11.8	97	100	738	100.0%	Y
A190.1	LKD	37.9	342	200	603	72.2%	Y
A190.2	Bed	12.5	104	100	1134	100.0%	Y
A190.3	Bed	11.7	97	100	1214	100.0%	Y
A191.1	LKD	30.8	275	200	394	63.6%	Y
A191.2	Bed	14.7	120	100	1145	100.0%	Y
A191.2	Bed	13.1	110	100	1231	100.0%	Y
A192.1	LKD	31.6	288	200	1773	100.0%	Y
A192.2	Bed	13.3	103	100	1741	100.0%	Y
A192.3	Bed	13.2	105	100	1296	100.0%	Y
A193.1	LKD	30.5	286	200	988	100.0%	Y
A193.2	Bed	13.9	121	100	604	100.0%	Y
A194.1	LKD	33.5	299	200	1681	100.0%	Y
A194.2	Bed	11.8	92	100	1620	100.0%	Y
A194.3	Bed	13.1	114	100	1312	100.0%	Y
A195.1	LKD	29.8	264	200	1097	100.0%	Y
A195.2	Bed	13.2	107	100	719	100.0%	Y
A195.3	Bed	13.3	117	100	699	100.0%	Y
A196.1	LKD	26.2	240	200	715	100.0%	Y
A196.2	Bed	11.8	97	100	790	100.0%	Y
A197.1	LKD	37.9	342	200	647	76.0%	Y
A197.2	Bed	12.5	104	100	1187	100.0%	Y
A197.3	Bed	11.7	97	100	1254	100.0%	Y
A198.1	LKD	30.8	275	200	416	68.4%	Y
A198.2	Bed	13.1	110	100	1299	100.0%	Y
A198.3	Bed	14.7	120	100	1176	100.0%	Y

Apartment Block D - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A199.1	LKD	31.6	288	200	1787	100.0%	Y
A199.2	Bed	13.3	103	100	1767	100.0%	Y
A199.3	Bed	13.2	105	100	1326	100.0%	Y
A200.1	LKD	30.5	286	200	1000	100.0%	Y
A200.2	Bed	13.9	121	100	616	100.0%	Y
A201.1	LKD	33.5	299	200	1722	100.0%	Y
A201.2	Bed	11.8	92	100	1762	100.0%	Y
A201.3	Bed	13.1	114	100	1498	100.0%	Y
A202.1	LKD	29.8	264	200	1115	100.0%	Y
A202.2	Bed	13.2	107	100	755	100.0%	Y
A202.3	Bed	13.3	117	100	732	100.0%	Y
A203.1	LKD	26.2	240	200	762	100.0%	Y
A203.2	Bed	11.8	97	100	822	100.0%	Y
A204.1	LKD	37.9	342	200	672	80.1%	Y
A204.2	Bed	12.5	104	100	1224	100.0%	Y
A204.3	Bed	11.7	97	100	1294	100.0%	Y
A205.1	LKD	30.8	275	200	429	70.9%	Y
A205.2	Bed	13.1	110	100	1320	100.0%	Y
A205.3	Bed	14.7	120	100	1197	100.0%	Y

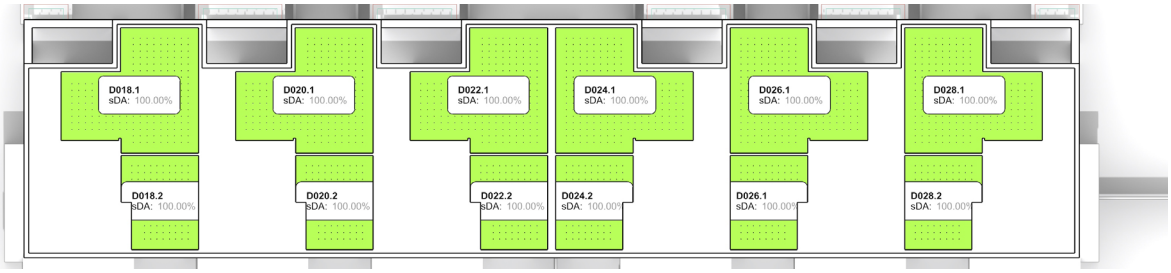
Table 12: Block D - Minimum Daylight Provision individual room compliance values for all habitable rooms BS EN 17037:2018+A1:2021 Table NA.1.

Figure 29: Apartment Block C -
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Apartment Block C - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
A242.1	LKD	29.8	253	643	200	100.0%	Y
A242.2	Bed	14.6	120	776	100	100.0%	Y
A242.3	Bed	13.0	110	1170	100	100.0%	Y
A243.1	LKD	29.8	253	751	200	100.0%	Y
A243.2	Bed	14.6	120	970	100	100.0%	Y
A243.3	Bed	13.0	110	1374	100	100.0%	Y
A244.1	LKD	30.1	280	2031	200	100.0%	Y
A244.2	Bed	12.8	105	1291	100	100.0%	Y
A244.3	Bed	8.1	66	293	100	100.0%	Y
A245.1	LKD	30.1	280	2318	200	100.0%	Y
A245.2	Bed	12.9	110	1409	100	100.0%	Y
A245.3	Bed	8.1	66	348	100	100.0%	Y
A246.1	LKD	29.8	253	1507	200	100.0%	Y
A246.2	Bed	13.0	110	759	100	100.0%	Y
A246.3	Bed	14.6	120	658	100	100.0%	Y
A247.1	LKD	29.8	253	1866	200	100.0%	Y
A247.2	Bed	14.6	120	689	100	100.0%	Y
A247.3	Bed	13.0	110	790	100	100.0%	Y
A248.1	LKD	29.8	253	1814	200	100.0%	Y
A248.2	Bed	14.6	120	563	100	100.0%	Y
A248.3	Bed	13.0	110	745	100	100.0%	Y
A249.1	LKD	29.8	253	2004	200	100.0%	Y
A249.2	Bed	13.0	110	772	100	100.0%	Y
A249.3	Bed	14.6	120	579	100	100.0%	Y

Table 13: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

First Floor



Ground Floor

Figure 30: Duplex units 17 - 28

Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex 17 - 28 : Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D017.1	LKD	32.3	302	2617	200	100.0%	Y
D017.2	Bed	13.1	107	1436	100	100.0%	Y
D017.3	Bed	11.7	93	826	100	100.0%	Y
D018.1	LKD	25.9	226	602	200	100.0%	Y
D018.2	Bed	12.7	107	2054	100	100.0%	Y
D019.1	LKD	30.4	288	1920	200	100.0%	Y
D019.2	Bed	13.1	107	1427	100	100.0%	Y
D019.3	Bed	11.7	90	752	100	100.0%	Y
D020.1	LKD	25.9	226	564	200	100.0%	Y
D020.2	Bed	12.7	107	2061	100	100.0%	Y
D021.1	LKD	30.4	288	2092	200	100.0%	Y
D021.2	Bed	13.1	107	1907	100	100.0%	Y
D021.3	Bed	11.7	90	811	100	100.0%	Y
D022.1	LKD	25.9	226	579	200	100.0%	Y
D022.2	Bed	12.7	107	2029	100	100.0%	Y
D023.1	LKD	30.4	288	2097	200	100.0%	Y
D023.2	Bed	13.1	107	1857	100	100.0%	Y
D023.3	Bed	11.7	90	818	100	100.0%	Y
D024.1	LKD	25.9	226	567	200	100.0%	Y
D024.2	Bed	12.7	107	2041	100	100.0%	Y
D025.1	LKD	30.4	288	1925	200	100.0%	Y
D025.2	Bed	13.1	107	1439	100	100.0%	Y
D025.3	Bed	11.7	90	758	100	100.0%	Y
D026.1	LKD	12.7	107	2058	200	100.0%	Y
D026.1	LKD	25.9	226	562	200	100.0%	Y
D027.1	LKD	32.3	302	2590	200	100.0%	Y
D027.2	Bed	13.1	107	1431	100	100.0%	Y
D027.3	Bed	11.7	93	816	100	100.0%	Y
D028.1	LKD	25.9	226	592	200	100.0%	Y
D028.2	Bed	12.7	107	2068	100	100.0%	Y

Table 14: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

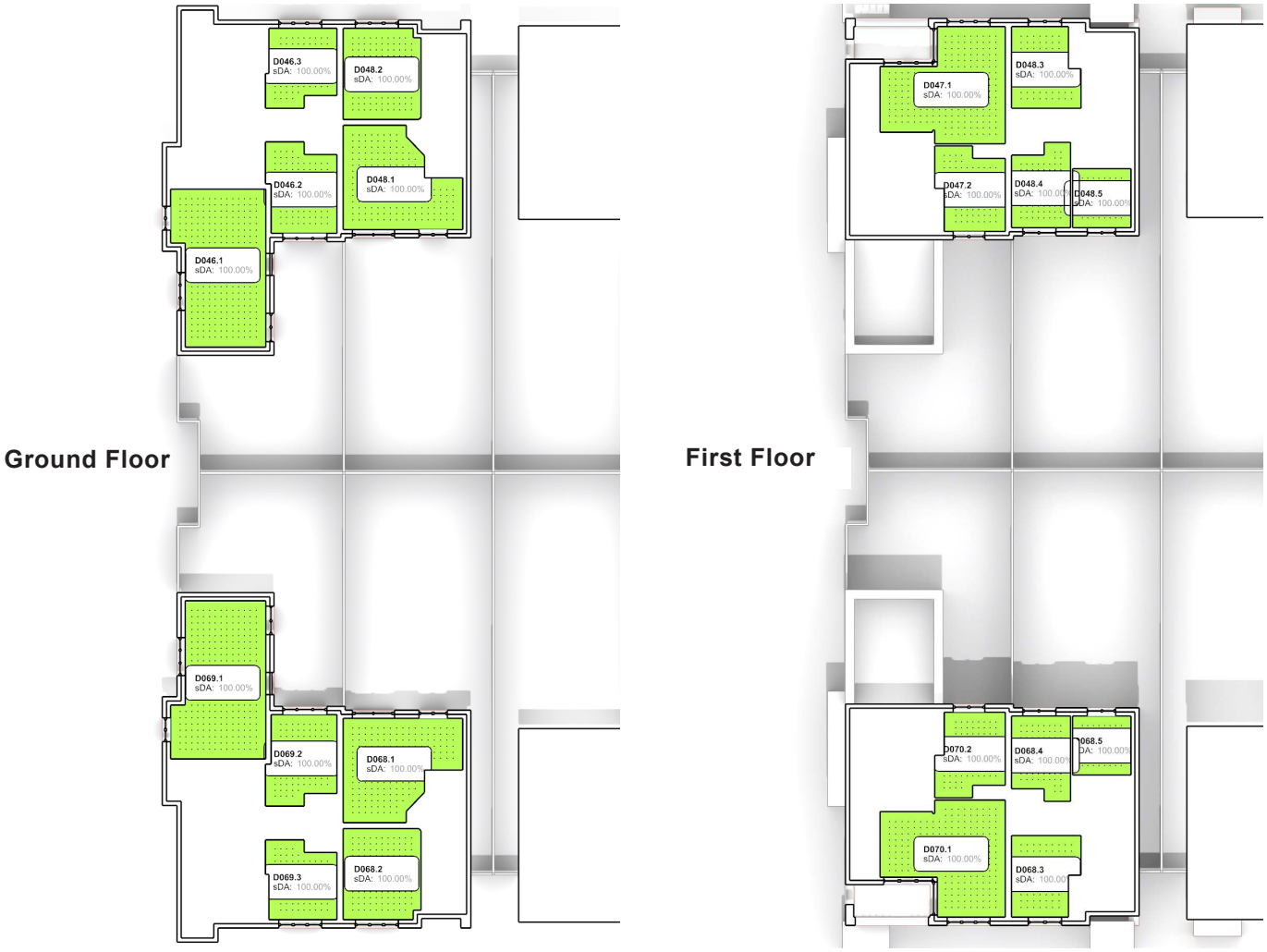
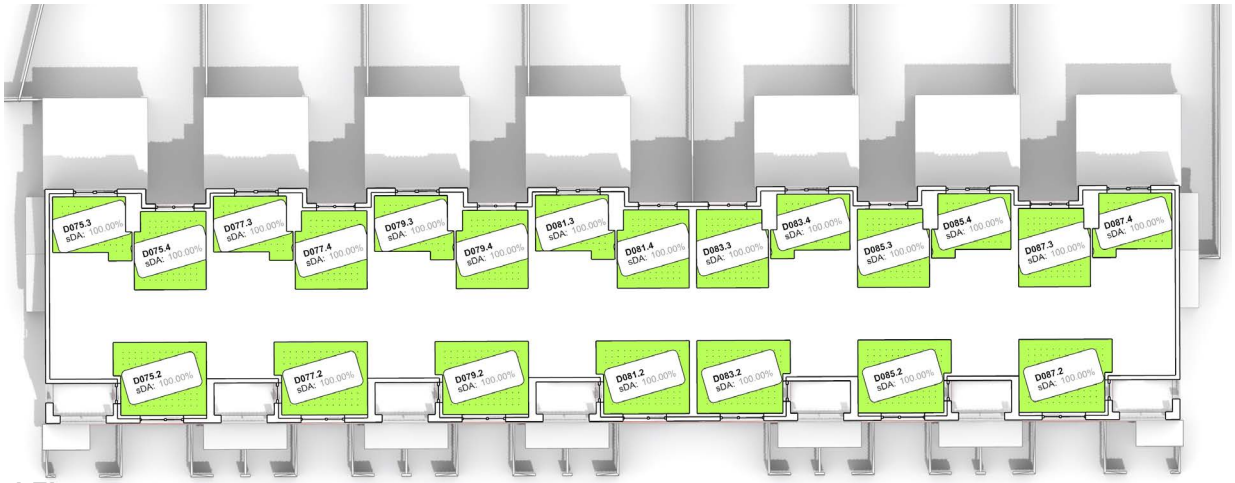


Figure 31: Duplex units 46 - 48 and 66 - 70

Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

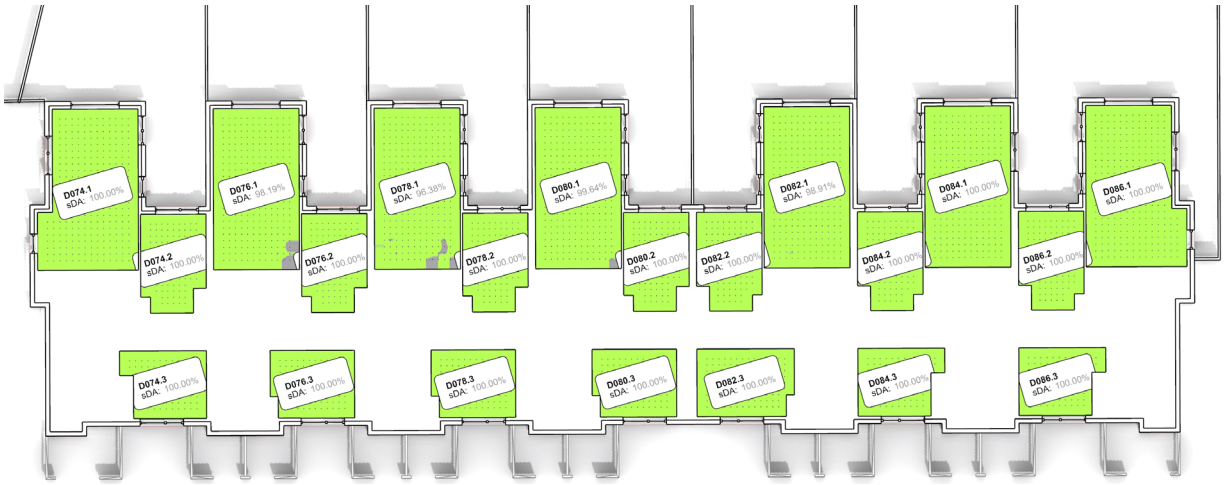
Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D046.1	LKD	30.5	290	1487	200	100.0%	Y
D046.2	Bed	13.2	111	1751	100	100.0%	Y
D046.3	Bed	11.6	92	654	100	100.0%	Y
D047.1	LKD	26.6	234	527	200	100.0%	Y
D047.2	Bed	11.8	95	1471	100	100.0%	Y
D048.1	KD	22.7	192	200	1534	100.0%	Y
D048.2	Liv	15.8	142	150	471	100.0%	Y
D048.3	Bed	11.6	85	100	394	100.0%	Y
D048.4	Bed	10.4	84	100	1317	100.0%	Y
D048.5	Bed	7.8	64	100	1422	100.0%	Y
D068.1	KD	22.7	192	200	567	100.0%	Y
D068.2	Liv	15.8	142	150	1509	100.0%	Y
D068.3	Bed	11.6	85	100	1143	100.0%	Y
D068.4	Bed	10.4	84	100	539	100.0%	Y
D068.5	Bed	7.8	64	100	567	100.0%	Y
D069.1	LKD	30.5	290	1212	200	100.0%	Y
D069.2	Bed	13.2	111	473	100	100.0%	Y
D069.3	Bed	11.6	92	2510	100	100.0%	Y
D070.1	LKD	26.6	234	1482	200	100.0%	Y
D070.2	Bed	11.8	95	455	100	100.0%	Y

Table 15: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms



Second Floor

First Floor

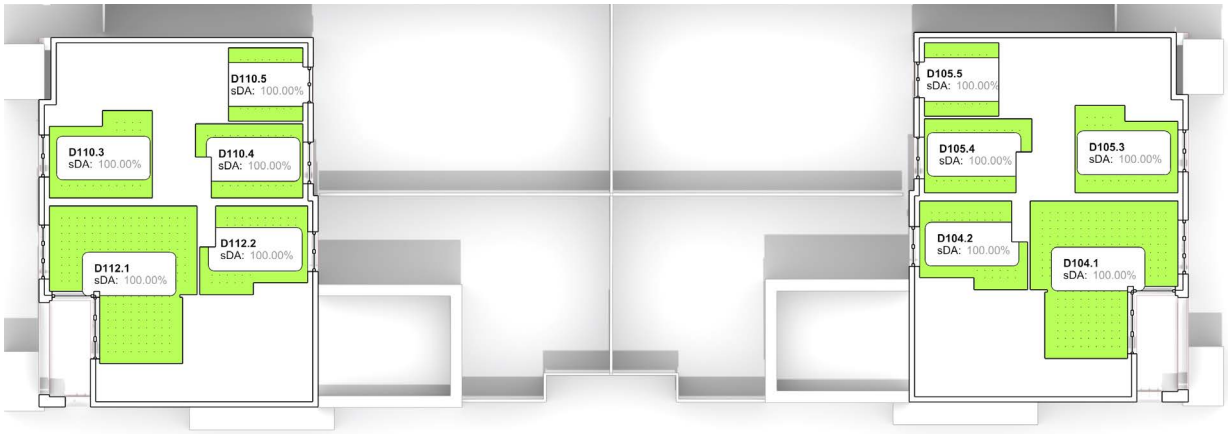


Ground Floor

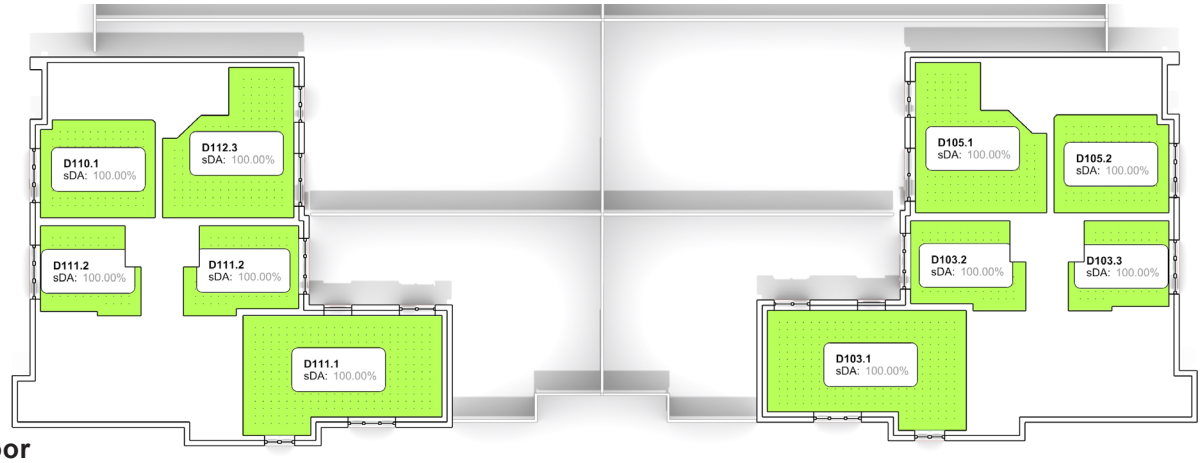
Figure 32: Duplex units 74 - 87
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units - Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D074.1	LKD	31.9	290	1377	200	100.0%	Y
D074.2	Bed	13.0	113	379	100	100.0%	Y
D074.3	Bed	11.5	94	3075	100	100.0%	Y
D075.1	LKD	34.7	333	666	200	100.0%	Y
D075.2	Bed	14.1	123	2388	100	100.0%	Y
D075.3	Bed	9.6	74	1064	100	100.0%	Y
D075.4	Bed	11.9	107	569	100	100.0%	Y
D076.1	LKD	30.0	276	701	200	92.4%	Y
D076.2	Bed	13.0	113	377	100	100.0%	Y
D076.3	Bed	12.0	105	2883	100	100.0%	Y
D077.2	LKD	34.7	333	666	200	100.0%	Y
D077.2	Bed	14.1	123	2368	100	100.0%	Y
D077.3	Bed	9.6	74	1052	100	100.0%	Y
D077.4	Bed	11.9	107	559	100	100.0%	Y
D078.1	LKD	30.0	276	704	200	94.9%	Y
D078.2	Bed	13.0	113	377	100	100.0%	Y
D078.3	Bed	12.0	105	2880	100	100.0%	Y
D079.1	LKD	34.7	333	667	200	100.0%	Y
D079.2	Bed	14.1	123	2376	100	100.0%	Y
D079.3	Bed	9.6	74	1047	100	100.0%	Y
D079.4	Bed	11.9	107	559	100	100.0%	Y
D080.1	LKD	30.0	276	817	200	100.0%	Y
D080.2	Bed	13.0	113	504	100	100.0%	Y
D080.3	Bed	12.0	105	3021	100	100.0%	Y
D081.1	LKD	34.7	333	681	200	100.0%	Y
D081.2	Bed	14.1	123	2421	100	100.0%	Y
D081.3	Bed	9.6	74	1034	100	100.0%	Y
D081.4	Bed	11.9	107	572	100	100.0%	Y
D082.1	LKD	30.0	276	658	200	98.2%	Y
D082.2	Bed	13.0	113	483	100	100.0%	Y
D082.3	Bed	13.9	123	2719	100	100.0%	Y
D083.1	LKD	34.7	333	684	200	100.0%	Y
D083.2	Bed	14.1	123	2449	100	100.0%	Y
D083.3	Bed	11.9	107	568	100	100.0%	Y
D083.4	Bed	9.6	74	1036	100	100.0%	Y
D084.1	LKD	30.0	276	828	200	100.0%	Y
D084.2	Bed	13.0	113	386	100	100.0%	Y
D084.3	Bed	11.5	94	2997	100	100.0%	Y
D085.1	LKD	34.7	333	671	200	100.0%	Y
D085.2	Bed	14.1	123	2383	100	100.0%	Y
D085.3	Bed	11.9	107	551	100	100.0%	Y
D085.4	Bed	9.6	74	1037	100	100.0%	Y
D086.1	LKD	31.9	290	1478	200	100.0%	Y
D086.2	Bed	13.0	113	384	100	100.0%	Y
D086.3	Bed	11.5	94	3133	100	100.0%	Y
D087.1	LKD	34.7	333	680	200	100.0%	Y
D087.2	Bed	14.1	123	2413	100	100.0%	Y
D087.3	Bed	11.9	107	557	100	100.0%	Y
D087.4	Bed	9.6	74	1058	100	100.0%	Y

Table 16: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms



First Floor



Ground Floor

Figure 33: Duplex units 103 - 112
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex units 103 - 112: Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D103.1	LKD	30.5	290	1660	200	100.0%	Y
D103.2	Bed	13.2	111	1009	100	100.0%	Y
D103.3	Bed	11.6	92	1505	100	100.0%	Y
D104.1	Bed	26.6	234	1055	100	100.0%	Y
D104.2	Bed	11.8	95	1061	100	100.0%	Y
D105.1	KD	22.7	192	1302	200	100.0%	Y
D105.2	Liv	15.8	142	1122	150	100.0%	Y
D105.3	Bed	11.6	85	854	100	100.0%	Y
D105.4	Bed	10.4	84	1197	100	100.0%	Y
D105.5	Bed	7.8	64	1275	100	100.0%	Y
D110.1	KD	15.8	142	964	200	100.0%	Y
D110.2	LKD	22.7	192	1255	150	100.0%	Y
D110.3	Bed	11.6	85	771	100	100.0%	Y
D110.4	Bed	10.4	84	1121	100	100.0%	Y
D110.5	Bed	7.8	64	1215	100	100.0%	Y
D111.1	LKD	30.5	290	1654	200	100.0%	Y
D111.2	Bed	13.2	111	933	100	100.0%	Y
D111.3	Bed	11.6	92	1293	100	100.0%	Y
D112.1	LKD	26.6	234	937	200	100.0%	Y
D112.2	Bed	11.8	95	995	100	100.0%	Y

Table 17: Minimum Daylight Provision compliance values for all habitable rooms

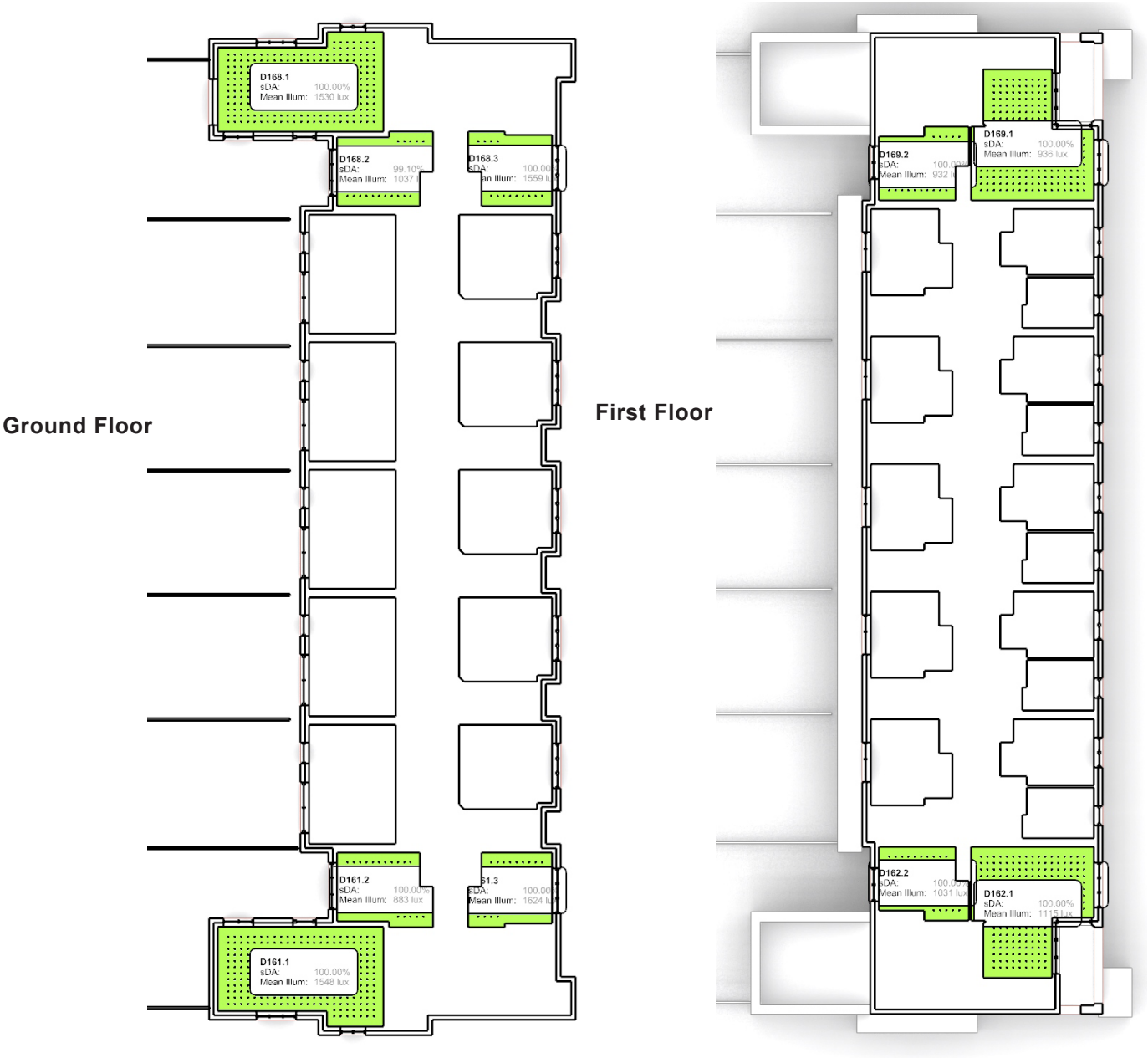
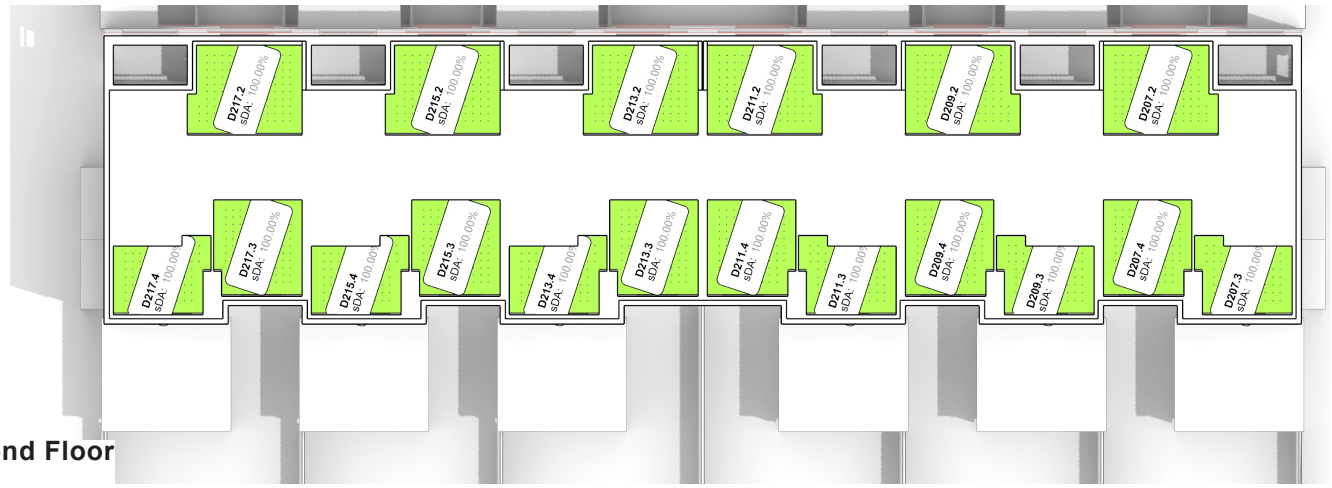


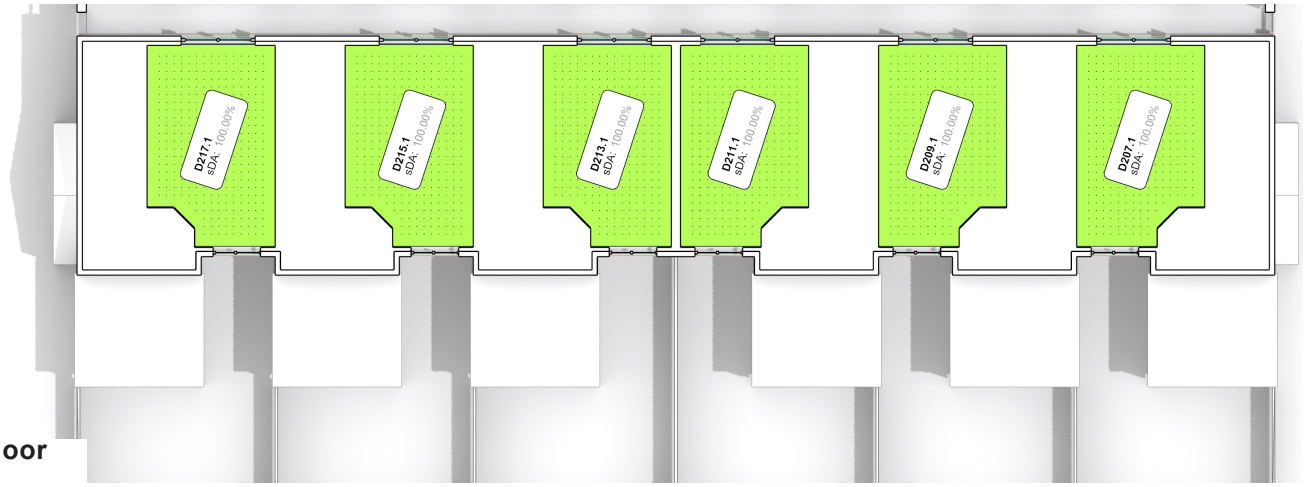
Figure 34: Duplex units 161 - 162 and 168 - 169
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D161.1	LKD	30.5	290	1548	200	100.0%	Y
D161.2	Bed	13.2	111	883	100	100.0%	Y
D161.3	Bed	11.6	92	1624	100	100.0%	Y
D162.1	LKD	26.6	234	1115	200	100.0%	Y
D162.2	Bed	11.8	95	1031	100	100.0%	Y
D168.1	LKD	30.5	290	1530	200	100.0%	Y
D168.2	LKD	13.2	111	1037	200	99.1%	Y
D168.3	Bed	11.6	92	1559	100	100.0%	Y
D169.1	LKD	26.6	234	936	200	100.0%	Y
D169.2	Bed	11.8	95	932	100	100.0%	Y

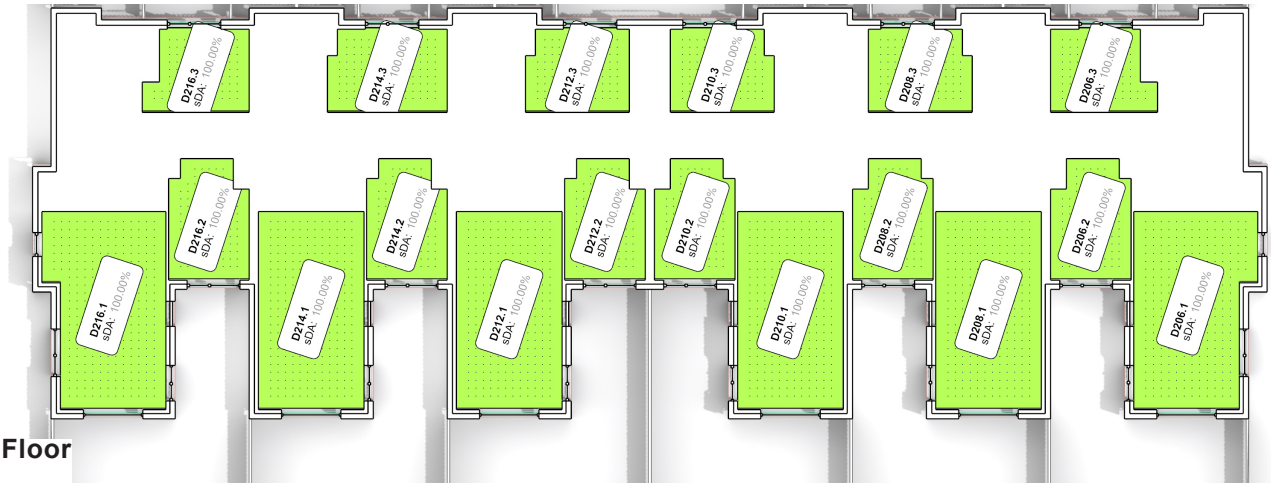
Table 18: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms



Second Floor



First Floor

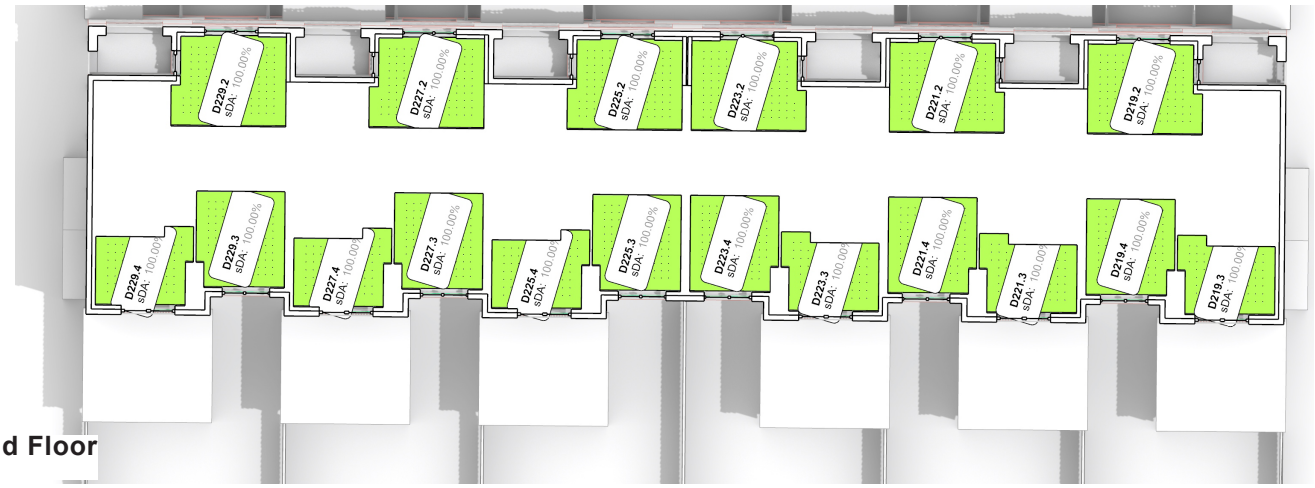


Ground Floor

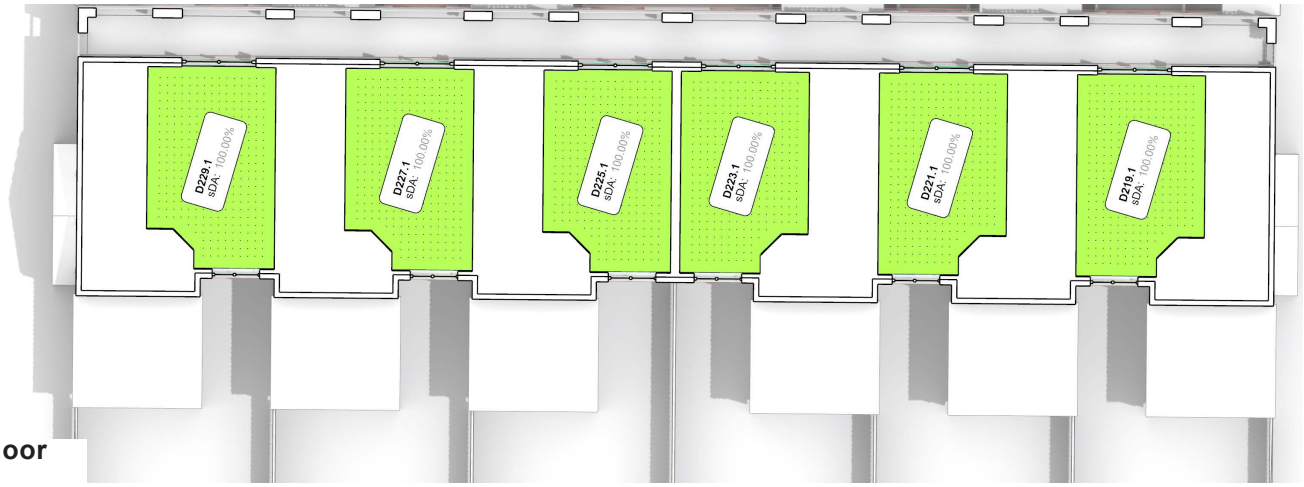
Figure 35: Duplex units 206 - 217
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D206.1	LKD	31.9	290	2344	200	100.0%	Y
D206.2	Bed	13.0	113	1262	100	100.0%	Y
D206.3	Bed	11.5	94	1436	100	100.0%	Y
D207.1	LKD	34.7	333	812	200	100.0%	Y
D207.2	Bed	14.1	123	1272	100	100.0%	Y
D207.3	Bed	9.6	74	2640	100	100.0%	Y
D207.4	Bed	11.9	107	1289	100	100.0%	Y
D208.1	LKD	30.0	276	1439	200	100.0%	Y
D208.2	Bed	13.0	113	1255	100	100.0%	Y
D208.3	Bed	12.0	105	1218	100	100.0%	Y
D209.1	LKD	34.7	333	816	200	100.0%	Y
D209.2	Bed	14.1	123	1243	100	100.0%	Y
D209.3	Bed	9.6	74	2627	100	100.0%	Y
D209.4	Bed	11.9	107	1289	100	100.0%	Y
D210.1	LKD	30.0	276	1463	200	100.0%	Y
D210.2	Bed	13.0	113	1431	100	100.0%	Y
D210.3	Bed	12.0	105	1289	100	100.0%	Y
D211.1	LKD	34.7	333	822	200	100.0%	Y
D211.2	Bed	14.1	123	1240	100	100.0%	Y
D211.3	Bed	9.6	74	2630	100	100.0%	Y
D211.4	Bed	11.9	107	1301	100	100.0%	Y
D212.1	LKD	30.0	276	1881	200	100.0%	Y
D212.2	Bed	13.0	113	1727	100	100.0%	Y
D212.3	Bed	12.0	105	1458	100	100.0%	Y
D213.1	LKD	34.7	333	873	200	100.0%	Y
D213.2	Bed	14.1	123	1225	100	100.0%	Y
D213.3	Bed	11.9	107	1362	100	100.0%	Y
D213.4	Bed	9.6	74	2685	100	100.0%	Y
D214.1	LKD	30.0	276	1678	200	100.0%	Y
D214.2	Bed	13.0	113	1223	100	100.0%	Y
D214.3	Bed	13.9	123	1203	100	100.0%	Y
D215.1	LKD	34.7	333	850	200	100.0%	Y
D215.2	Bed	14.1	123	1215	100	100.0%	Y
D215.3	Bed	11.9	107	1334	100	100.0%	Y
D215.4	Bed	9.6	74	2695	100	100.0%	Y
D216.1	LKD	31.9	290	1907	200	100.0%	Y
D216.2	Bed	13.0	113	1216	100	100.0%	Y
D216.3	Bed	11.5	94	1370	100	100.0%	Y
D217.1	LKD	34.7	333	851	200	100.0%	Y
D217.2	Bed	14.1	123	1248	100	100.0%	Y
D217.3	Bed	11.9	107	1332	100	100.0%	Y
D217.4	Bed	9.6	74	2709	100	100.0%	Y

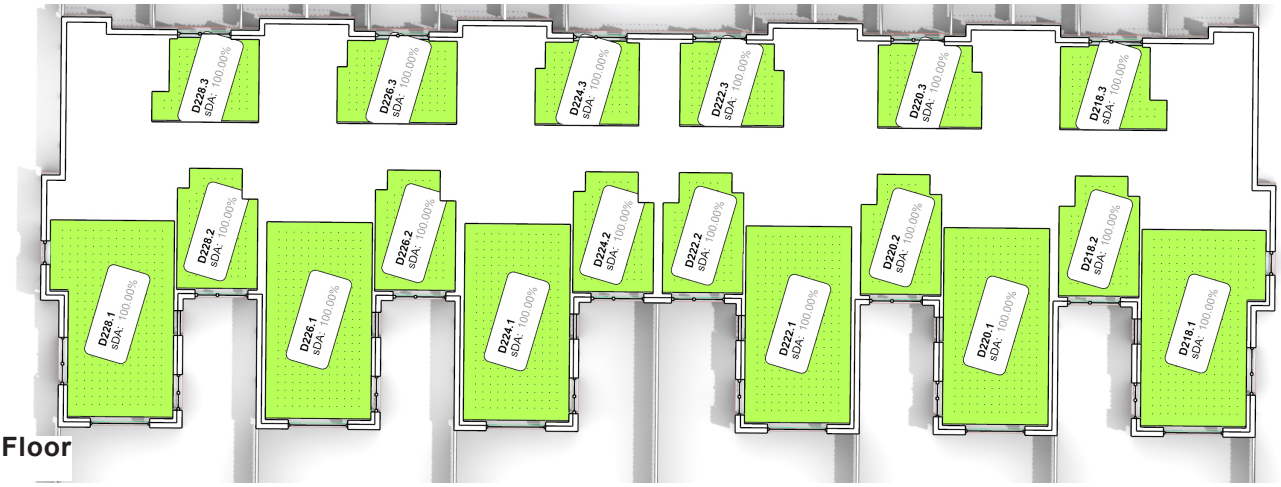
Table 19: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms



Second Floor



First Floor



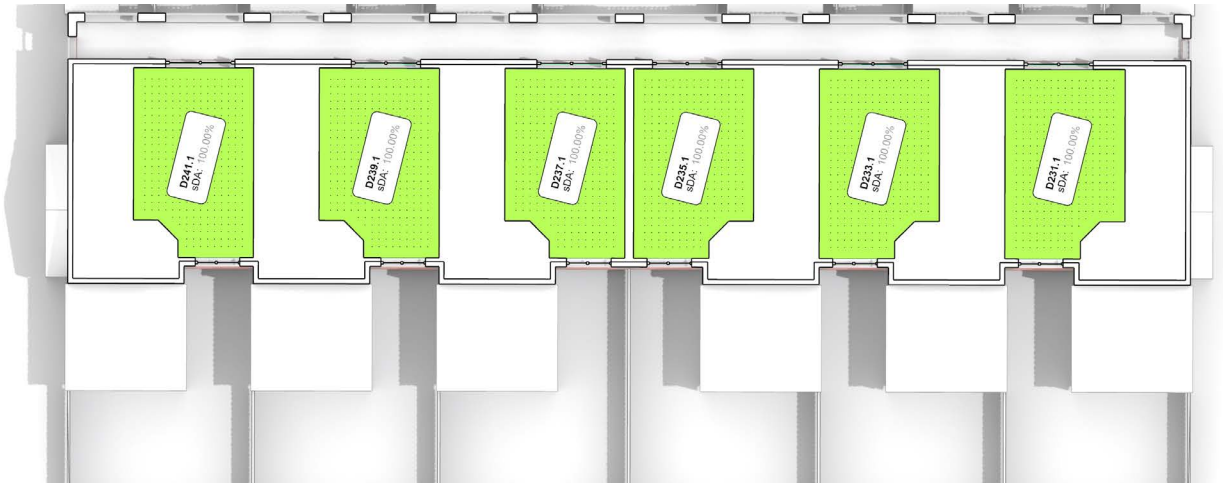
Ground Floor

Figure 36: Duplex units 218 - 229
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

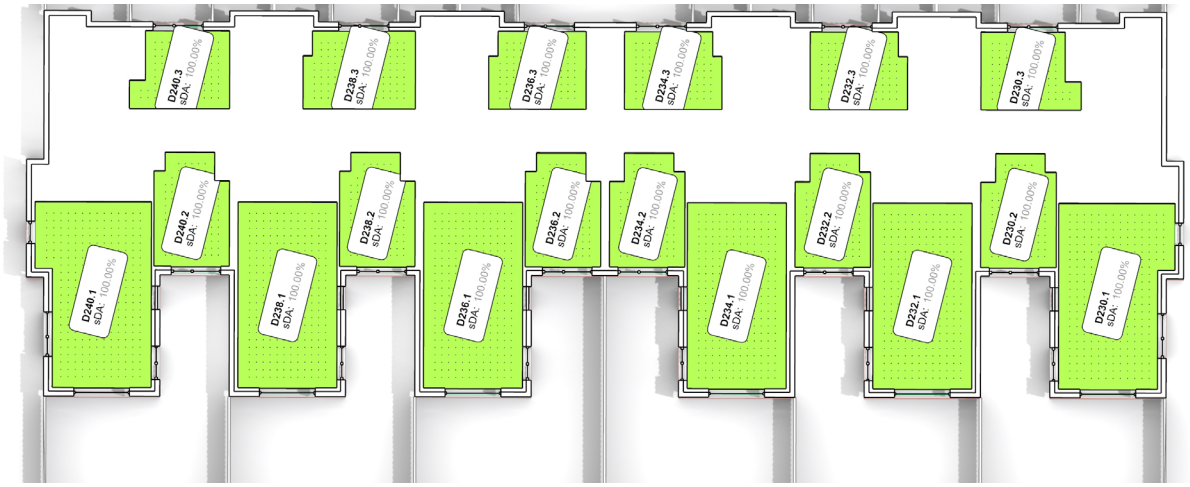
Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D218.1	LKD	31.9	290	2202	200	100.0%	Y
D218.2	Bed	13.0	113	1245	100	100.0%	Y
D218.3	Bed	11.5	94	1565	100	100.0%	Y
D219.1	LKD	34.7	333	819	200	100.0%	Y
D219.2	Bed	14.1	123	1340	100	100.0%	Y
D219.3	Bed	9.6	74	2569	100	100.0%	Y
D219.4	Bed	11.9	107	1269	100	100.0%	Y
D220.1	LKD	30.0	276	1407	200	100.0%	Y
D220.2	Bed	13.0	113	1254	100	100.0%	Y
D220.3	Bed	12.0	105	1300	100	100.0%	Y
D221.1	LKD	34.7	333	814	200	100.0%	Y
D221.2	Bed	14.1	123	1279	100	100.0%	Y
D221.3	Bed	9.6	74	2590	100	100.0%	Y
D221.4	Bed	11.9	107	1265	100	100.0%	Y
D222.1	LKD	30.0	276	1442	200	100.0%	Y
D222.2	Bed	13.0	113	1411	100	100.0%	Y
D222.3	Bed	12.0	105	1323	100	100.0%	Y
D223.1	LKD	34.7	333	814	200	100.0%	Y
D223.2	Bed	14.1	123	1310	100	100.0%	Y
D223.3	Bed	9.6	74	2561	100	100.0%	Y
D223.4	Bed	11.9	107	1274	100	100.0%	Y
D224.1	LKD	30.0	276	1871	200	100.0%	Y
D224.2	Bed	13.0	113	1704	100	100.0%	Y
D224.3	Bed	12.0	105	1514	100	100.0%	Y
D225.1	LKD	34.7	333	869	200	100.0%	Y
D225.2	Bed	14.1	123	1232	100	100.0%	Y
D225.3	Bed	11.9	107	1328	100	100.0%	Y
D225.4	Bed	9.6	74	2643	100	100.0%	Y
D226.1	LKD	30.0	276	1668	200	100.0%	Y
D226.2	Bed	13.0	113	1208	100	100.0%	Y
D226.3	Bed	13.9	123	1249	100	100.0%	Y
D227.1	LKD	34.7	333	848	200	100.0%	Y
D227.2	Bed	14.1	123	1237	100	100.0%	Y
D227.3	Bed	11.9	107	1307	100	100.0%	Y
D227.4	Bed	9.6	74	2679	100	100.0%	Y
D228.1	LKD	31.9	290	1898	200	100.0%	Y
D228.2	Bed	13.0	113	1190	100	100.0%	Y
D228.3	Bed	11.5	94	1396	100	100.0%	Y
D229.1	LKD	34.7	333	849	200	100.0%	Y
D229.2	Bed	14.1	123	1257	100	100.0%	Y
D229.3	Bed	11.9	107	1316	100	100.0%	Y
D229.4	Bed	9.6	74	2667	100	100.0%	Y

Table 20: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

Second Floor



First Floor



Ground Floor

Figure 37: Duplex units 230 - 241
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D230.1	LKD	31.9	290	2171	200	100.0%	Y
D230.2	Bed	13.0	113	1242	100	100.0%	Y
D230.3	Bed	11.5	94	1586	100	100.0%	Y
D231.1	LKD	34.7	333	810	200	100.0%	Y
D231.2	Bed	14.1	123	1373	100	100.0%	Y
D231.3	Bed	9.6	74	2544	100	100.0%	Y
D231.4	Bed	11.9	107	1239	100	100.0%	Y
D232.1	LKD	30.0	276	1394	200	100.0%	Y
D232.2	Bed	13.0	113	1227	100	100.0%	Y
D232.3	Bed	12.0	105	1352	100	100.0%	Y
D233.1	LKD	34.7	333	804	200	100.0%	Y
D233.2	Bed	14.1	123	1309	100	100.0%	Y
D233.3	Bed	9.6	74	2520	100	100.0%	Y
D233.4	Bed	11.9	107	1240	100	100.0%	Y
D234.1	LKD	30.0	276	1413	200	100.0%	Y
D234.2	Bed	13.0	113	1388	100	100.0%	Y
D234.3	Bed	12.0	105	1392	100	100.0%	Y
D235.1	LKD	34.7	333	808	200	100.0%	Y
D235.2	Bed	14.1	123	1298	100	100.0%	Y
D235.3	Bed	9.6	74	2533	100	100.0%	Y
D235.4	Bed	11.9	107	1253	100	100.0%	Y
D236.1	LKD	30.0	276	1841	200	100.0%	Y
D236.2	Bed	13.0	113	1686	100	100.0%	Y
D236.3	Bed	12.0	105	1594	100	100.0%	Y
D237.1	LKD	34.7	333	867	200	100.0%	Y
D237.2	Bed	14.1	123	1272	100	100.0%	Y
D237.3	Bed	11.9	107	1305	100	100.0%	Y
D237.4	Bed	9.6	74	2606	100	100.0%	Y
D238.1	LKD	30.0	276	1639	200	100.0%	Y
D238.2	Bed	13.0	113	1184	100	100.0%	Y
D238.3	Bed	13.9	123	1311	100	100.0%	Y
D239.1	LKD	34.7	333	843	200	100.0%	Y
D239.2	Bed	14.1	123	1269	100	100.0%	Y
D239.3	Bed	11.9	107	1277	100	100.0%	Y
D239.4	Bed	9.6	74	2629	100	100.0%	Y
D240.1	LKD	31.9	290	1904	200	100.0%	Y
D240.2	Bed	13.0	113	1190	100	100.0%	Y
D240.3	Bed	11.5	94	1498	100	100.0%	Y
D241.1	LKD	34.7	333	847	200	100.0%	Y
D241.2	Bed	14.1	123	1301	100	100.0%	Y
D241.3	Bed	11.9	107	1278	100	100.0%	Y
D241.4	Bed	9.6	74	2631	100	100.0%	Y

Table 21: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

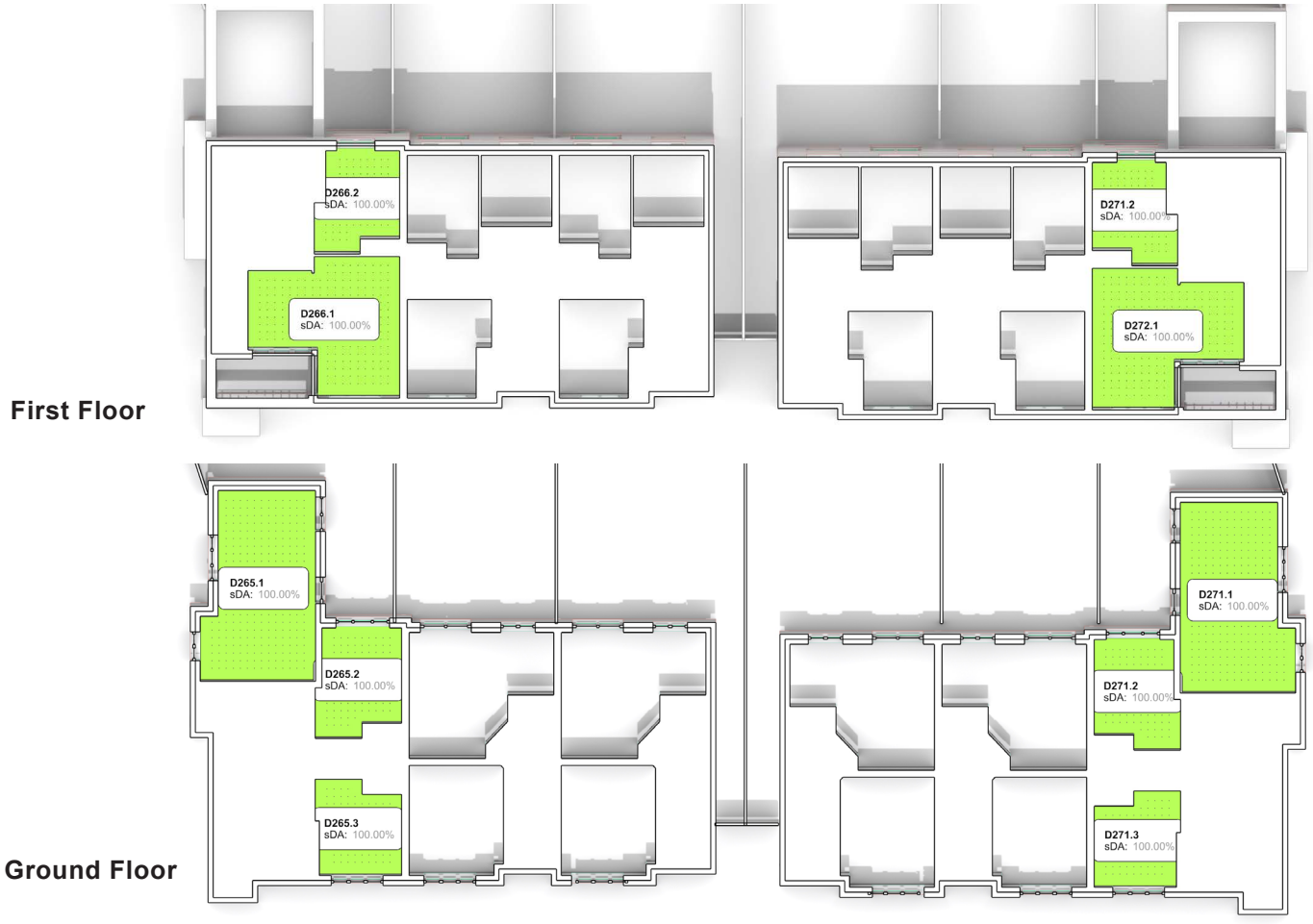


Figure 38: Duplex units 265 - 266 and 271 - 272
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D265.1	LKD	30.5	290	1122	200	100.0%	Y
D265.2	Bed	13.2	111	452	100	100.0%	Y
D265.3	Bed	11.6	92	2019	100	100.0%	Y
D266.1	LKD	26.6	234	962	200	100.0%	Y
D266.2	Bed	11.8	95	457	100	100.0%	Y
D271.1	LKD	30.5	290	1195	200	100.0%	Y
D271.2	Bed	13.2	111	454	100	100.0%	Y
D271.2	Bed	11.8	95	466	100	100.0%	Y
D271.3	Bed	11.6	92	2153	100	100.0%	Y
D272.1	LKD	26.6	234	1069	200	100.0%	Y
D276.1	LKD	30.5	290	1282	200	100.0%	Y
D276.2	Bed	13.2	111	468	100	100.0%	Y
D276.3	Bed	11.6	92	2256	100	100.0%	Y
D277.1	LKD	26.6	234	1124	200	100.0%	Y
D277.2	Bed	11.8	95	464	100	100.0%	Y

Table 22: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

Figure 39: Duplex units 276 - 277 and 282 - 283
Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D276.1	LKD	30.5	290	1282	200	100.0%	Y
D276.2	Bed	13.2	111	468	100	100.0%	Y
D276.3	Bed	11.6	92	2256	100	100.0%	Y
D277.1	LKD	26.6	234	1124	200	100.0%	Y
D277.2	Bed	11.8	95	464	100	100.0%	Y
D282.1	LKD	30.5	290	1188	200	100.0%	Y
D282.2	Bed	11.6	92	2185	100	100.0%	Y
D282.2	Bed	13.2	111	460	100	100.0%	Y
D283.1	LKD	26.6	234	1094	200	100.0%	Y
D283.2	Bed	11.8	95	462	100	100.0%	Y

Table 23: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

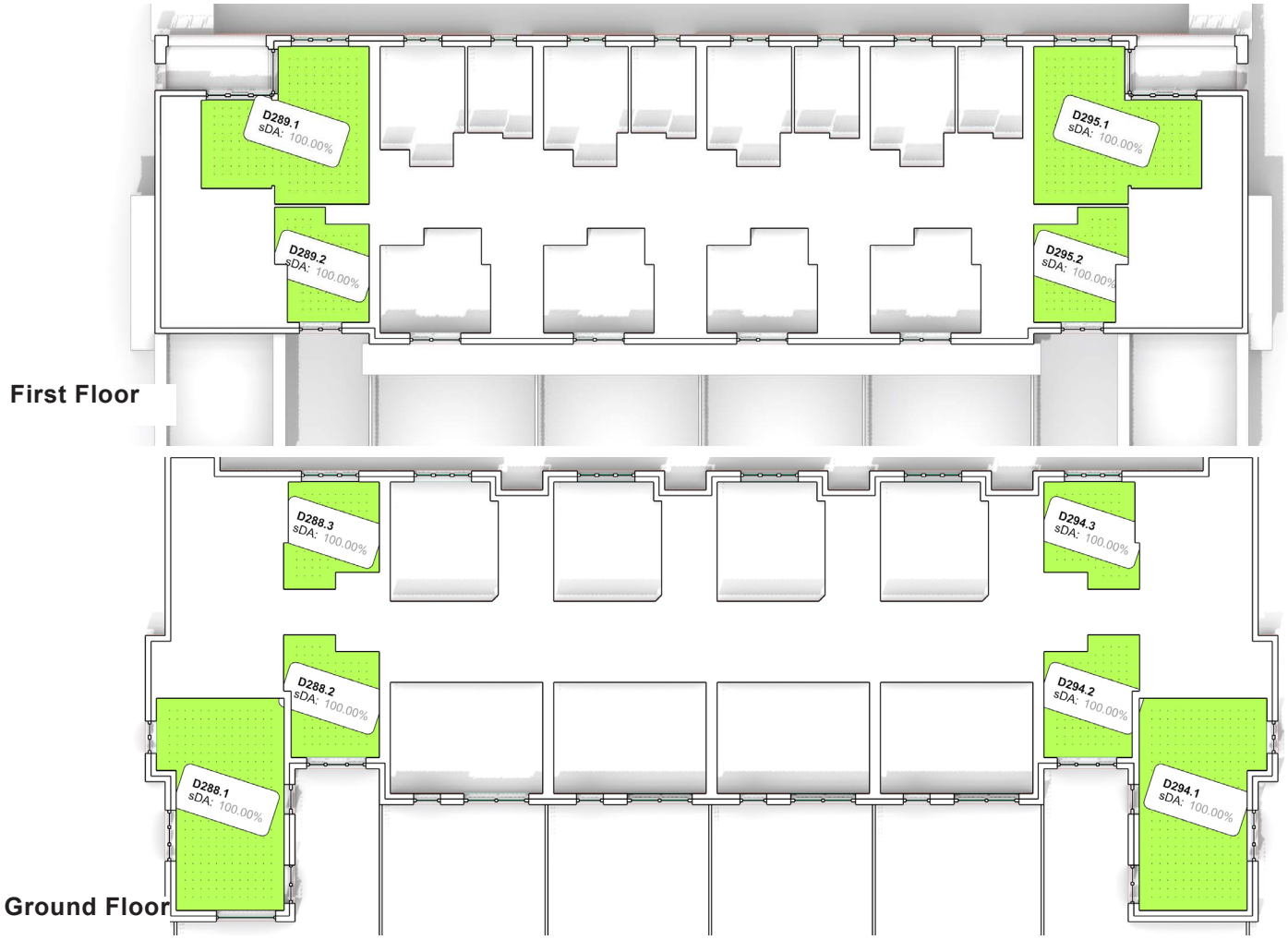


Figure 40: Duplex units 288 - 289 and 294 - 295

Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for all habitable rooms

Duplex Units Minimum illuminance levels from BS EN17037:2018+A1:2021 - Table NA.1							
Space ID	Use	Area m2	Sensor Count	Median DF	Target Lux	% of grid target exceeded: Minimum 50% of grid	Meets Criteria
D288.1	LKD	30.5	290	2175	200	100.0%	Y
D288.2	Bed	13.2	111	1470	100	100.0%	Y
D288.3	Bed	11.6	92	726	100	100.0%	Y
D289.1	LKD	26.6	234	591	200	100.0%	Y
D289.2	Bed	11.8	95	1433	100	100.0%	Y
D294.1	LKD	30.5	290	1387	200	100.0%	Y
D294.2	Bed	13.2	111	1427	100	100.0%	Y
D294.3	Bed	11.6	92	736	100	100.0%	Y
D295.1	LKD	26.6	234	564	200	100.0%	Y
D295.2	Bed	11.8	95	1436	100	100.0%	Y

Table 24: Minimum Daylight Provision BS EN17037:2018+A1:2021 Table NA.1 compliance for habitable rooms

Appendix B - EN17037:2018 Table A.1 Daylight Provision Room Compliance Results

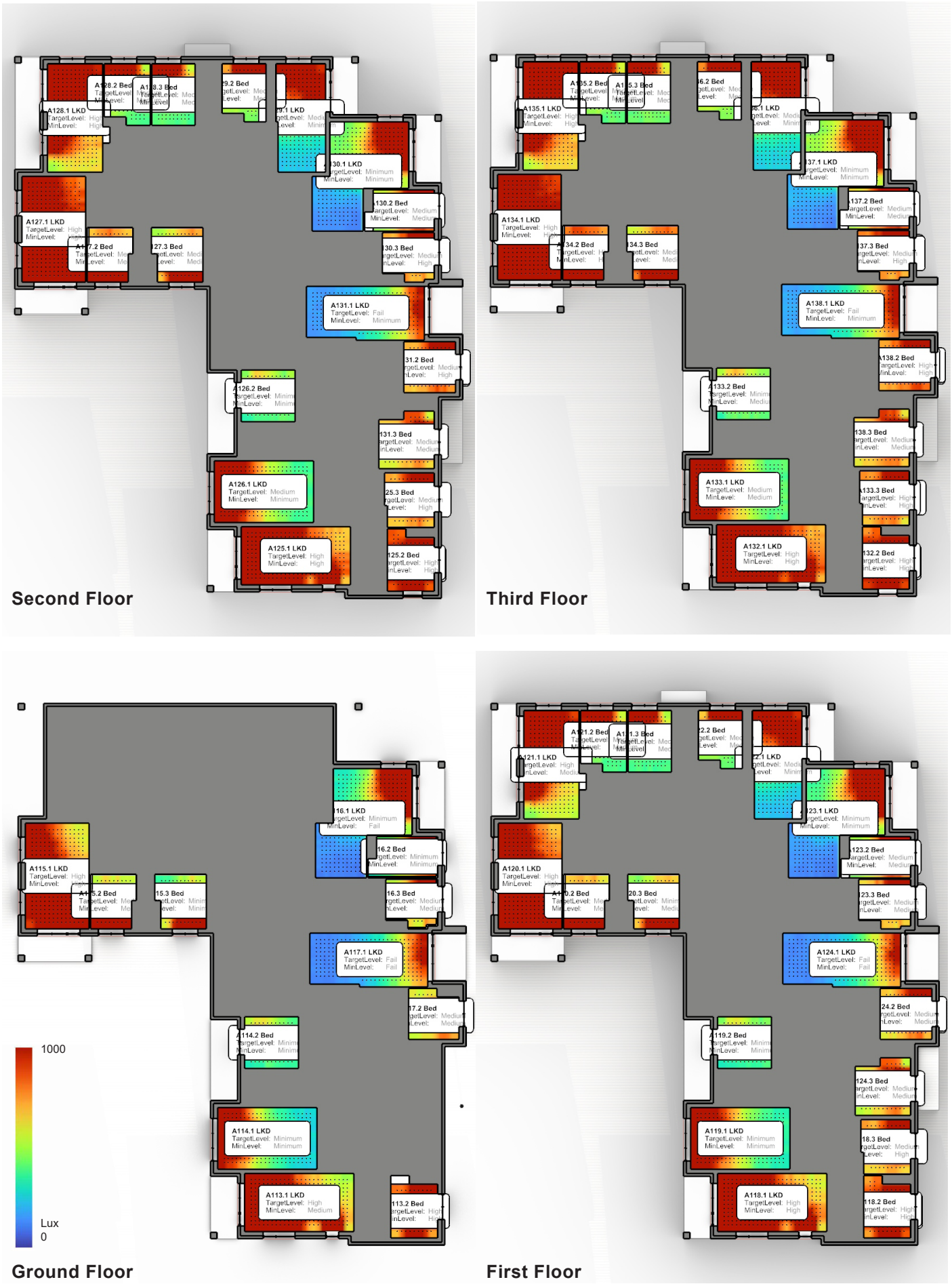


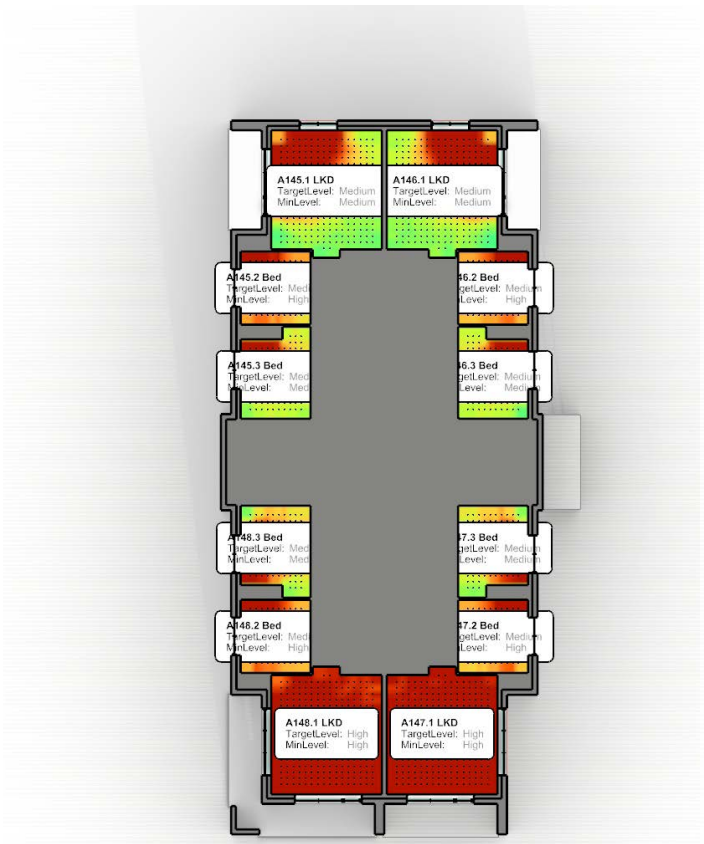
Figure 41: Block A1 - Daylight Provision and Annual Average Illuminance to all habitable rooms

Apartment Block A - EN17037:2018 Table A.1 Daylight Provision Room Compliance

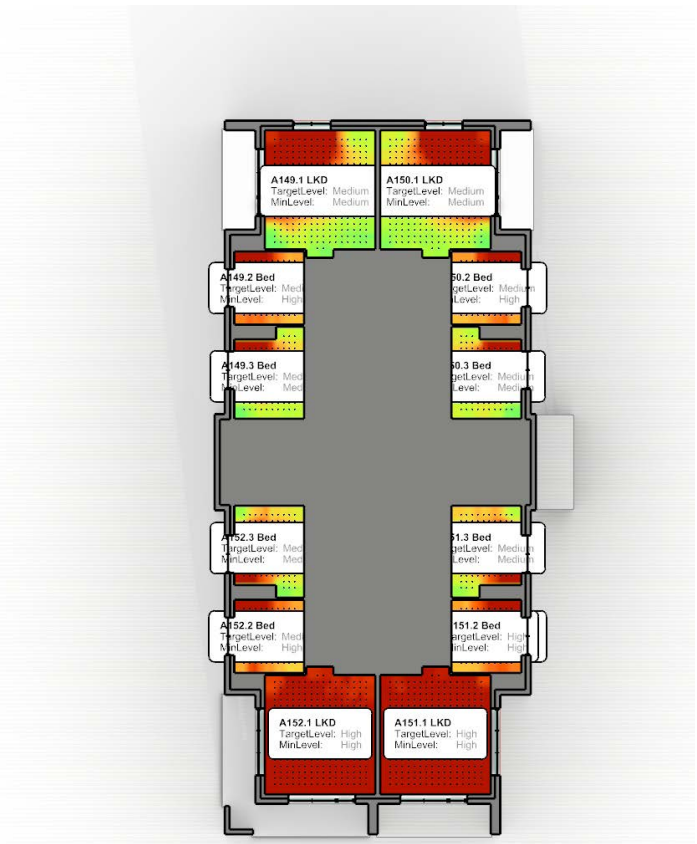
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A113.1	LKD	31.6	288	High	75.5%	64.5%	54.1%	Medium	81.8%	60.0%	46.1%
A113.2	Bed	12.5	99	High	78.5%	67.7%	56.6%	High	86.4%	69.9%	55.5%
A114.1	LKD	30.4	286	Minimum	55.9%	34.5%	17.7%	Minimum	69.2%	30.3%	8.9%
A114.2	Bed	13.9	121	Minimum	54.6%	31.8%	15.4%	Minimum	74.9%	40.8%	17.9%
A115.1	LKD	33.5	299	High	77.1%	65.7%	54.8%	High	84.6%	64.6%	51.7%
A115.2	Bed	11.8	92	Medium	65.9%	51.3%	38.5%	Medium	79.4%	51.9%	36.3%
A115.3	Bed	13.1	114	Minimum	59.4%	43.2%	29.8%	Minimum	74.4%	41.8%	27.0%
A116.1	LKD	37.9	342	Minimum	53.6%	28.8%	8.1%	Fail	46.8%	2.2%	0.0%
A116.2	Bed	13.3	110	Minimum	64.7%	47.5%	26.1%	Minimum	77.8%	46.0%	21.4%
A116.3	Bed	11.7	97	Medium	69.3%	52.5%	34.3%	Medium	82.7%	57.4%	36.4%
A117.1	LKD	30.8	275	Fail	28.7%	9.3%	4.3%	Fail	43.9%	4.0%	0.7%
A117.2	Bed	11.9	90	Medium	70.0%	54.6%	37.4%	Medium	83.2%	60.3%	40.1%
A118.1	LKD	31.6	288	High	77.7%	66.9%	57.6%	High	83.2%	64.2%	51.0%
A118.2	Bed	13.3	103	High	79.5%	69.5%	59.4%	High	86.9%	72.4%	58.7%
A118.3	Bed	13.2	105	Medium	74.5%	61.0%	46.7%	High	85.6%	67.1%	50.5%
A119.1	LKD	30.4	286	Minimum	64.1%	47.4%	28.7%	Minimum	76.5%	44.8%	18.1%
A119.2	Bed	13.9	121	Minimum	56.0%	34.6%	14.1%	Minimum	76.2%	43.6%	18.4%
A120.1	LKD	33.5	299	High	78.6%	68.5%	58.0%	High	86.6%	70.6%	57.6%
A120.2	Bed	11.8	92	Medium	68.7%	54.9%	42.7%	Medium	82.3%	59.9%	43.2%
A120.3	Bed	13.1	114	Minimum	65.2%	49.9%	35.8%	Medium	78.1%	50.5%	32.8%
A121.1	LKD	29.8	264	High	76.9%	63.8%	50.4%	Medium	85.5%	65.4%	48.6%
A121.2	Bed	13.2	107	Medium	71.2%	53.7%	33.6%	Medium	83.0%	57.4%	35.6%
A121.3	Bed	13.3	117	Medium	69.9%	51.8%	29.8%	Medium	82.8%	56.3%	33.8%
A122.1	LKD	26.2	240	Medium	68.2%	51.2%	29.7%	Minimum	72.1%	28.2%	2.1%
A122.2	Bed	11.8	97	Medium	75.0%	57.9%	41.1%	Medium	85.1%	61.7%	41.1%
A123.1	LKD	37.9	342	Minimum	58.0%	37.4%	12.6%	Minimum	50.5%	2.6%	0.0%
A123.2	Bed	12.5	104	Medium	73.0%	58.0%	42.7%	Medium	81.3%	55.8%	34.6%
A123.3	Bed	11.7	97	Medium	74.0%	59.4%	44.3%	Medium	84.7%	64.8%	46.9%
A124.1	LKD	30.8	275	Fail	32.5%	9.4%	5.0%	Fail	47.8%	3.6%	0.9%
A124.2	Bed	13.1	110	Medium	74.3%	60.4%	45.7%	Medium	84.8%	65.5%	48.4%
A124.3	Bed	14.7	120	Medium	71.9%	57.1%	41.0%	Medium	83.9%	62.1%	43.4%
A125.1	LKD	31.6	288	High	79.4%	69.0%	59.9%	High	84.4%	66.9%	53.9%
A125.2	Bed	13.3	103	High	80.4%	71.3%	61.2%	High	87.5%	74.5%	61.2%
A125.3	Bed	13.2	105	Medium	76.0%	63.0%	49.5%	High	86.3%	68.9%	53.5%
A126.1	LKD	30.4	286	Medium	66.5%	51.0%	32.6%	Minimum	78.9%	50.0%	25.2%
A126.2	Bed	13.9	121	Minimum	59.7%	39.6%	18.3%	Minimum	78.2%	49.5%	24.3%
A127.1	LKD	33.5	299	High	80.2%	71.3%	61.2%	High	87.4%	74.2%	61.7%
A127.2	Bed	11.8	92	Medium	72.4%	59.5%	47.6%	Medium	83.4%	63.6%	48.3%
A127.3	Bed	13.1	114	Medium	67.3%	53.6%	39.3%	Medium	79.7%	53.7%	35.8%
A128.1	LKD	29.8	264	High	77.9%	65.6%	52.9%	High	86.5%	68.3%	52.6%
A128.2	Bed	13.2	107	Medium	72.6%	55.7%	37.6%	Medium	83.6%	58.6%	37.6%
A128.3	Bed	13.3	117	Medium	70.4%	53.1%	33.1%	Medium	83.8%	58.4%	36.9%
A129.1	LKD	26.2	240	Medium	70.2%	53.8%	33.7%	Minimum	74.2%	33.4%	2.4%
A129.2	Bed	11.8	97	Medium	75.4%	59.1%	42.9%	Medium	85.6%	64.5%	44.8%
A130.1	LKD	37.9	342	Minimum	61.6%	42.9%	18.1%	Minimum	55.3%	3.0%	0.1%
A130.2	Bed	12.5	104	Medium	73.8%	60.3%	45.4%	Medium	83.4%	61.6%	42.7%
A130.3	Bed	11.7	97	Medium	75.8%	62.0%	47.7%	High	86.0%	68.2%	52.1%
A131.1	LKD	30.8	275	Fail	39.1%	11.1%	5.2%	Minimum	55.8%	5.6%	2.8%
A131.2	Bed	13.1	110	Medium	75.7%	62.4%	48.7%	High	85.9%	68.1%	52.7%
A131.3	Bed	14.7	120	Medium	72.9%	58.8%	43.8%	Medium	84.6%	64.7%	47.3%

Apartment Block A - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A132.1	LKD	31.6	288	High	80.3%	70.8%	61.3%	High	85.5%	68.5%	55.8%
A132.2	Bed	13.3	103	High	80.7%	72.4%	62.2%	High	87.9%	75.1%	62.4%
A133.1	LKD	30.4	286	Medium	67.7%	52.8%	35.3%	Medium	79.8%	52.6%	28.7%
A133.2	Bed	13.9	121	Minimum	61.4%	43.3%	20.0%	Medium	79.4%	52.4%	27.5%
A133.3	Bed	13.2	105	High	76.5%	63.9%	50.7%	High	86.4%	69.8%	54.7%
A134.1	LKD	33.5	299	High	80.9%	72.8%	63.2%	High	88.0%	76.2%	63.8%
A134.2	Bed	11.8	92	High	74.8%	63.6%	52.2%	High	84.4%	66.4%	52.0%
A134.3	Bed	13.1	114	Medium	71.8%	58.6%	46.0%	Medium	82.2%	59.6%	44.0%
A135.1	LKD	29.8	264	High	78.5%	66.9%	55.4%	High	86.8%	69.8%	54.9%
A135.2	Bed	13.2	107	Medium	73.2%	56.7%	39.1%	Medium	84.4%	60.5%	40.4%
A135.3	Bed	13.3	117	Medium	71.6%	54.8%	36.2%	Medium	84.6%	60.6%	39.7%
A136.1	LKD	26.2	240	Medium	70.8%	55.6%	36.9%	Minimum	75.4%	36.7%	3.7%
A136.2	Bed	11.8	97	Medium	75.5%	60.1%	44.2%	Medium	85.6%	64.2%	44.8%
A137.1	LKD	37.9	342	Minimum	63.3%	45.6%	22.4%	Minimum	57.6%	4.2%	0.3%
A137.2	Bed	12.5	104	Medium	74.3%	61.1%	47.0%	Medium	84.1%	63.9%	46.8%
A137.3	Bed	11.7	97	Medium	76.5%	63.7%	49.8%	High	86.7%	70.3%	54.6%
A138.1	LKD	30.8	275	Fail	42.5%	12.5%	5.4%	Minimum	61.1%	8.4%	3.7%
A138.2	Bed	13.1	110	High	76.5%	63.9%	50.8%	High	86.5%	69.7%	54.9%
A138.3	Bed	14.7	120	Medium	73.7%	60.0%	45.3%	Medium	84.8%	66.0%	49.3%

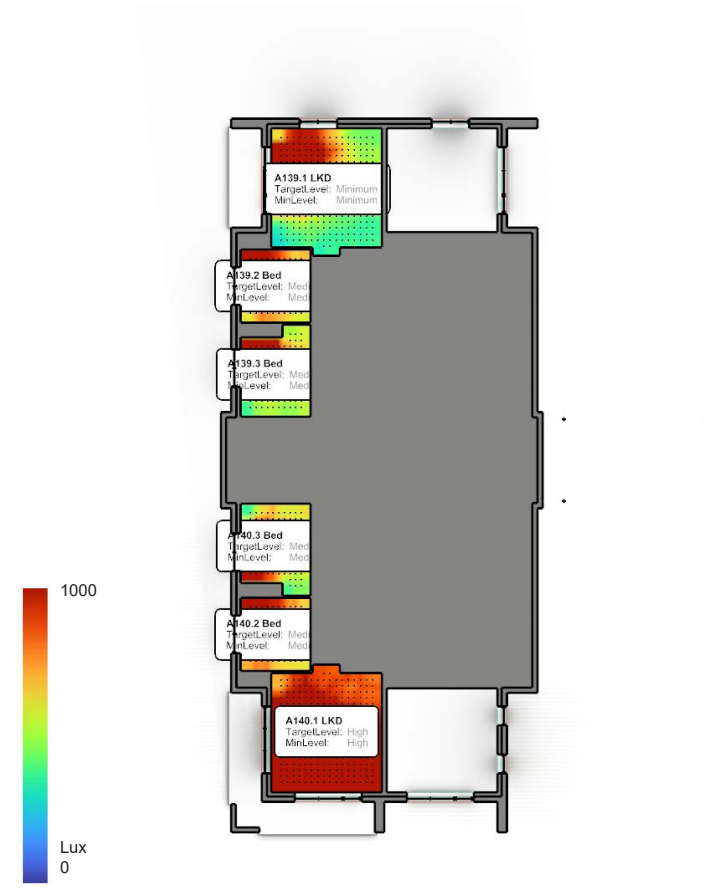
Table 25: Daylight Provision individual room compliance values for all habitable rooms



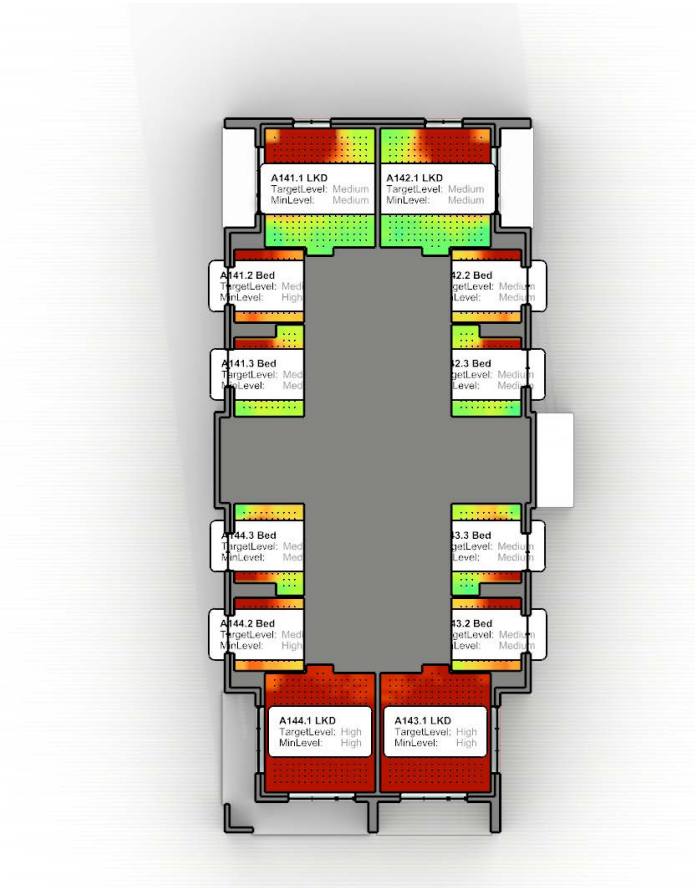
Second Floor



Third Floor



Ground Floor

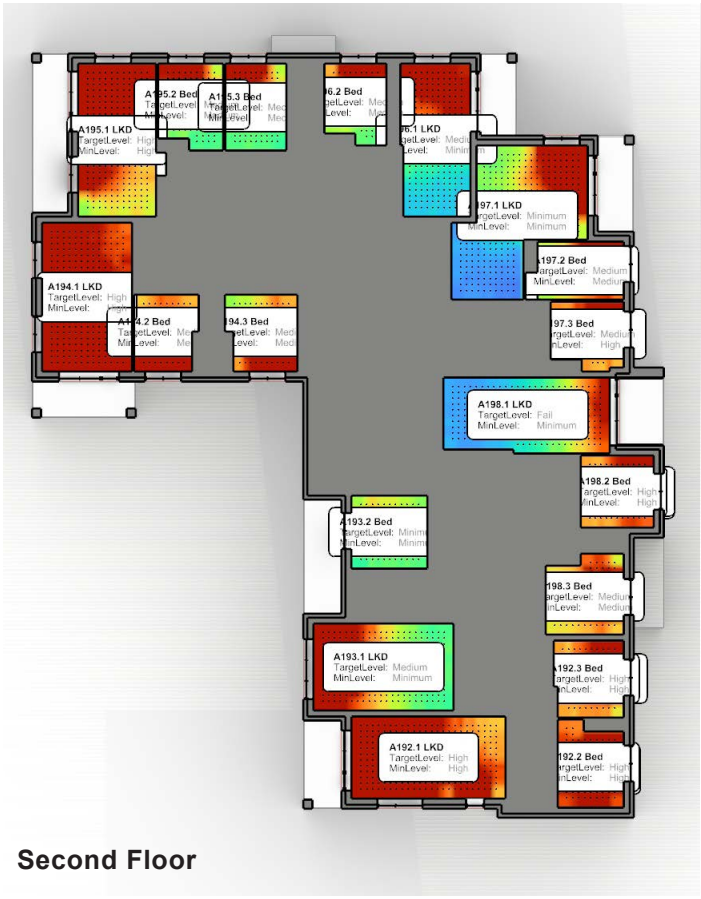


First Floor

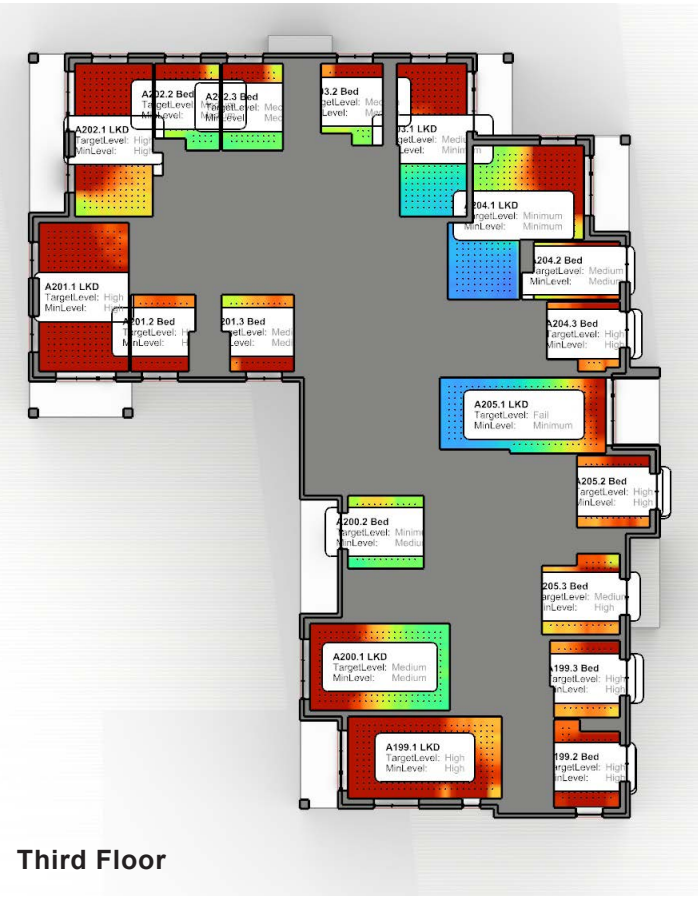
Figure 42: Block B - Daylight Provision and Annual Average Illuminance to all habitable rooms

Apartment Block B - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A139.1	LKD	30.7	290	Minimum	65.8%	46.7%	25.2%	Minimum	79.8%	49.7%	23.0%
A139.2	Bed	11.7	100	Medium	74.4%	59.7%	42.0%	Medium	85.7%	65.8%	46.8%
A139.3	Bed	13.5	116	Medium	68.4%	51.3%	33.0%	Medium	82.7%	58.2%	35.3%
A140.1	LKD	30.7	290	High	80.3%	71.2%	61.3%	High	86.5%	71.3%	57.4%
A140.2	Bed	11.7	100	Medium	73.9%	59.5%	42.7%	Medium	85.6%	65.7%	47.2%
A140.3	Bed	13.5	116	Medium	68.8%	52.4%	35.3%	Medium	82.6%	58.1%	35.4%
A141.1	LKD	30.7	290	Medium	70.1%	54.6%	34.7%	Medium	82.3%	58.3%	35.3%
A141.2	Bed	11.7	100	Medium	74.3%	60.4%	44.7%	High	86.3%	67.6%	50.7%
A141.3	Bed	13.5	116	Medium	69.6%	53.2%	36.1%	Medium	83.4%	60.7%	39.1%
A142.1	LKD	30.7	290	Medium	68.7%	53.2%	34.7%	Medium	82.2%	57.0%	35.0%
A142.2	Bed	11.7	100	Medium	74.2%	60.3%	45.1%	Medium	84.8%	65.7%	48.8%
A142.3	Bed	13.5	116	Medium	68.2%	52.6%	34.5%	Medium	82.6%	58.7%	37.9%
A143.1	LKD	30.7	290	High	81.3%	73.7%	64.0%	High	87.2%	74.9%	62.0%
A143.2	Bed	11.7	100	Medium	74.2%	60.5%	45.9%	Medium	84.8%	65.8%	48.9%
A143.3	Bed	13.5	116	Medium	69.4%	54.6%	38.1%	Medium	82.6%	58.8%	38.9%
A144.1	LKD	30.7	290	High	80.8%	72.6%	62.4%	High	87.4%	74.7%	61.1%
A144.2	Bed	11.7	100	Medium	74.2%	60.5%	45.6%	High	86.1%	67.4%	50.4%
A144.3	Bed	13.5	116	Medium	69.9%	54.4%	38.1%	Medium	83.5%	61.2%	41.0%
A145.1	LKD	30.7	290	Medium	70.7%	55.4%	36.8%	Medium	82.5%	59.0%	36.6%
A145.2	Bed	11.7	100	Medium	75.0%	61.4%	46.3%	High	86.2%	67.2%	50.8%
A145.3	Bed	13.5	116	Medium	70.2%	54.6%	37.5%	Medium	83.9%	61.7%	42.0%
A146.1	LKD	30.7	290	Medium	70.1%	55.3%	38.0%	Medium	82.8%	60.0%	39.7%
A146.2	Bed	11.7	100	Medium	75.6%	62.1%	48.3%	High	85.9%	68.1%	52.4%
A146.3	Bed	13.5	116	Medium	69.5%	54.7%	38.9%	Medium	83.8%	62.7%	43.4%
A147.1	LKD	30.7	290	High	81.8%	74.6%	65.1%	High	87.7%	75.9%	63.4%
A147.2	Bed	11.7	100	Medium	75.2%	61.8%	48.2%	High	85.8%	68.0%	52.5%
A147.3	Bed	13.5	116	Medium	70.0%	55.9%	40.5%	Medium	83.9%	62.5%	43.3%
A148.1	LKD	30.7	290	High	81.1%	72.9%	62.8%	High	87.4%	74.8%	61.7%
A148.2	Bed	11.7	100	Medium	75.5%	61.9%	47.3%	High	86.5%	68.0%	52.1%
A148.3	Bed	13.5	116	Medium	70.4%	55.5%	38.9%	Medium	83.9%	61.7%	42.4%
A149.1	LKD	30.7	290	Medium	72.2%	57.3%	40.5%	Medium	83.8%	60.9%	40.6%
A149.2	Bed	11.7	100	Medium	75.3%	61.7%	46.8%	High	86.5%	68.1%	52.1%
A149.3	Bed	13.5	116	Medium	70.2%	54.8%	38.0%	Medium	84.2%	62.2%	43.1%
A150.1	LKD	30.7	290	Medium	72.9%	58.7%	43.5%	Medium	84.1%	62.9%	44.5%
A150.2	Bed	11.7	100	Medium	76.0%	63.1%	49.7%	High	86.1%	68.7%	53.3%
A150.3	Bed	13.5	116	Medium	71.2%	57.0%	42.0%	Medium	84.1%	63.4%	45.2%
A151.1	LKD	30.7	290	High	81.8%	74.6%	65.2%	High	87.7%	76.2%	64.0%
A151.2	Bed	11.7	100	High	76.3%	63.7%	50.2%	High	86.1%	68.8%	53.9%
A151.3	Bed	13.5	116	Medium	71.3%	57.5%	43.2%	Medium	84.4%	64.4%	47.2%
A152.1	LKD	30.7	290	High	81.3%	73.4%	63.3%	High	87.4%	74.9%	61.6%
A152.2	Bed	11.7	100	Medium	75.1%	61.7%	47.3%	High	86.5%	67.9%	52.2%
A152.3	Bed	13.5	116	Medium	70.4%	55.6%	39.7%	Medium	83.8%	62.2%	43.7%

Table 26: Daylight Provision individual room compliance values for all habitable rooms

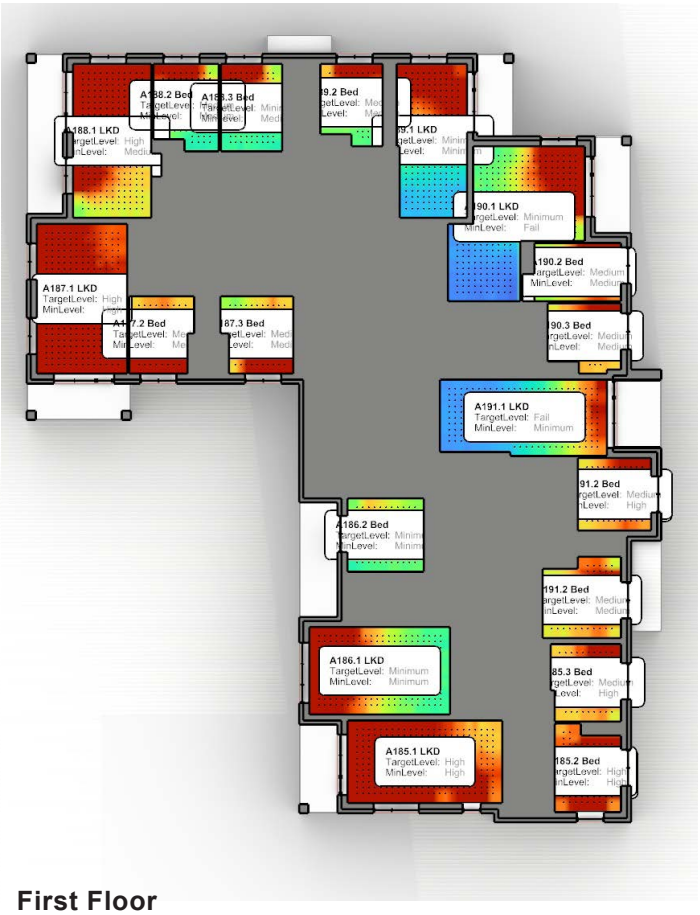


Second Floor



Third Floor

Ground Floor



First Floor

Figure 43: Block D - Daylight Provision and Annual Average Illuminance to all habitable rooms

Apartment Block D - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A180.1	LKD	31.6	288	High	78.5%	68.2%	58.5%	High	84.3%	66.6%	53.3%
A180.2	Bed	12.5	99	High	78.3%	67.9%	57.0%	High	86.5%	70.5%	56.8%
A181.1	LKD	30.5	286	Minimum	60.3%	39.9%	22.9%	Minimum	76.4%	40.3%	18.1%
A181.2	Bed	13.9	121	Minimum	58.1%	37.7%	19.9%	Minimum	78.3%	47.6%	25.8%
A182.1	LKD	33.5	299	High	79.7%	70.3%	59.4%	High	87.2%	73.2%	59.3%
A182.2	Bed	11.8	92	Medium	68.5%	54.1%	41.4%	Medium	81.8%	57.9%	40.6%
A182.3	Bed	13.1	114	Minimum	63.2%	46.8%	32.4%	Minimum	76.0%	45.2%	30.0%
A183.1	LKD	37.9	342	Minimum	52.6%	28.9%	9.9%	Fail	40.5%	1.9%	0.0%
A183.2	Bed	12.5	104	Medium	67.0%	51.0%	31.4%	Medium	79.5%	50.6%	26.4%
A183.3	Bed	11.7	97	Medium	69.5%	52.7%	34.6%	Medium	83.4%	59.8%	38.6%
A184.1	LKD	30.8	275	Fail	34.3%	11.1%	5.1%	Minimum	51.8%	5.8%	3.1%
A184.2	Bed	11.9	90	Medium	70.4%	55.6%	39.0%	Medium	83.4%	61.1%	41.6%
A185.1	LKD	31.6	288	High	78.8%	68.4%	58.9%	High	84.6%	66.9%	53.8%
A185.2	Bed	13.3	103	High	79.7%	70.0%	60.1%	High	86.7%	72.1%	58.6%
A185.3	Bed	13.2	105	Medium	74.3%	60.8%	46.7%	High	85.4%	67.3%	51.3%
A186.1	LKD	30.5	286	Minimum	65.6%	49.0%	30.2%	Minimum	78.4%	47.8%	23.3%
A186.2	Bed	13.9	121	Minimum	57.4%	36.8%	18.4%	Minimum	77.7%	47.2%	24.0%
A187.1	LKD	33.5	299	High	79.8%	70.6%	60.1%	High	87.4%	74.0%	60.6%
A187.2	Bed	11.8	92	Medium	71.2%	57.4%	44.9%	Medium	82.7%	61.2%	44.2%
A187.3	Bed	13.1	114	Medium	66.1%	50.6%	36.9%	Medium	78.5%	50.9%	33.7%
A188.1	LKD	29.8	264	High	77.1%	64.4%	51.0%	Medium	85.9%	66.3%	49.7%
A188.2	Bed	13.2	107	Medium	69.4%	52.3%	32.1%	Medium	79.7%	51.8%	25.9%
A188.3	Bed	13.3	117	Minimum	67.5%	49.5%	26.6%	Medium	80.9%	52.9%	26.1%
A189.1	LKD	26.2	240	Minimum	66.6%	49.6%	28.2%	Minimum	69.9%	26.0%	2.0%
A189.2	Bed	11.8	97	Medium	72.3%	55.3%	37.2%	Medium	84.1%	58.9%	38.1%
A190.1	LKD	37.9	342	Minimum	58.1%	37.8%	13.8%	Fail	48.3%	2.5%	0.0%
A190.2	Bed	12.5	104	Medium	71.4%	56.8%	41.0%	Medium	82.1%	57.4%	37.0%
A190.3	Bed	11.7	97	Medium	73.9%	59.6%	44.7%	Medium	85.4%	66.4%	49.5%
A191.1	LKD	30.8	275	Fail	37.7%	10.7%	5.0%	Minimum	54.5%	5.8%	3.2%
A191.2	Bed	14.7	120	Medium	71.2%	57.4%	41.8%	Medium	84.1%	63.2%	45.7%
A191.2	Bed	13.1	110	Medium	74.8%	61.2%	47.4%	High	85.3%	66.7%	50.3%
A192.1	LKD	31.6	288	High	79.2%	69.2%	59.6%	High	84.9%	67.3%	54.6%
A192.2	Bed	13.3	103	High	80.2%	70.7%	61.2%	High	87.4%	74.2%	61.1%
A192.3	Bed	13.2	105	High	76.1%	63.3%	50.1%	High	86.3%	69.4%	54.6%
A193.1	LKD	30.5	286	Medium	66.5%	50.3%	31.7%	Minimum	78.9%	49.6%	25.0%
A193.2	Bed	13.9	121	Minimum	58.4%	38.2%	18.8%	Minimum	78.3%	48.5%	24.5%
A194.1	LKD	33.5	299	High	80.3%	71.6%	60.9%	High	87.6%	74.5%	61.2%
A194.2	Bed	11.8	92	Medium	72.8%	60.3%	48.5%	Medium	83.4%	63.7%	48.7%
A194.3	Bed	13.1	114	Medium	67.6%	53.9%	40.1%	Medium	79.9%	53.9%	36.6%
A195.1	LKD	29.8	264	High	77.9%	65.8%	52.7%	High	86.3%	67.0%	51.3%
A195.2	Bed	13.2	107	Medium	71.6%	54.7%	36.1%	Medium	82.3%	57.1%	34.8%
A195.3	Bed	13.3	117	Medium	69.6%	52.4%	32.2%	Medium	82.8%	57.0%	35.1%
A196.1	LKD	26.2	240	Medium	69.3%	53.3%	32.9%	Minimum	73.7%	33.4%	2.4%
A196.2	Bed	11.8	97	Medium	74.5%	58.0%	42.0%	Medium	84.9%	61.7%	40.9%
A197.1	LKD	37.9	342	Minimum	61.7%	43.1%	19.0%	Minimum	53.7%	3.2%	0.0%
A197.2	Bed	12.5	104	Medium	73.6%	60.1%	45.2%	Medium	83.3%	61.9%	43.3%
A197.3	Bed	11.7	97	Medium	76.0%	62.8%	49.0%	High	86.1%	68.5%	52.6%
A198.1	LKD	30.8	275	Fail	41.4%	11.8%	5.3%	Minimum	58.9%	7.8%	3.7%
A198.2	Bed	13.1	110	High	76.0%	63.1%	50.0%	High	86.2%	69.0%	54.1%
A198.3	Bed	14.7	120	Medium	73.2%	59.4%	44.7%	Medium	84.6%	65.1%	48.6%

Apartment Block D - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A199.1	LKD	31.6	288	High	79.3%	69.3%	59.6%	High	84.8%	67.3%	54.4%
A199.2	Bed	13.3	103	High	80.6%	71.8%	61.8%	High	87.5%	74.6%	62.0%
A199.3	Bed	13.2	105	High	76.5%	64.0%	51.3%	High	86.4%	69.7%	55.5%
A200.1	LKD	30.5	286	Medium	66.6%	50.8%	32.7%	Medium	79.2%	50.5%	25.8%
A200.2	Bed	13.9	121	Minimum	60.1%	40.4%	20.3%	Medium	79.7%	51.8%	27.6%
A201.1	LKD	33.5	299	High	80.7%	72.0%	61.7%	High	87.7%	75.0%	62.3%
A201.2	Bed	11.8	92	High	75.2%	64.2%	52.8%	High	84.3%	66.1%	52.1%
A201.3	Bed	13.1	114	Medium	71.5%	58.3%	45.8%	Medium	81.9%	58.8%	42.6%
A202.1	LKD	29.8	264	High	78.2%	66.1%	53.2%	High	86.6%	68.4%	52.5%
A202.2	Bed	13.2	107	Medium	73.3%	56.9%	39.5%	Medium	83.2%	59.3%	38.7%
A202.3	Bed	13.3	117	Medium	71.3%	54.5%	35.7%	Medium	84.4%	59.7%	38.7%
A203.1	LKD	26.2	240	Medium	70.1%	54.5%	36.3%	Minimum	75.3%	37.6%	3.9%
A203.2	Bed	11.8	97	Medium	75.4%	59.8%	44.0%	Medium	85.6%	64.7%	45.6%
A204.1	LKD	37.9	342	Minimum	63.8%	46.6%	24.1%	Minimum	58.2%	4.7%	0.2%
A204.2	Bed	12.5	104	Medium	74.7%	61.4%	47.6%	Medium	84.4%	64.6%	48.2%
A204.3	Bed	11.7	97	High	76.6%	64.0%	50.3%	High	86.6%	69.8%	54.3%
A205.1	LKD	30.8	275	Fail	42.4%	12.5%	5.5%	Minimum	61.2%	8.6%	3.7%
A205.2	Bed	13.1	110	High	76.8%	64.3%	51.6%	High	86.6%	69.8%	55.2%
A205.3	Bed	14.7	120	Medium	74.4%	61.1%	47.8%	High	85.0%	66.8%	50.8%
A205.3	Bed	16.0	130	High	81.1%	69.0%	51.1%	High	91.5%	72.6%	52.6%

Table 27: Daylight Provision individual room compliance values for all habitable rooms

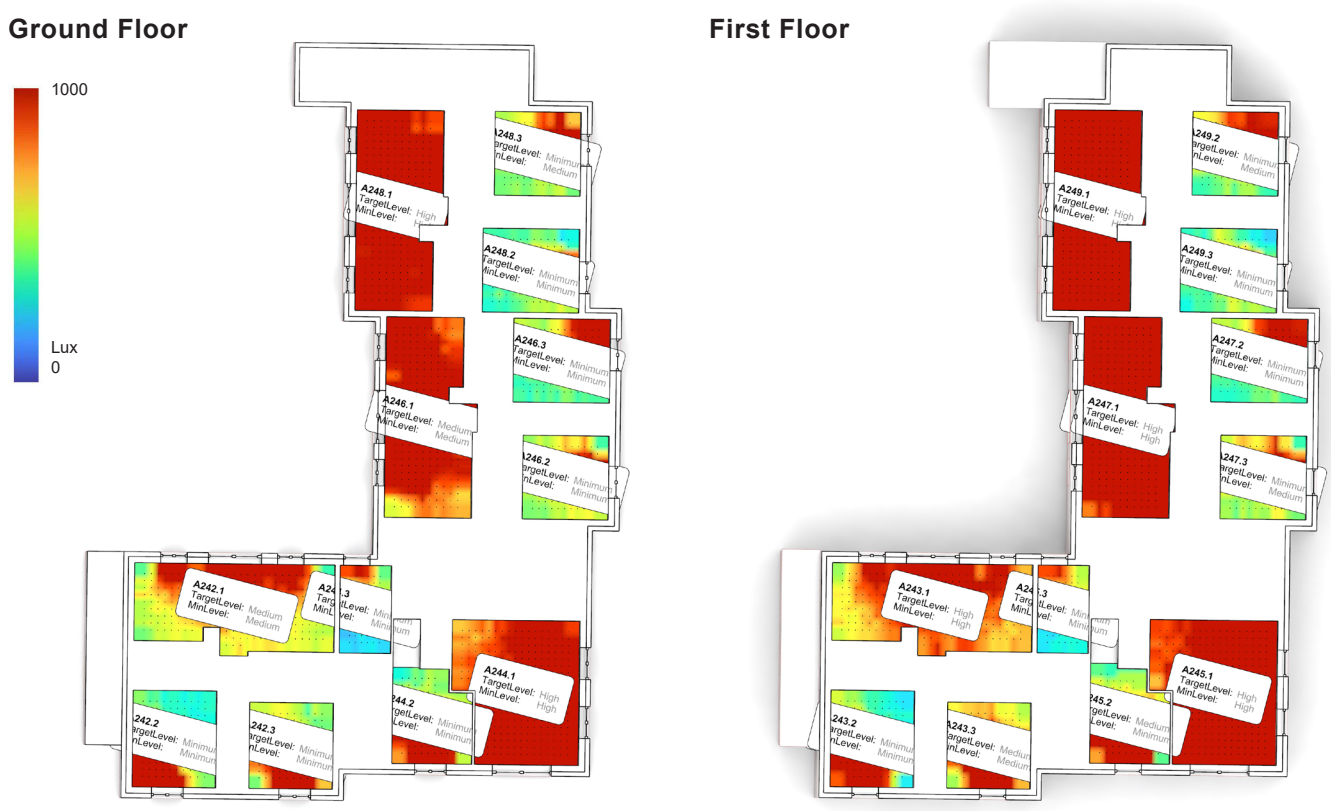


Figure 44: Block C - Daylight Provision and Annual Average Illuminance to all habitable rooms

Apartment Block C - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
A242.1	LKD	29.8	253	Medium	82.2%	67.4%	42.2%	Medium	91.4%	70.8%	39.4%
A242.2	Bed	14.6	120	Minimum	52.0%	32.4%	19.6%	Minimum	70.8%	27.3%	10.5%
A242.3	Bed	13.0	110	Minimum	64.2%	44.6%	32.3%	Minimum	79.2%	44.6%	27.7%
A243.1	LKD	29.8	253	High	86.5%	75.8%	59.8%	High	93.0%	76.6%	56.2%
A243.2	Bed	14.6	120	Minimum	59.4%	36.6%	20.5%	Minimum	73.6%	27.1%	8.5%
A243.3	Bed	13.0	110	Medium	70.3%	51.8%	37.1%	Medium	83.4%	53.0%	31.5%
A244.1	LKD	30.1	280	High	86.1%	77.7%	66.5%	High	91.7%	72.1%	56.4%
A244.2	Bed	12.8	105	Minimum	64.7%	47.8%	35.6%	Minimum	78.9%	45.2%	25.9%
A244.3	Bed	8.1	66	Minimum	50.1%	19.7%	6.3%	Minimum	73.4%	14.2%	1.9%
A245.1	LKD	30.1	280	High	87.5%	79.3%	70.5%	High	92.5%	76.7%	60.9%
A245.2	Bed	12.9	110	Medium	70.4%	53.1%	38.9%	Minimum	79.0%	44.7%	19.9%
A245.3	Bed	8.1	66	Minimum	63.7%	29.9%	9.4%	Minimum	81.6%	24.7%	2.6%
A246.1	LKD	29.8	253	Medium	81.1%	65.7%	46.3%	Medium	91.5%	70.8%	43.7%
A246.2	Bed	13.0	110	Minimum	68.4%	41.7%	23.6%	Minimum	86.6%	49.9%	22.3%
A246.3	Bed	14.6	120	Minimum	61.7%	34.1%	18.5%	Minimum	83.1%	36.6%	14.2%
A247.1	LKD	29.8	253	High	87.9%	78.8%	67.1%	High	94.7%	81.0%	65.4%
A247.2	Bed	14.6	120	Minimum	66.1%	36.8%	17.5%	Minimum	83.8%	38.8%	13.2%
A247.3	Bed	13.0	110	Minimum	70.1%	45.0%	22.7%	Medium	87.0%	53.9%	21.7%
A248.1	LKD	29.8	253	High	83.6%	71.7%	56.2%	High	92.9%	76.3%	57.5%
A248.2	Bed	14.6	120	Minimum	56.4%	26.0%	13.0%	Minimum	82.2%	28.6%	10.2%
A248.3	Bed	13.0	110	Minimum	67.8%	40.1%	22.1%	Medium	86.5%	50.9%	22.0%
A249.1	LKD	29.8	253	High	89.0%	80.8%	70.8%	High	95.4%	83.6%	71.2%
A249.2	Bed	13.0	110	Minimum	71.3%	46.9%	23.7%	Medium	86.4%	52.0%	20.0%
A249.3	Bed	14.6	120	Minimum	58.6%	26.5%	11.7%	Minimum	81.1%	27.7%	9.0%

Table 28: Daylight provision individual room compliance values for all habitable rooms

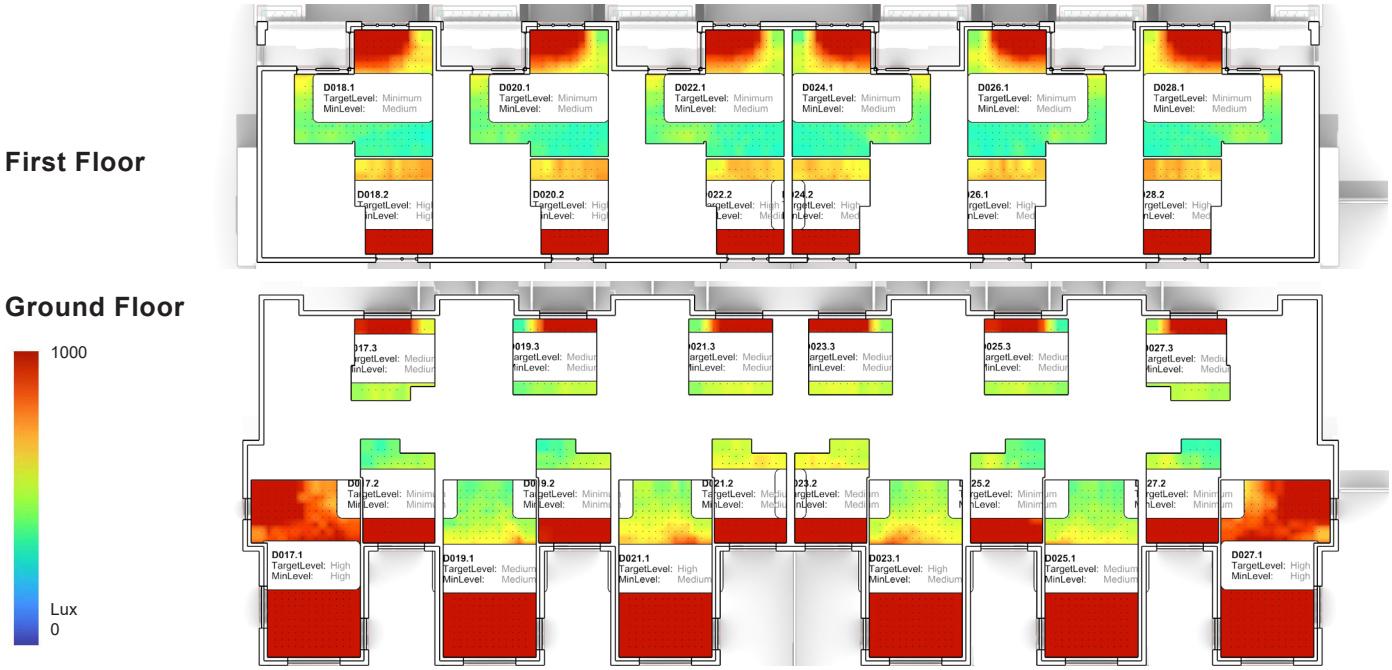


Figure 45: Duplex units 17 - 28

Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D017.1	LKD	32.3	302	High	86.1%	78.0%	69.1%	High	90.9%	75.1%	61.2%
D017.2	Bed	13.1	107	Minimum	65.6%	47.8%	33.3%	Minimum	79.2%	46.3%	27.8%
D017.3	Bed	11.7	93	Medium	81.9%	67.8%	41.5%	Medium	91.2%	71.4%	44.0%
D018.1	LKD	25.9	226	Minimum	71.9%	48.3%	14.2%	Medium	87.0%	56.6%	19.1%
D018.2	Bed	12.7	107	High	78.8%	66.8%	52.1%	High	89.0%	68.8%	50.0%
D019.1	LKD	30.4	288	Medium	75.2%	61.4%	49.7%	Medium	80.9%	51.6%	33.3%
D019.2	Bed	13.1	107	Minimum	65.9%	48.0%	33.8%	Minimum	79.6%	45.8%	28.4%
D019.3	Bed	11.7	90	Medium	80.2%	64.3%	33.7%	Medium	91.1%	69.0%	35.6%
D020.1	LKD	25.9	226	Minimum	70.5%	44.7%	10.0%	Medium	86.6%	54.5%	15.8%
D020.2	Bed	12.7	107	High	78.8%	67.2%	52.8%	High	89.1%	69.1%	50.3%
D021.1	LKD	30.4	288	High	78.3%	66.5%	53.3%	Medium	82.6%	54.8%	38.2%
D021.2	Bed	13.1	107	Medium	72.6%	58.0%	43.5%	Medium	84.5%	58.1%	38.7%
D021.3	Bed	11.7	90	Medium	81.3%	67.3%	40.9%	Medium	91.7%	71.8%	45.7%
D022.1	LKD	25.9	226	Minimum	70.7%	45.1%	11.3%	Medium	86.7%	55.5%	16.3%
D022.2	Bed	12.7	107	High	78.3%	66.4%	51.5%	Medium	88.5%	68.2%	48.9%
D023.1	LKD	30.4	288	High	78.3%	66.7%	52.7%	Medium	82.4%	55.1%	37.8%
D023.2	Bed	13.1	107	Medium	72.9%	57.2%	42.7%	Medium	84.0%	55.8%	37.3%
D023.3	Bed	11.7	90	Medium	81.6%	67.2%	41.1%	Medium	92.0%	73.4%	47.2%
D024.1	LKD	25.9	226	Minimum	70.1%	45.0%	11.2%	Medium	86.5%	55.1%	17.1%
D024.2	Bed	12.7	107	High	78.3%	66.0%	50.8%	Medium	88.1%	67.7%	47.9%
D025.1	LKD	30.4	288	Medium	75.7%	63.4%	48.2%	Medium	81.0%	50.2%	34.3%
D025.2	Bed	13.1	107	Minimum	66.0%	48.1%	34.4%	Minimum	78.4%	43.9%	27.3%
D025.3	Bed	11.7	90	Medium	80.2%	63.7%	33.4%	Medium	91.3%	70.0%	39.2%
D026.1	LKD	12.7	107	High	78.8%	67.2%	52.6%	Medium	88.4%	68.4%	48.9%
D026.1	LKD	25.9	226	Minimum	69.7%	44.5%	9.3%	Medium	85.9%	53.9%	14.9%
D027.1	LKD	32.3	302	High	85.5%	77.6%	67.7%	High	90.9%	73.5%	58.4%
D027.2	Bed	13.1	107	Minimum	67.3%	49.6%	35.1%	Minimum	77.7%	42.5%	27.5%
D027.3	Bed	11.7	93	Medium	80.6%	66.8%	40.7%	Medium	91.3%	71.2%	43.9%
D028.1	LKD	25.9	226	Minimum	71.4%	48.5%	14.0%	Medium	86.4%	55.9%	18.9%
D028.2	Bed	12.7	107	High	78.8%	67.4%	52.8%	Medium	88.7%	68.6%	49.7%

Table 29: Daylight Provision individual room compliance values for all habitable rooms

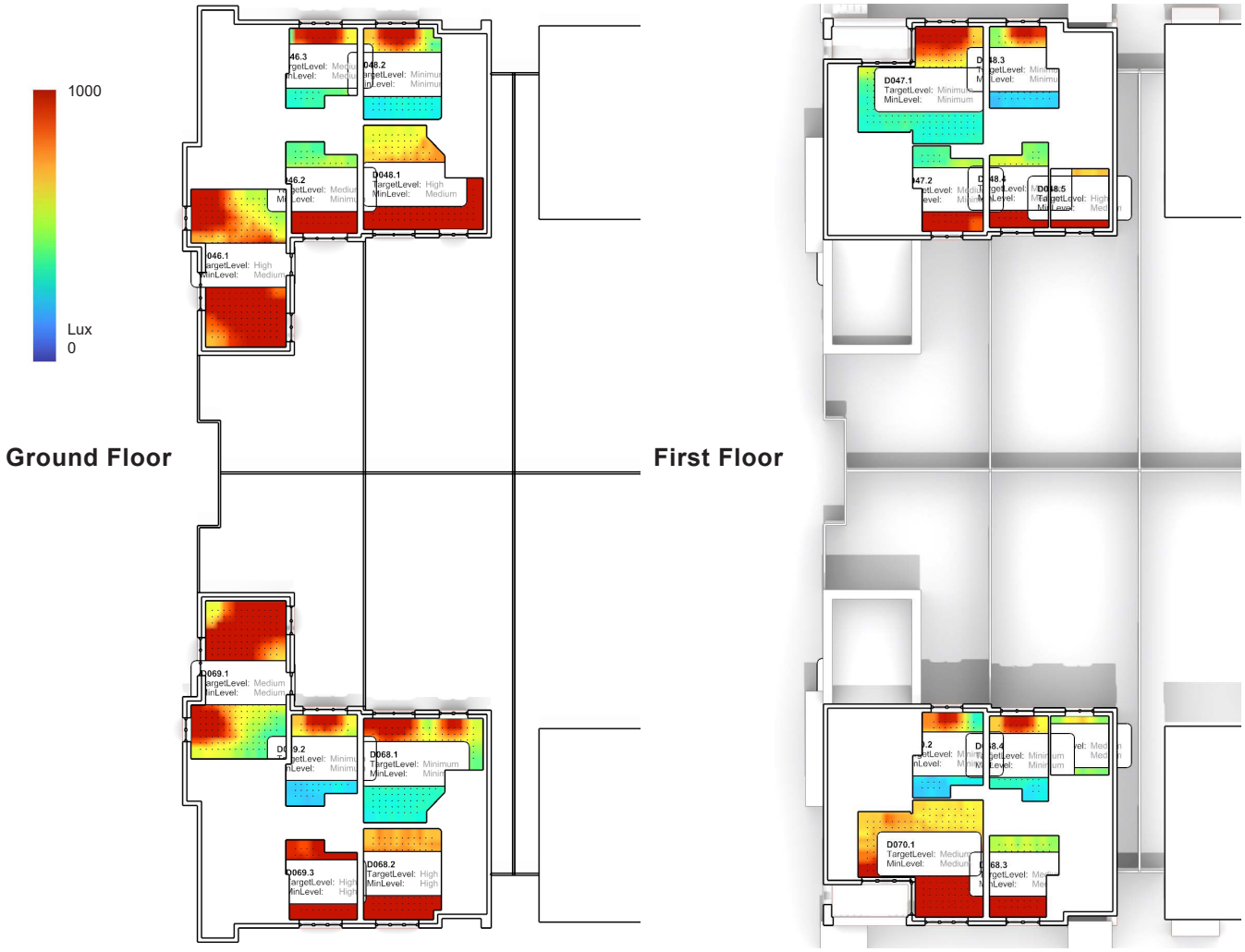


Figure 46: Duplex units 46 - 48 and 68 - 70

Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D046.1	LKD	30.5	290	High	80.4%	70.1%	56.6%	Medium	85.2%	62.9%	43.2%
D046.2	Bed	13.2	111	Medium	69.2%	51.9%	39.8%	Minimum	77.1%	45.5%	29.2%
D046.3	Bed	11.6	92	Medium	75.2%	55.8%	19.8%	Medium	85.8%	52.6%	14.2%
D047.1	LKD	26.6	234	Minimum	65.2%	35.6%	0.7%	Minimum	83.5%	45.3%	3.5%
D047.2	Bed	11.8	95	Medium	71.0%	53.6%	35.8%	Minimum	79.7%	45.0%	21.4%
D048.1	KD	22.7	192	High	77.0%	65.1%	53.0%	Medium	83.3%	59.4%	43.0%
D048.2	Liv	15.8	142	Minimum	64.6%	29.6%	0.5%	Minimum	81.3%	34.2%	1.0%
D048.3	Bed	11.6	85	Minimum	51.6%	15.9%	0.0%	Minimum	75.5%	14.9%	0.0%
D048.4	Bed	10.4	84	Medium	75.5%	61.1%	45.1%	Medium	83.7%	57.3%	35.2%
D048.5	Bed	7.8	64	High	78.7%	66.1%	51.1%	Medium	88.3%	68.2%	49.0%
D068.1	KD	22.7	192	Minimum	72.4%	47.7%	14.4%	Minimum	81.6%	41.0%	5.7%
D068.2	Liv	15.8	142	High	77.3%	65.0%	50.3%	High	88.8%	69.0%	51.1%
D068.3	Bed	11.6	85	Medium	70.0%	53.0%	37.8%	Medium	82.9%	54.0%	34.8%
D068.4	Bed	10.4	84	Minimum	70.7%	46.6%	12.6%	Minimum	82.6%	43.7%	3.0%
D068.5	Bed	7.8	64	Medium	77.5%	59.7%	26.3%	Medium	90.6%	66.7%	34.7%
D069.1	LKD	30.5	290	Medium	79.3%	65.1%	44.2%	Medium	85.0%	55.5%	28.7%
D069.2	Bed	13.2	111	Minimum	60.9%	24.5%	1.0%	Minimum	75.5%	16.5%	0.0%
D069.3	Bed	11.6	92	High	82.1%	72.1%	60.8%	High	91.3%	74.6%	60.2%
D070.1	LKD	26.6	234	Medium	74.8%	60.5%	43.8%	Medium	86.8%	65.4%	45.0%
D070.2	Bed	11.8	95	Minimum	61.1%	25.5%	0.0%	Minimum	77.1%	17.2%	0.0%

Table 30: Daylight Provision individual room compliance values for all habitable rooms

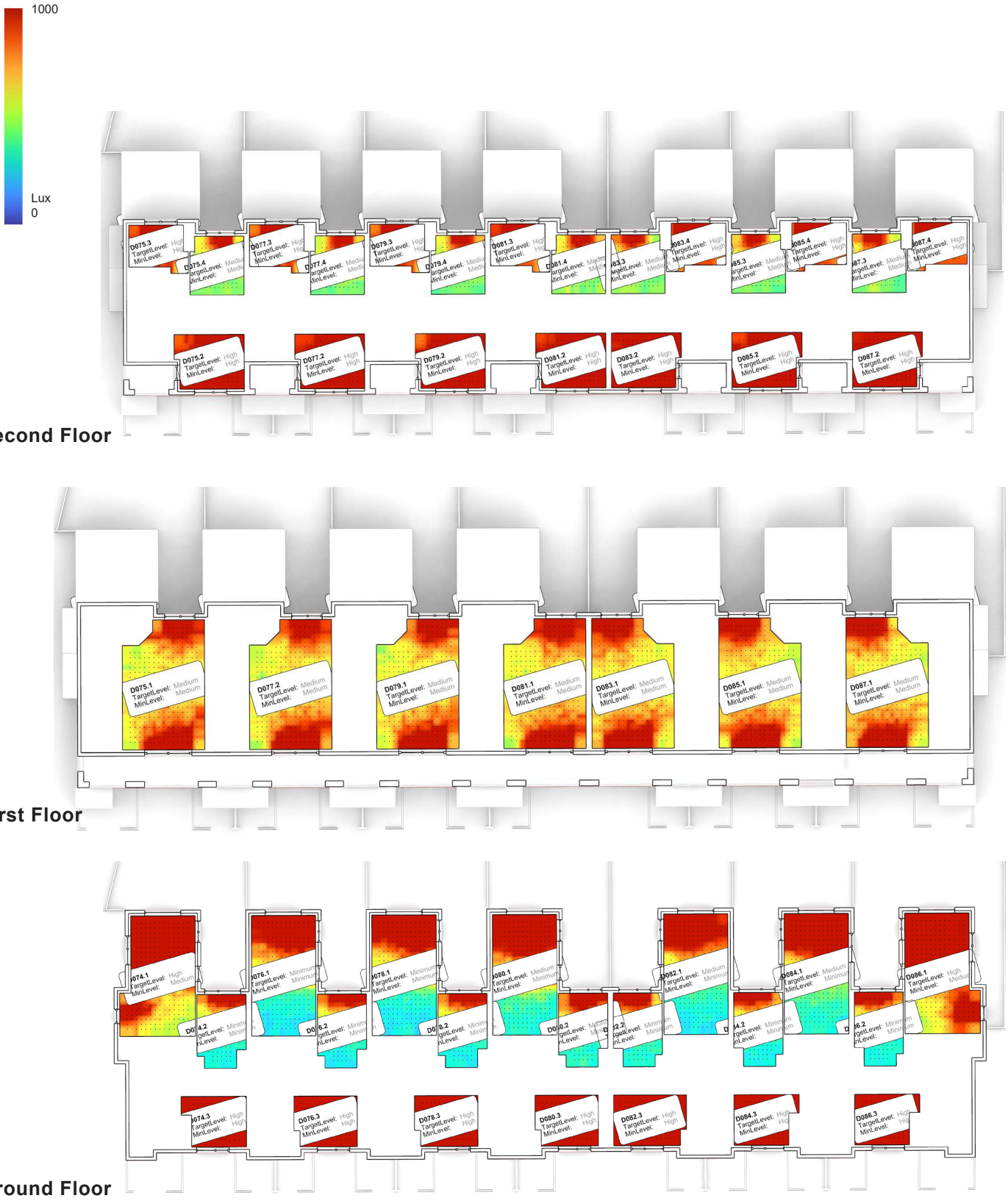


Figure 47: Duplex units 74 - 87
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D074.1	LKD	31.9	290	High	85.2%	75.4%	61.6%	Medium	89.7%	68.2%	41.6%
D074.2	Bed	13.0	113	Minimum	69.7%	38.4%	8.3%	Minimum	84.2%	33.0%	1.9%
D074.3	Bed	11.5	94	High	86.4%	78.3%	68.8%	High	93.8%	80.8%	70.0%
D075.1	LKD	34.7	333	Medium	76.0%	59.8%	37.9%	Medium	88.9%	67.1%	41.5%
D075.2	Bed	14.1	123	High	84.4%	75.7%	65.5%	High	92.5%	77.9%	65.0%
D075.3	Bed	9.6	74	High	88.1%	79.0%	67.4%	High	95.0%	82.4%	69.1%
D075.4	Bed	11.9	107	Medium	74.5%	53.9%	25.0%	Medium	89.0%	62.2%	24.7%
D076.1	LKD	30.0	276	Minimum	72.9%	48.3%	24.2%	Minimum	78.6%	22.9%	2.5%
D076.2	Bed	13.0	113	Minimum	68.3%	36.4%	7.2%	Minimum	82.9%	29.3%	1.0%
D076.3	Bed	12.0	105	High	85.3%	76.8%	67.3%	High	93.2%	79.8%	67.4%
D077.2	LKD	34.7	333	Medium	76.0%	59.5%	37.4%	Medium	88.8%	66.9%	41.6%
D077.2	Bed	14.1	123	High	83.6%	75.0%	64.1%	High	92.6%	77.8%	64.7%
D077.3	Bed	9.6	74	High	88.1%	79.2%	67.9%	High	94.9%	82.0%	69.0%
D077.4	Bed	11.9	107	Medium	74.9%	54.2%	25.5%	Medium	89.6%	63.9%	26.9%
D078.1	LKD	30.0	276	Minimum	72.5%	47.7%	22.8%	Minimum	78.9%	22.9%	1.7%
D078.2	Bed	13.0	113	Minimum	69.5%	38.0%	8.2%	Minimum	83.9%	31.3%	1.1%
D078.3	Bed	12.0	105	High	84.8%	76.3%	66.8%	High	93.3%	79.7%	67.5%
D079.1	LKD	34.7	333	Medium	75.9%	59.6%	37.6%	Medium	88.8%	66.8%	41.0%
D079.2	Bed	14.1	123	High	83.5%	75.0%	63.8%	High	92.5%	77.9%	64.7%
D079.3	Bed	9.6	74	High	88.1%	79.2%	67.1%	High	94.8%	81.6%	68.4%
D079.4	Bed	11.9	107	Medium	75.1%	54.6%	24.9%	Medium	89.3%	62.8%	26.4%
D080.1	LKD	30.0	276	Medium	77.1%	55.0%	31.1%	Minimum	80.8%	31.0%	7.8%
D080.2	Bed	13.0	113	Medium	76.2%	51.1%	20.9%	Minimum	85.8%	40.6%	6.4%
D080.3	Bed	12.0	105	High	86.2%	78.4%	69.5%	High	93.7%	81.1%	70.5%
D081.1	LKD	34.7	333	Medium	76.5%	61.0%	38.1%	Medium	89.2%	68.4%	43.5%
D081.2	Bed	14.1	123	High	84.3%	75.8%	64.9%	High	92.6%	78.8%	65.5%
D081.3	Bed	9.6	74	High	88.1%	79.0%	67.0%	High	95.0%	82.2%	69.1%
D081.4	Bed	11.9	107	Medium	75.3%	54.4%	27.3%	Medium	89.2%	63.2%	26.9%
D082.1	LKD	30.0	276	Medium	76.2%	53.2%	28.3%	Minimum	80.4%	25.0%	0.0%
D082.2	Bed	13.0	113	Minimum	74.5%	47.5%	13.9%	Minimum	86.1%	43.2%	4.4%
D082.3	Bed	13.9	123	High	84.7%	76.4%	65.6%	High	93.4%	80.2%	68.1%
D083.1	LKD	34.7	333	Medium	75.7%	59.5%	38.2%	Medium	89.0%	67.4%	40.6%
D083.2	Bed	14.1	123	High	84.2%	75.8%	65.8%	High	92.5%	78.1%	64.7%
D083.3	Bed	11.9	107	Medium	75.1%	54.3%	24.0%	Medium	89.4%	64.2%	27.1%
D083.4	Bed	9.6	74	High	87.7%	78.6%	66.5%	High	94.9%	81.8%	68.4%
D084.1	LKD	30.0	276	Medium	79.7%	61.2%	38.0%	Minimum	82.9%	36.8%	5.8%
D084.2	Bed	13.0	113	Minimum	69.6%	39.3%	10.2%	Minimum	82.7%	29.7%	2.1%
D084.3	Bed	11.5	94	High	85.7%	77.7%	67.7%	High	93.3%	79.9%	67.6%
D085.1	LKD	34.7	333	Medium	76.0%	59.9%	38.1%	Medium	88.8%	66.9%	40.3%
D085.2	Bed	14.1	123	High	83.6%	74.8%	64.3%	High	92.2%	77.3%	63.8%
D085.3	Bed	11.9	107	Medium	75.0%	54.1%	23.2%	Medium	89.4%	63.3%	26.3%
D085.4	Bed	9.6	74	High	87.3%	78.4%	66.0%	High	95.0%	81.9%	68.7%
D086.1	LKD	31.9	290	High	84.3%	73.2%	58.7%	Medium	90.3%	66.5%	39.6%
D086.2	Bed	13.0	113	Minimum	69.7%	38.8%	9.8%	Minimum	83.4%	33.1%	1.7%
D086.3	Bed	11.5	94	High	86.5%	78.9%	69.5%	High	93.9%	81.5%	71.2%
D087.1	LKD	34.7	333	Medium	75.8%	60.0%	37.6%	Medium	88.9%	67.2%	40.6%
D087.2	Bed	14.1	123	High	84.2%	76.0%	66.0%	High	92.5%	78.6%	65.5%
D087.3	Bed	11.9	107	Medium	75.1%	54.2%	25.1%	Medium	89.1%	62.4%	25.1%
D087.4	Bed	9.6	74	High	87.9%	79.2%	67.0%	High	95.2%	82.3%	68.9%

Table 31: Daylight Provision individual room compliance values for all habitable rooms

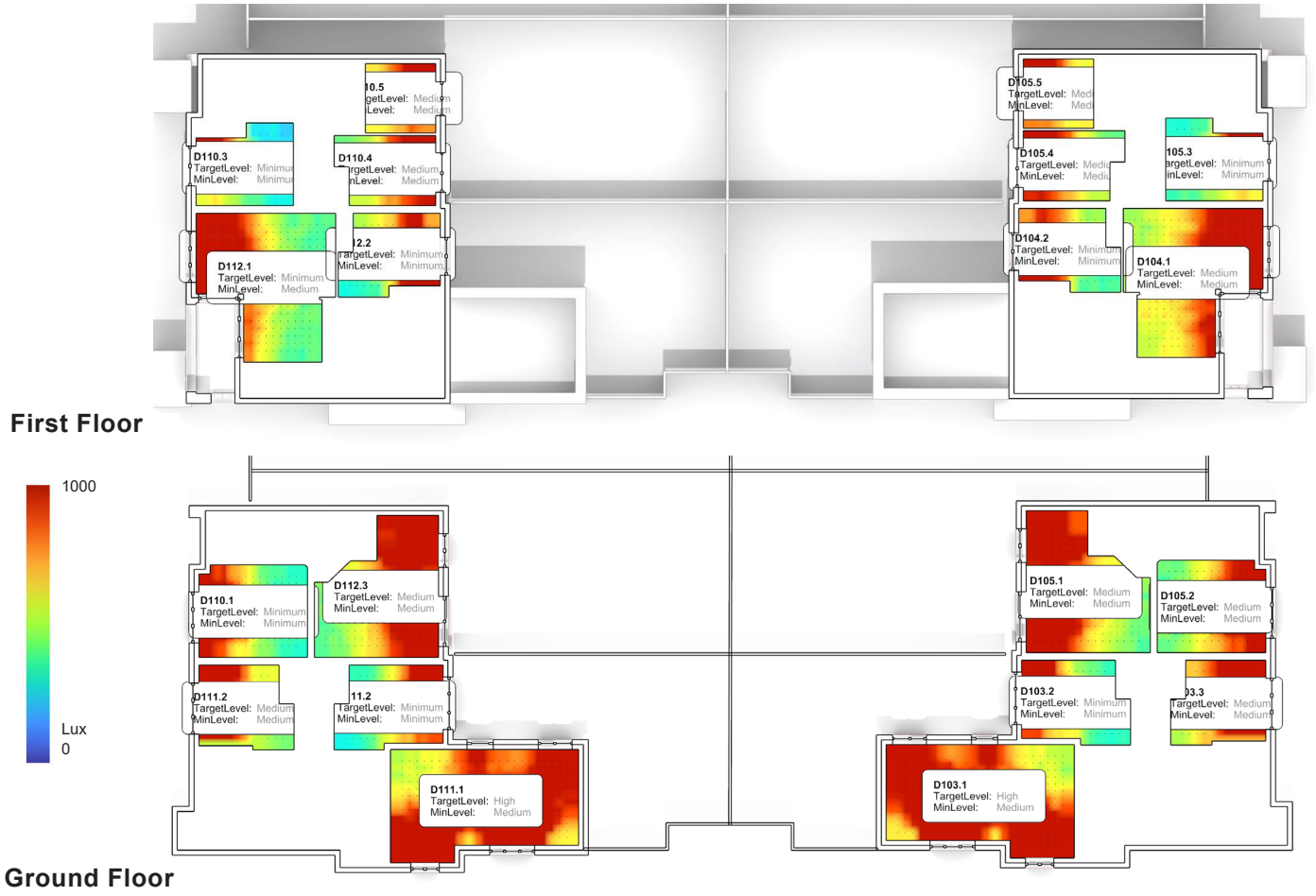


Figure 48: Duplex units 103 - 112
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D103.1	LKD	30.5	290	High	79.5%	67.6%	53.2%	Medium	86.6%	63.9%	44.8%
D103.2	Bed	13.2	111	Minimum	65.9%	33.8%	17.2%	Minimum	77.3%	26.6%	11.0%
D103.3	Bed	11.6	92	Medium	79.0%	66.6%	45.9%	Medium	86.9%	64.1%	39.7%
D104.1	Bed	26.6	234	Medium	73.5%	56.9%	35.2%	Medium	86.5%	62.0%	34.8%
D104.2	Bed	11.8	95	Minimum	70.0%	44.6%	21.7%	Minimum	81.7%	34.7%	12.5%
D105.1	KD	22.7	192	Medium	76.4%	58.0%	34.1%	Medium	84.2%	51.0%	24.6%
D105.2	Liv	15.8	142	Medium	72.0%	51.4%	28.1%	Medium	81.7%	50.4%	23.6%
D105.3	Bed	11.6	85	Minimum	66.0%	42.0%	19.1%	Minimum	79.6%	40.6%	12.5%
D105.4	Bed	10.4	84	Medium	75.8%	58.2%	32.5%	Medium	85.5%	53.5%	20.7%
D105.5	Bed	7.8	64	Medium	78.3%	62.8%	38.6%	Medium	88.7%	66.9%	39.1%
D110.1	KD	15.8	142	Minimum	66.4%	39.3%	19.5%	Minimum	80.5%	38.2%	17.0%
D110.2	Liv	22.7	192	Medium	75.9%	57.9%	34.6%	Medium	82.9%	50.9%	22.8%
D110.3	Bed	11.6	85	Minimum	56.2%	28.0%	12.6%	Minimum	74.9%	21.6%	6.5%
D110.4	Bed	10.4	84	Medium	75.5%	57.1%	31.9%	Medium	84.5%	54.1%	22.3%
D110.5	Bed	7.8	64	Medium	78.2%	63.0%	40.7%	Medium	89.2%	67.1%	41.8%
D111.1	LKD	30.5	290	High	79.5%	67.1%	53.3%	Medium	86.8%	63.9%	44.7%
D111.2	Bed	13.2	111	Minimum	65.0%	35.1%	16.5%	Minimum	77.6%	27.4%	10.5%
D111.3	Bed	11.6	92	Medium	76.7%	60.7%	34.7%	Medium	85.1%	55.5%	26.8%
D112.1	LKD	26.6	234	Minimum	67.5%	48.4%	18.1%	Medium	82.8%	51.2%	16.3%
D112.2	Bed	11.8	95	Minimum	68.5%	44.2%	21.8%	Minimum	81.0%	36.6%	13.7%

Table 32: Daylight Provision individual room compliance values for all habitable rooms

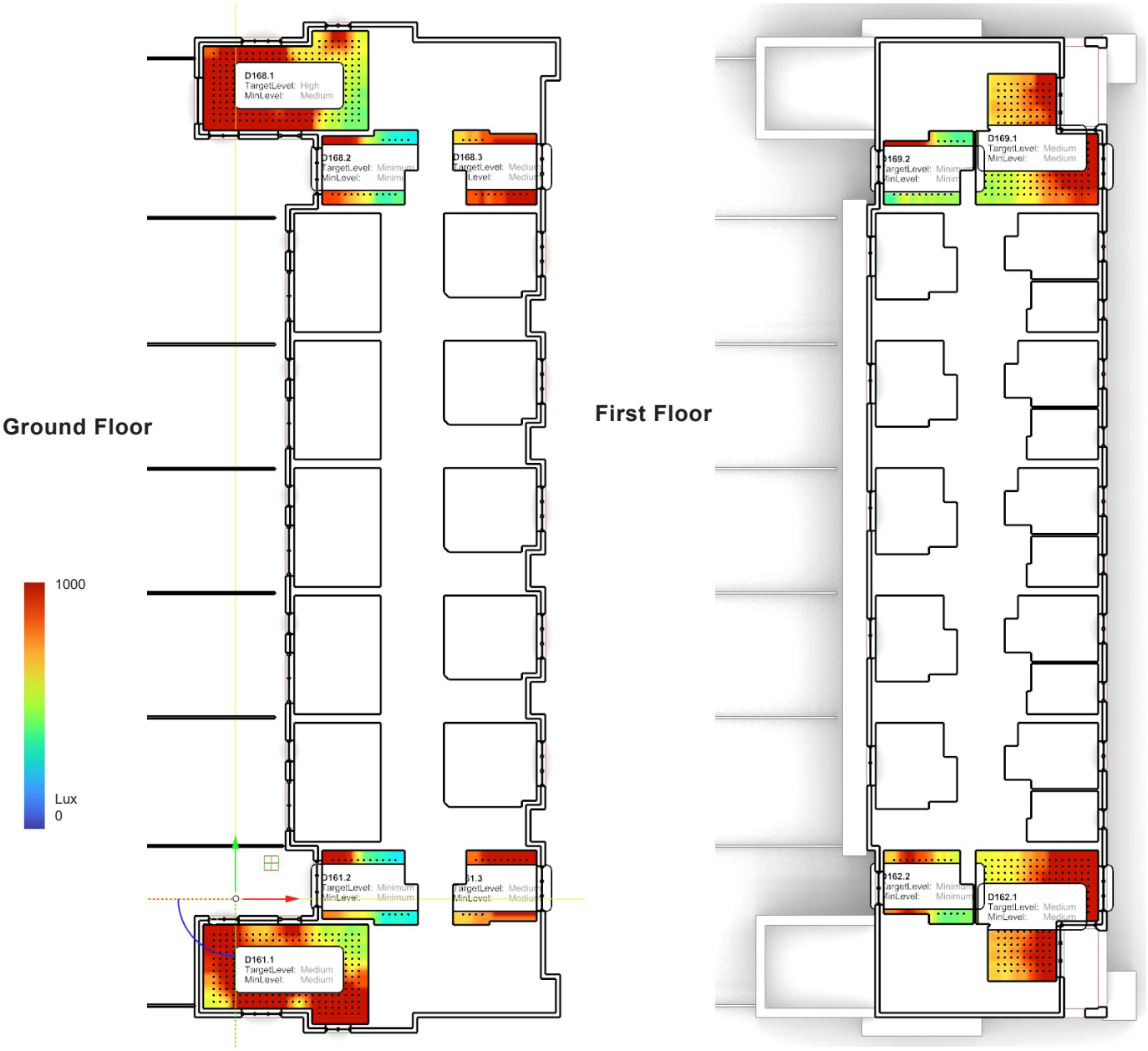


Figure 49: Duplex units 161 - 162 and 168 - 169
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D161.1	LKD	30.5	290	Medium	77.7%	64.5%	48.7%	Medium	85.7%	60.6%	41.4%
D161.2	Bed	13.2	111	Minimum	62.9%	29.3%	14.9%	Minimum	76.2%	22.6%	9.3%
D161.3	Bed	11.6	92	Medium	81.9%	69.3%	49.4%	Medium	91.5%	70.8%	47.7%
D162.1	LKD	26.6	234	Medium	76.3%	58.9%	36.8%	Medium	88.5%	65.1%	39.2%
D162.2	Bed	11.8	95	Minimum	72.9%	48.1%	24.4%	Minimum	84.7%	44.3%	15.5%
D168.1	LKD	30.5	290	High	81.4%	68.7%	54.7%	Medium	87.2%	63.1%	41.4%
D168.2	LKD	13.2	111	Minimum	64.2%	39.4%	19.2%	Minimum	74.0%	26.3%	11.2%
D168.3	Bed	11.6	92	Medium	82.2%	68.4%	49.0%	Medium	91.5%	70.1%	48.1%
D169.1	LKD	26.6	234	Medium	75.1%	54.7%	30.8%	Medium	89.5%	63.2%	34.4%
D169.2	Bed	11.8	95	Minimum	71.5%	45.7%	20.5%	Minimum	83.0%	40.8%	14.8%

Table 33: Daylight Provision individual room compliance values for all habitable rooms

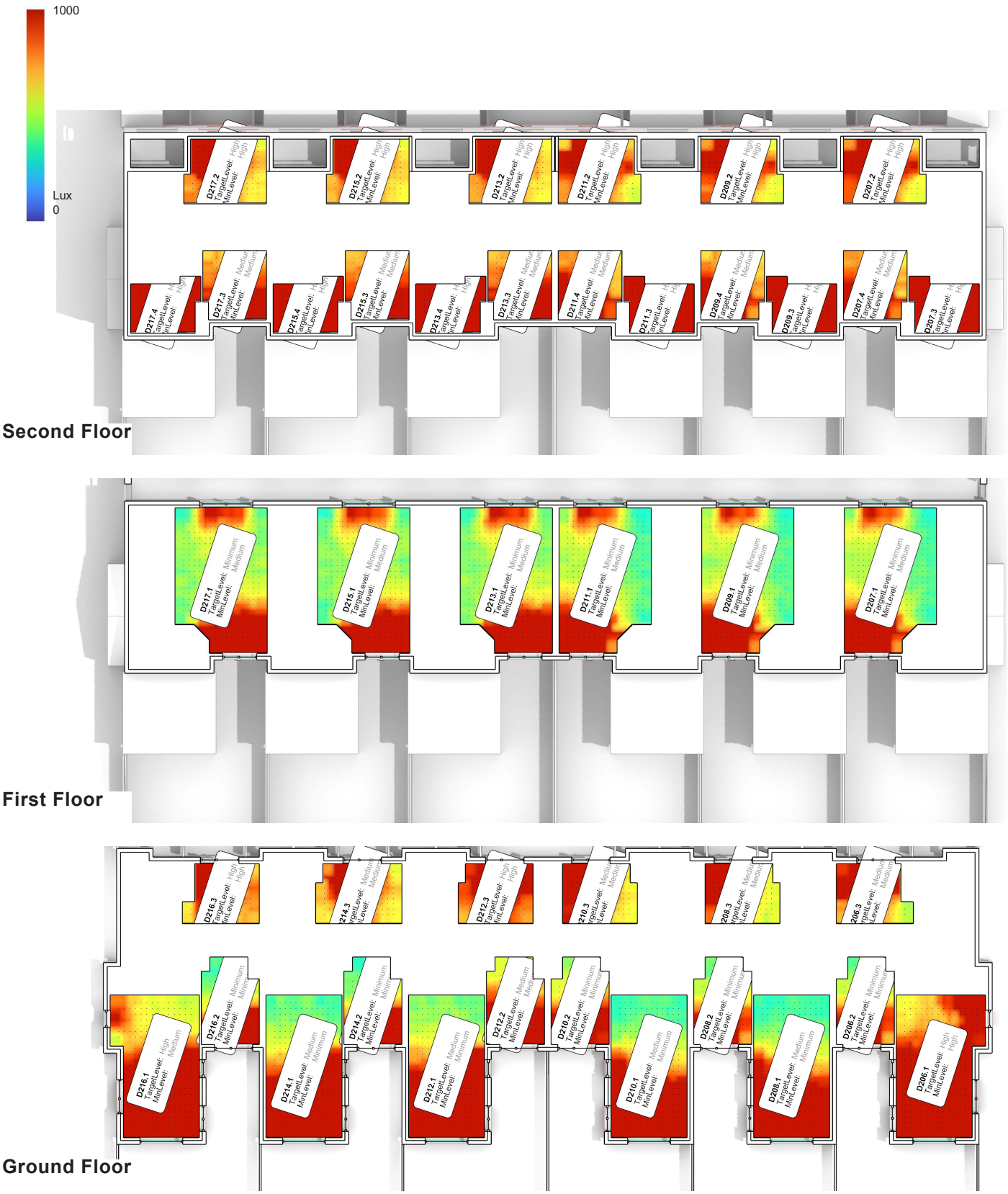


Figure 50: Duplex units 206 - 217
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D206.1	LKD	31.9	290	High	84.9%	75.7%	65.0%	High	89.2%	70.2%	52.7%
D206.2	Bed	13.0	113	Minimum	63.1%	42.2%	26.5%	Minimum	80.1%	40.1%	21.0%
D206.3	Bed	11.5	94	Medium	82.4%	70.2%	50.0%	Medium	91.8%	72.6%	48.8%
D207.1	LKD	34.7	333	Minimum	69.7%	45.1%	15.1%	Medium	85.8%	53.0%	14.3%
D207.2	Bed	14.1	123	High	82.9%	71.8%	52.9%	High	92.5%	75.7%	56.1%
D207.3	Bed	9.6	74	High	88.4%	79.9%	69.9%	High	95.2%	83.3%	72.0%
D207.4	Bed	11.9	107	Medium	76.5%	59.7%	39.2%	Medium	89.6%	68.1%	42.7%
D208.1	LKD	30.0	276	Medium	72.6%	55.3%	38.0%	Minimum	80.0%	40.2%	21.2%
D208.2	Bed	13.0	113	Minimum	61.7%	40.9%	25.0%	Minimum	79.5%	39.8%	21.3%
D208.3	Bed	12.0	105	Medium	80.7%	67.3%	42.9%	Medium	90.8%	69.8%	42.9%
D209.1	LKD	34.7	333	Minimum	71.0%	46.3%	16.6%	Medium	85.8%	53.9%	15.8%
D209.2	Bed	14.1	123	High	82.2%	70.5%	50.1%	High	92.2%	74.9%	53.4%
D209.3	Bed	9.6	74	High	88.2%	79.5%	69.4%	High	95.1%	82.8%	71.2%
D209.4	Bed	11.9	107	Medium	76.8%	59.8%	39.3%	Medium	89.9%	68.2%	43.7%
D210.1	LKD	30.0	276	Medium	75.5%	58.8%	39.8%	Minimum	81.9%	43.0%	22.1%
D210.2	Bed	13.0	113	Minimum	71.7%	49.6%	30.8%	Minimum	85.3%	46.1%	24.2%
D210.3	Bed	12.0	105	Medium	81.9%	70.3%	47.5%	Medium	92.1%	73.4%	49.8%
D211.1	LKD	34.7	333	Minimum	72.1%	47.4%	16.6%	Medium	86.3%	55.4%	16.3%
D211.2	Bed	14.1	123	High	82.4%	70.5%	51.0%	High	92.2%	74.7%	53.2%
D211.3	Bed	9.6	74	High	88.2%	79.6%	69.8%	High	95.1%	83.2%	71.8%
D211.4	Bed	11.9	107	Medium	76.6%	59.5%	39.2%	Medium	90.0%	69.0%	44.3%
D212.1	LKD	30.0	276	Medium	75.9%	62.1%	47.7%	Minimum	82.1%	49.5%	32.8%
D212.2	Bed	13.0	113	Medium	69.8%	51.6%	36.3%	Medium	85.3%	50.0%	29.7%
D212.3	Bed	12.0	105	High	82.3%	71.0%	53.0%	High	92.0%	72.8%	50.6%
D213.1	LKD	34.7	333	Minimum	72.4%	49.8%	18.8%	Medium	86.4%	58.4%	20.3%
D213.2	Bed	14.1	123	High	82.2%	70.3%	50.4%	High	92.4%	75.2%	54.2%
D213.3	Bed	11.9	107	Medium	76.6%	60.3%	40.5%	Medium	89.8%	68.4%	45.5%
D213.4	Bed	9.6	74	High	88.0%	79.4%	69.3%	High	95.2%	83.0%	71.3%
D214.1	LKD	30.0	276	Medium	72.3%	57.3%	42.0%	Minimum	80.0%	45.1%	27.9%
D214.2	Bed	13.0	113	Minimum	60.4%	38.6%	23.3%	Minimum	79.2%	35.8%	18.9%
D214.3	Bed	13.9	123	Medium	79.9%	64.7%	37.9%	Medium	90.7%	68.6%	40.7%
D215.1	LKD	34.7	333	Minimum	72.2%	48.6%	18.3%	Medium	86.0%	56.2%	18.1%
D215.2	Bed	14.1	123	High	82.4%	70.4%	50.9%	High	92.5%	75.4%	54.6%
D215.3	Bed	11.9	107	Medium	76.3%	59.6%	39.1%	Medium	89.3%	67.5%	43.4%
D215.4	Bed	9.6	74	High	88.0%	79.5%	69.6%	High	95.2%	83.4%	72.2%
D216.1	LKD	31.9	290	High	83.7%	72.5%	58.6%	Medium	88.7%	65.4%	44.5%
D216.2	Bed	13.0	113	Minimum	59.8%	38.0%	22.8%	Minimum	79.3%	36.0%	19.0%
D216.3	Bed	11.5	94	High	83.4%	71.6%	51.5%	High	92.9%	75.5%	53.0%
D217.1	LKD	34.7	333	Minimum	72.4%	49.7%	18.4%	Medium	86.5%	57.6%	19.8%
D217.2	Bed	14.1	123	High	82.6%	70.8%	51.8%	High	92.6%	75.5%	55.8%
D217.3	Bed	11.9	107	Medium	76.1%	59.0%	39.0%	Medium	89.9%	68.7%	44.3%
D217.4	Bed	9.6	74	High	88.1%	79.5%	69.3%	High	95.1%	83.0%	71.4%

Table 34: Daylight Provision individual room compliance values for all habitable rooms

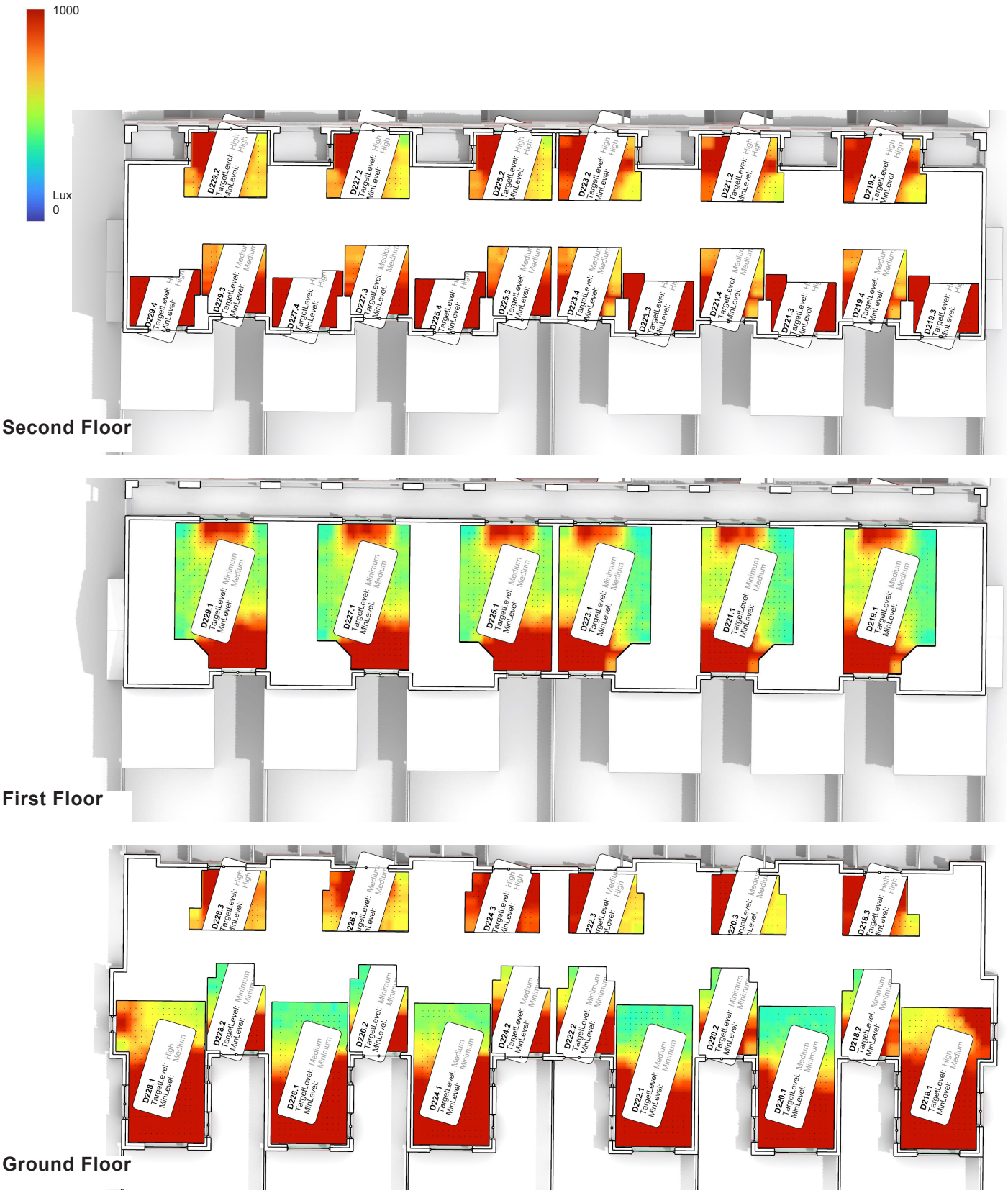


Figure 51: Duplex units 218- 229
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D218.1	LKD	31.9	290	High	83.6%	73.2%	61.7%	Medium	88.6%	66.2%	48.2%
D218.2	Bed	13.0	113	Minimum	61.5%	40.7%	25.1%	Minimum	80.0%	38.6%	20.3%
D218.3	Bed	11.5	94	High	83.5%	72.4%	54.0%	High	92.6%	75.3%	53.9%
D219.1	LKD	34.7	333	Minimum	72.7%	48.9%	16.9%	Medium	86.3%	56.3%	16.8%
D219.2	Bed	14.1	123	High	82.8%	71.4%	54.1%	High	92.6%	76.2%	57.1%
D219.3	Bed	9.6	74	High	88.2%	79.8%	69.8%	High	95.1%	83.1%	71.6%
D219.4	Bed	11.9	107	Medium	76.1%	59.1%	37.8%	Medium	89.5%	67.3%	41.9%
D220.1	LKD	30.0	276	Medium	72.1%	54.8%	37.3%	Minimum	80.3%	40.4%	20.6%
D220.2	Bed	13.0	113	Minimum	61.9%	41.0%	25.9%	Minimum	81.1%	40.5%	20.7%
D220.3	Bed	12.0	105	Medium	81.7%	69.0%	45.3%	Medium	91.5%	71.3%	45.5%
D221.1	LKD	34.7	333	Minimum	72.5%	48.2%	16.3%	Medium	86.1%	55.2%	15.9%
D221.2	Bed	14.1	123	High	82.4%	70.6%	51.6%	High	92.5%	74.9%	54.3%
D221.3	Bed	9.6	74	High	87.9%	79.3%	69.2%	High	95.1%	83.0%	71.5%
D221.4	Bed	11.9	107	Medium	75.9%	58.4%	37.4%	Medium	90.0%	69.0%	44.5%
D222.1	LKD	30.0	276	Medium	75.3%	57.8%	39.3%	Minimum	81.6%	42.1%	20.9%
D222.2	Bed	13.0	113	Minimum	72.3%	48.9%	29.7%	Minimum	85.4%	47.2%	23.6%
D222.3	Bed	12.0	105	Medium	81.9%	70.5%	48.8%	High	92.1%	74.1%	50.1%
D223.1	LKD	34.7	333	Minimum	72.6%	48.0%	16.3%	Medium	86.4%	56.0%	16.5%
D223.2	Bed	14.1	123	High	82.9%	71.5%	53.7%	High	92.5%	75.6%	56.3%
D223.3	Bed	9.6	74	High	88.5%	80.2%	70.1%	High	94.8%	82.3%	70.2%
D223.4	Bed	11.9	107	Medium	76.2%	59.2%	38.4%	Medium	90.1%	69.3%	44.4%
D224.1	LKD	30.0	276	Medium	75.3%	61.0%	46.5%	Minimum	82.1%	49.2%	32.2%
D224.2	Bed	13.0	113	Medium	70.8%	52.4%	37.2%	Medium	85.4%	50.2%	30.7%
D224.3	Bed	12.0	105	High	82.7%	71.7%	53.7%	High	92.3%	74.7%	54.3%
D225.1	LKD	34.7	333	Medium	73.0%	50.2%	19.4%	Medium	86.4%	58.4%	19.4%
D225.2	Bed	14.1	123	High	82.2%	70.4%	50.6%	High	92.3%	74.6%	53.6%
D225.3	Bed	11.9	107	Medium	76.8%	60.4%	40.0%	Medium	89.9%	68.9%	45.8%
D225.4	Bed	9.6	74	High	87.9%	79.4%	69.1%	High	95.0%	82.6%	70.8%
D226.1	LKD	30.0	276	Medium	72.1%	56.6%	41.2%	Minimum	80.2%	45.1%	27.0%
D226.2	Bed	13.0	113	Minimum	59.2%	37.0%	23.1%	Minimum	79.5%	34.1%	18.1%
D226.3	Bed	13.9	123	Medium	80.0%	65.6%	39.1%	Medium	90.0%	67.8%	39.3%
D227.1	LKD	34.7	333	Minimum	72.9%	49.2%	18.5%	Medium	86.0%	56.1%	18.0%
D227.2	Bed	14.1	123	High	82.1%	70.4%	50.9%	High	92.5%	75.1%	55.3%
D227.3	Bed	11.9	107	Medium	76.1%	59.2%	38.1%	Medium	89.5%	67.1%	42.5%
D227.4	Bed	9.6	74	High	88.3%	79.9%	69.9%	High	95.2%	83.0%	71.6%
D228.1	LKD	31.9	290	High	83.7%	72.2%	58.7%	Medium	88.8%	65.9%	44.6%
D228.2	Bed	13.0	113	Minimum	58.7%	36.4%	22.3%	Minimum	79.1%	33.0%	17.1%
D228.3	Bed	11.5	94	High	82.4%	71.3%	51.9%	High	92.1%	73.1%	50.8%
D229.1	LKD	34.7	333	Minimum	72.4%	48.9%	18.0%	Medium	86.6%	57.3%	19.1%
D229.2	Bed	14.1	123	High	82.6%	71.4%	53.1%	High	92.6%	75.7%	56.5%
D229.3	Bed	11.9	107	Medium	76.2%	59.3%	39.0%	Medium	89.9%	68.5%	44.4%
D229.4	Bed	9.6	74	High	88.1%	79.6%	69.5%	High	95.2%	83.4%	72.1%

Table 35: Daylight Provision individual room compliance values for all habitable rooms

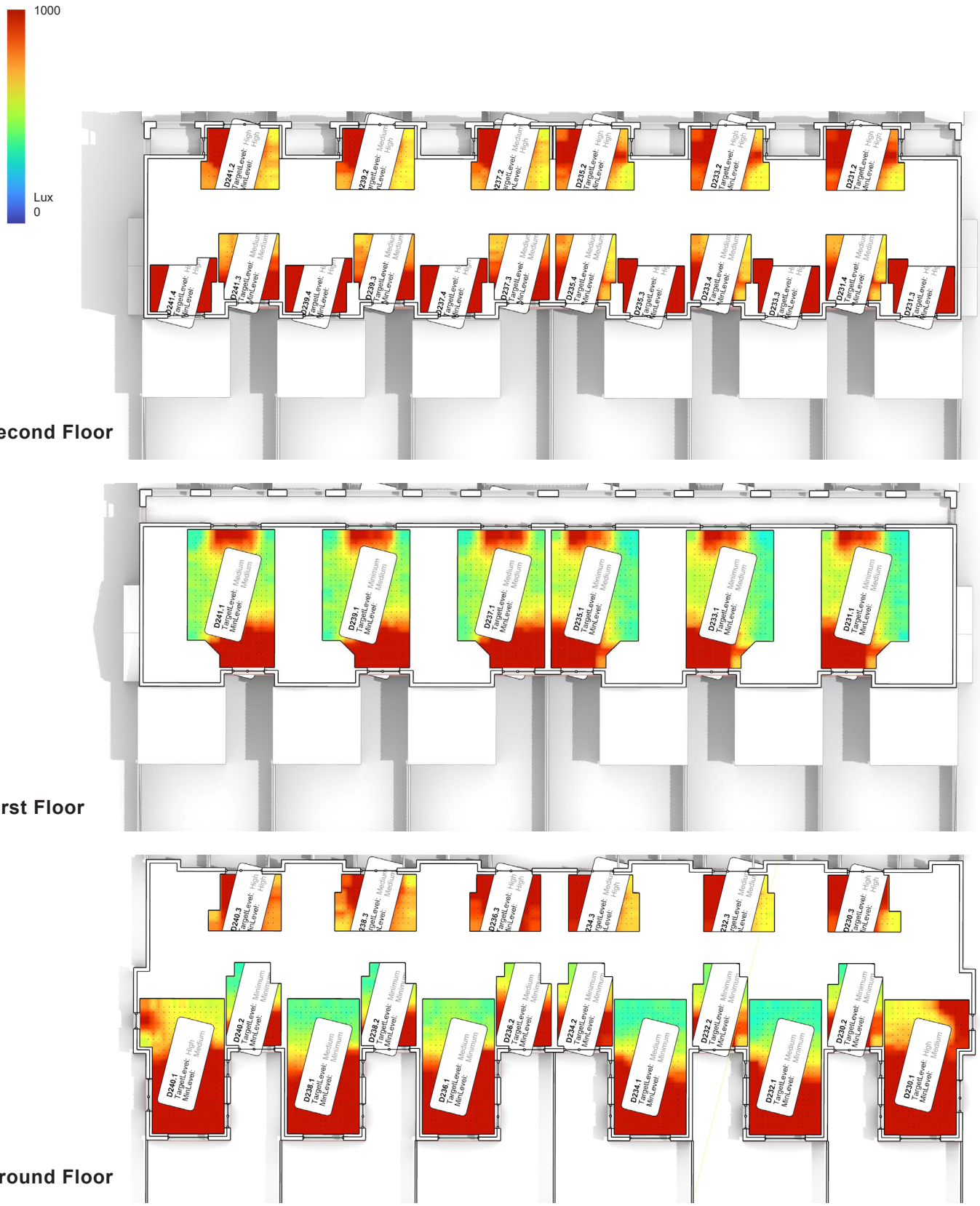


Figure 52: Duplex units 230 - 241
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units - EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D230.1	LKD	31.9	290	High	84.0%	73.5%	62.3%	Medium	88.6%	66.4%	48.2%
D230.2	Bed	13.0	113	Minimum	62.0%	40.2%	25.1%	Minimum	80.4%	39.4%	20.5%
D230.3	Bed	11.5	94	High	83.3%	72.7%	55.1%	High	92.2%	74.2%	53.3%
D231.1	LKD	34.7	333	Minimum	72.6%	48.1%	16.5%	Medium	86.3%	56.1%	16.3%
D231.2	Bed	14.1	123	High	83.4%	72.8%	56.7%	High	92.7%	76.5%	58.4%
D231.3	Bed	9.6	74	High	88.4%	80.1%	69.8%	High	95.1%	83.0%	71.1%
D231.4	Bed	11.9	107	Medium	76.2%	59.2%	37.9%	Medium	89.9%	68.6%	43.2%
D232.1	LKD	30.0	276	Medium	72.2%	54.7%	37.0%	Minimum	80.4%	39.8%	19.8%
D232.2	Bed	13.0	113	Minimum	60.8%	39.7%	25.0%	Minimum	80.3%	39.0%	20.3%
D232.3	Bed	12.0	105	Medium	81.7%	69.0%	45.8%	Medium	92.4%	73.6%	47.9%
D233.1	LKD	34.7	333	Minimum	72.4%	47.8%	15.5%	Medium	86.6%	56.2%	15.8%
D233.2	Bed	14.1	123	High	82.6%	70.9%	51.9%	High	92.2%	74.6%	53.5%
D233.3	Bed	9.6	74	High	87.8%	79.2%	68.9%	High	95.2%	83.2%	71.9%
D233.4	Bed	11.9	107	Medium	75.9%	58.7%	37.6%	Medium	89.9%	68.8%	43.4%
D234.1	LKD	30.0	276	Medium	75.2%	57.6%	38.4%	Minimum	81.8%	41.8%	21.0%
D234.2	Bed	13.0	113	Minimum	71.2%	47.2%	28.8%	Minimum	85.6%	46.5%	23.7%
D234.3	Bed	12.0	105	Medium	82.9%	71.1%	49.6%	High	93.4%	77.2%	55.0%
D235.1	LKD	34.7	333	Minimum	72.8%	48.3%	16.3%	Medium	87.0%	57.3%	18.7%
D235.2	Bed	14.1	123	High	82.3%	69.8%	50.2%	High	92.5%	74.8%	53.1%
D235.3	Bed	9.6	74	High	88.2%	79.7%	69.5%	High	95.2%	83.0%	71.2%
D235.4	Bed	11.9	107	Medium	76.7%	59.7%	38.6%	Medium	90.1%	69.4%	44.0%
D236.1	LKD	30.0	276	Medium	75.5%	60.8%	46.3%	Minimum	82.1%	48.8%	31.5%
D236.2	Bed	13.0	113	Medium	70.8%	52.0%	36.9%	Minimum	85.7%	49.5%	29.6%
D236.3	Bed	12.0	105	High	83.5%	71.4%	53.2%	High	92.8%	74.9%	54.4%
D237.1	LKD	34.7	333	Medium	73.4%	51.4%	19.6%	Medium	86.9%	59.7%	19.8%
D237.2	Bed	14.1	123	High	82.4%	69.4%	50.0%	High	92.6%	74.8%	53.6%
D237.3	Bed	11.9	107	Medium	76.9%	60.6%	40.3%	Medium	90.0%	69.1%	45.3%
D237.4	Bed	9.6	74	High	88.2%	79.5%	69.7%	High	95.3%	83.5%	72.0%
D238.1	LKD	30.0	276	Medium	72.4%	56.9%	41.3%	Minimum	79.9%	44.2%	27.2%
D238.2	Bed	13.0	113	Minimum	58.2%	35.6%	22.6%	Minimum	78.9%	31.9%	17.0%
D238.3	Bed	13.9	123	Medium	81.4%	64.7%	41.6%	Medium	91.4%	68.9%	43.5%
D239.1	LKD	34.7	333	Minimum	73.4%	49.9%	18.0%	Medium	86.8%	58.2%	18.9%
D239.2	Bed	14.1	123	Medium	82.2%	68.9%	48.7%	High	92.4%	73.9%	51.9%
D239.3	Bed	11.9	107	Medium	76.1%	58.7%	38.0%	Medium	89.5%	67.9%	43.8%
D239.4	Bed	9.6	74	High	88.2%	79.5%	69.3%	High	95.2%	83.2%	71.6%
D240.1	LKD	31.9	290	High	84.6%	73.5%	59.3%	Medium	90.4%	70.8%	47.5%
D240.2	Bed	13.0	113	Minimum	60.3%	37.4%	23.0%	Minimum	79.4%	33.9%	16.9%
D240.3	Bed	11.5	94	High	83.7%	71.3%	51.8%	High	93.4%	76.3%	55.2%
D241.1	LKD	34.7	333	Medium	73.6%	51.3%	18.1%	Medium	87.3%	60.6%	20.9%
D241.2	Bed	14.1	123	High	82.6%	69.9%	51.7%	High	92.6%	75.2%	54.9%
D241.3	Bed	11.9	107	Medium	76.1%	58.8%	38.7%	Medium	89.7%	68.3%	43.9%
D241.4	Bed	9.6	74	High	88.2%	79.5%	69.5%	High	95.3%	83.3%	71.8%

Table 36: Daylight Provision individual room compliance values for all habitable rooms

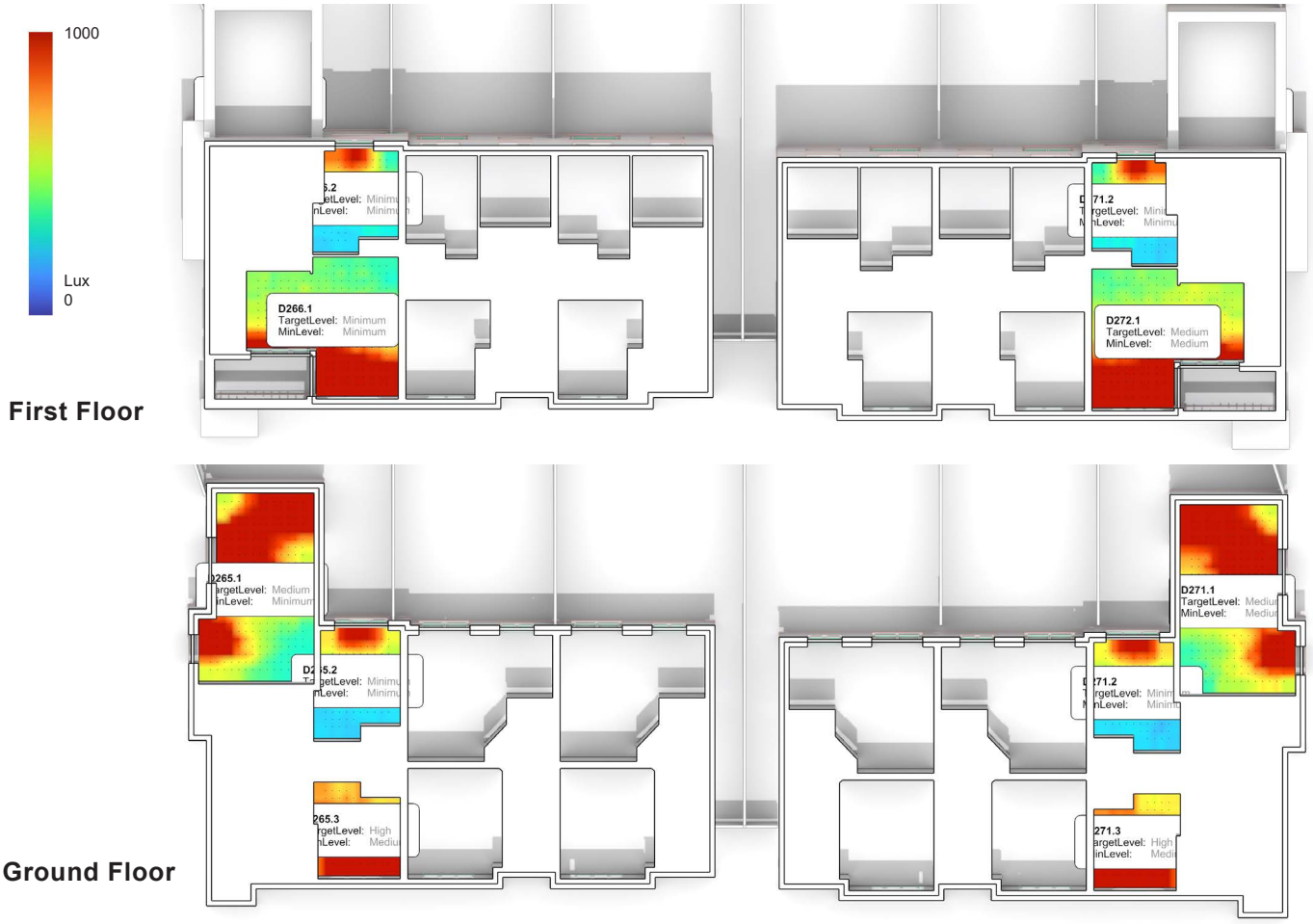


Figure 53: Duplex units 265 - 266 and 271 - 272
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D265.1	LKD	30.5	290	Medium	77.1%	59.1%	38.0%	Minimum	83.3%	45.3%	19.5%
D265.2	Bed	13.2	111	Minimum	59.6%	21.9%	0.6%	Minimum	77.4%	16.8%	0.0%
D265.3	Bed	11.6	92	Medium	76.7%	63.0%	50.0%	Medium	87.1%	65.3%	47.8%
D266.1	LKD	26.6	234	Minimum	64.1%	44.8%	27.9%	Minimum	80.6%	48.1%	26.2%
D266.2	Bed	11.8	95	Minimum	62.9%	28.7%	0.0%	Minimum	79.6%	22.1%	0.0%
D271.1	LKD	30.5	290	Medium	79.0%	63.3%	43.0%	Medium	84.2%	53.4%	26.9%
D271.2	Bed	13.2	111	Minimum	59.3%	23.9%	0.0%	Minimum	71.7%	9.4%	0.0%
D271.2	Bed	11.8	95	Minimum	63.4%	28.9%	0.0%	Minimum	76.7%	19.3%	0.0%
D271.3	Bed	11.6	92	High	76.4%	64.7%	51.4%	Medium	85.1%	62.3%	44.5%
D272.1	LKD	26.6	234	Medium	67.3%	50.0%	33.3%	Medium	81.3%	51.9%	30.2%

Table 37: Daylight Provision individual room compliance values for all habitable rooms

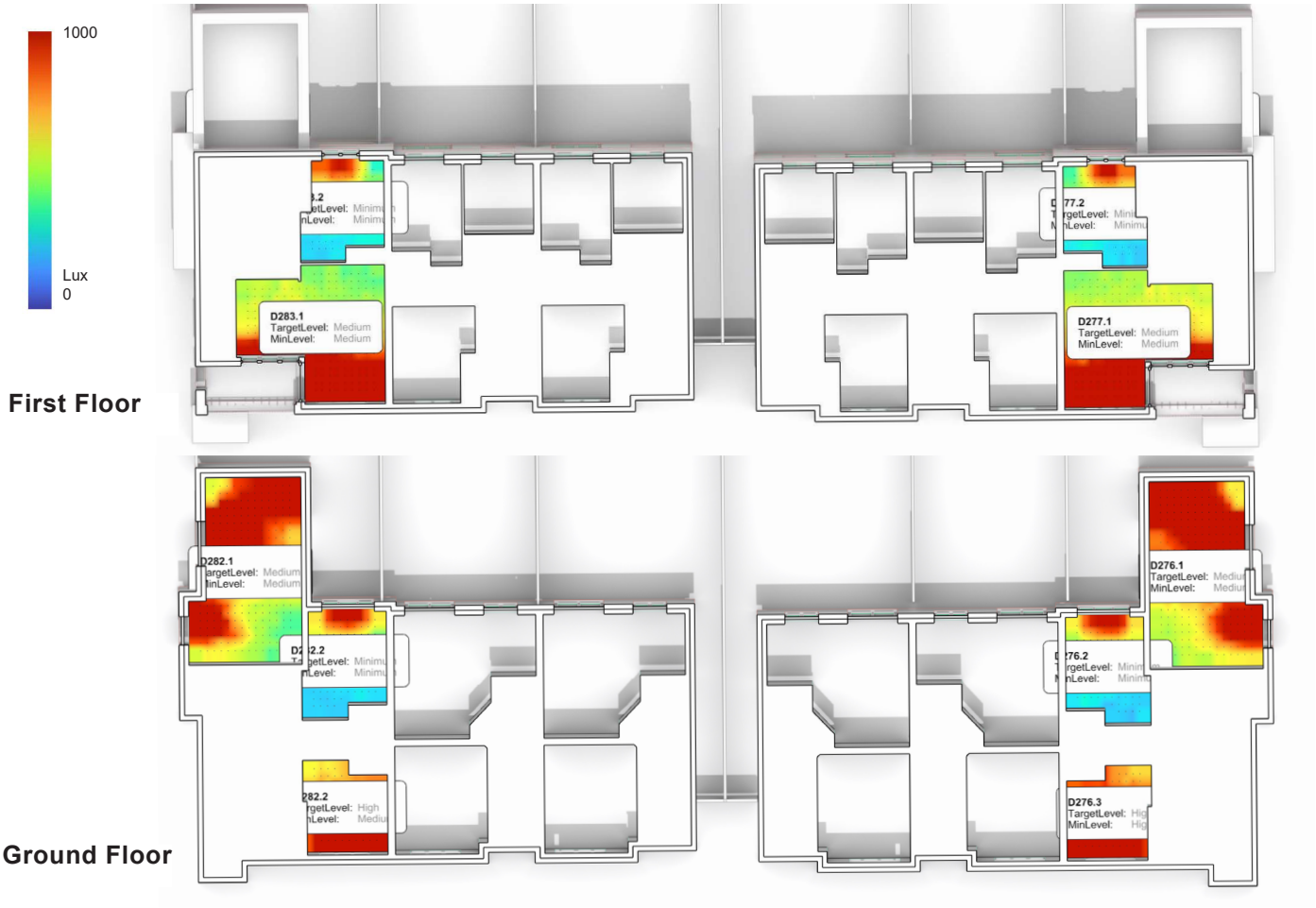


Figure 54: Duplex units 276 - 277 and 282 - 283
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D276.1	LKD	30.5	290	Medium	81.5%	67.8%	49.2%	Medium	88.5%	62.3%	35.3%
D276.2	Bed	13.2	111	Minimum	59.3%	24.5%	0.0%	Minimum	72.3%	10.6%	0.0%
D276.3	Bed	11.6	92	High	79.0%	68.5%	56.2%	High	88.1%	68.1%	51.5%
D277.1	LKD	26.6	234	Medium	70.2%	53.4%	36.4%	Medium	84.4%	58.2%	35.6%
D277.2	Bed	11.8	95	Minimum	63.7%	27.4%	0.1%	Minimum	77.0%	18.6%	0.0%
D282.1	LKD	30.5	290	Medium	79.0%	64.2%	42.8%	Medium	85.7%	54.4%	27.1%
D282.2	Bed	11.6	92	High	77.7%	65.4%	53.4%	Medium	85.9%	64.2%	47.1%
D282.2	Bed	13.2	111	Minimum	59.1%	21.5%	0.5%	Minimum	76.7%	15.8%	0.0%
D283.1	LKD	26.6	234	Medium	69.3%	50.3%	34.2%	Medium	82.5%	53.0%	31.8%
D283.2	Bed	11.8	95	Minimum	61.9%	27.2%	0.0%	Minimum	79.8%	24.0%	0.0%

Table 38: Daylight Provision individual room compliance values for all habitable rooms

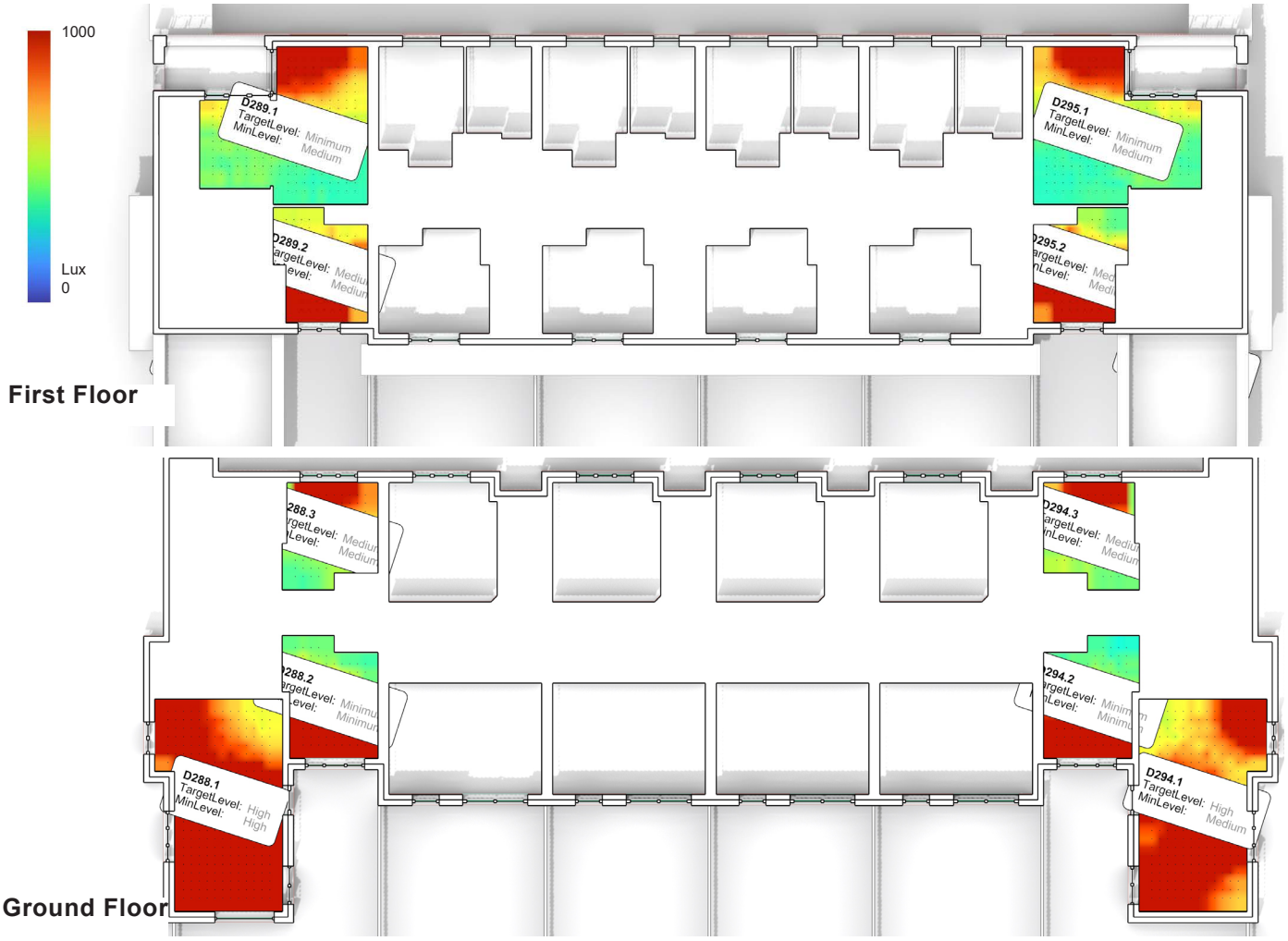


Figure 55: Duplex units 288- 289 and 294 - 295
Daylight Provision and Annual Average Illuminance to all habitable rooms

Duplex Units EN17037:2018 Table A.1 Daylight Provision Room Compliance											
Space ID	Description	Area [m2]	Sensor Count	Target Compliance	300lux_50	500lux_50	750lux_50	Minimum Compliance	100lux_95	300lux_95	500lux_95
D288.1	LKD	30.5	290	High	85.1%	76.1%	65.5%	High	89.4%	71.6%	53.5%
D288.2	Bed	13.2	111	Minimum	63.5%	45.2%	32.2%	Minimum	75.8%	40.7%	23.6%
D288.3	Bed	11.6	92	Medium	80.0%	60.2%	31.0%	Medium	90.7%	67.0%	32.9%
D289.1	LKD	26.6	234	Minimum	72.3%	45.4%	13.5%	Medium	87.4%	57.4%	19.4%
D289.2	Bed	11.8	95	Medium	71.8%	55.2%	38.5%	Minimum	82.6%	49.5%	26.9%
D294.1	LKD	30.5	290	High	81.6%	71.6%	55.8%	Medium	88.4%	67.7%	46.1%
D294.2	Bed	13.2	111	Minimum	63.2%	45.8%	31.2%	Minimum	74.7%	38.9%	23.9%
D294.3	Bed	11.6	92	Medium	80.3%	61.1%	31.7%	Medium	91.1%	68.6%	34.7%
D295.1	LKD	26.6	234	Minimum	71.8%	44.0%	9.9%	Medium	87.7%	57.1%	18.5%
D295.2	Bed	11.8	95	Medium	71.3%	53.5%	37.0%	Medium	83.4%	53.5%	28.4%

Table 39: Daylight Provision individual room compliance values for all habitable rooms

Appendix C - Sunlight Hours for Living Spaces

Sunlight Hours - Block A			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
A113	Y	8.8	High
A114	Y	4.0	High
A115	Y	5.4	High
A116	N	1.9	Minimum
A117	N	1.4	Fail
A118	Y	8.8	High
A119	Y	4.4	High
A120	Y	6.3	High
A121	Y	2.3	Minimum
A122	N	0.3	Fail
A123	N	2.5	Minimum
A124	N	1.6	Minimum
A125	Y	8.8	High
A126	Y	4.8	High
A127	Y	6.3	High
A128	Y	3.0	Medium
A129	N	0.7	Fail
A130	N	3.3	Medium
A131	N	2.2	Minimum
A132	Y	8.8	High
A133	Y	4.8	High
A134	Y	7.6	High
A135	Y	3.4	Medium
A136	N	1.0	Fail
A137	N	3.5	Medium
A138	N	2.6	Minimum

Table 40: Sunlight Hours - Block A

Sunlight Hours - Block B			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
A139	Y	3.8	Medium
A140	Y	6.7	High
A141	Y	3.8	Medium
A142	N	3.2	Medium
A143	Y	6.7	High
A144	Y	6.7	High
A145	Y	3.8	Medium
A146	N	3.5	Medium
A147	Y	6.7	High
A148	Y	6.7	High
A149	Y	3.8	Medium
A150	N	3.7	Medium
A151	Y	6.7	High
A152	Y	6.7	High

Table 41: Sunlight Hours - Block B

Sunlight Hours - Block C			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
A242	N	0.0	Fail
A243	N	0.0	Fail
A244	Y	9.3	High
A245	Y	9.4	High
A246	Y	4.7	High
A247	Y	5.8	High
A248	Y	5.8	High
A249	Y	5.8	High

Table 42: Sunlight Hours - Block C

Sunlight Hours - Block D			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
A180	Y	8.8	High
A181	Y	5.2	High
A182	Y	5.8	High
A183	N	2.9	Minimum
A184	N	2.1	Minimum
A185	Y	8.8	High
A186	Y	5.2	High
A187	Y	6.3	High
A188	Y	3.4	Medium
A189	N	0.6	Fail
A190	N	3.3	Medium
A191	N	2.3	Minimum
A192	Y	8.8	High
A193	Y	5.1	High
A194	Y	6.3	High
A195	Y	3.4	Medium
A196	N	0.9	Fail
A197	N	3.4	Medium
A198	N	2.5	Minimum
A199	Y	8.8	High
A200	Y	4.8	High
A201	Y	7.6	High
A202	Y	3.4	Medium
A203	N	1.0	Fail
A204	N	3.5	Medium
A205	N	2.6	Minimum

Table 43: Sunlight Hours - Block D

Sunlight Hours - Duplex Units			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
D17	Y	9.9	High
D18	N	0.8	Fail
D19	Y	9.9	High
D20	N	0.8	Fail
D21	Y	9.9	High
D22	N	0.9	Fail
D23	Y	9.9	High
D24	N	0.9	Fail
D25	Y	9.9	High
D26	N	0.8	Fail
D27	Y	9.9	High
D28	N	0.8	Fail
D46	Y	4.3	High
D47	N	0.0	Fail
D69	Y	3.4	Medium
D70	Y	2.7	Minimum
D74	N	3.8	Medium
D75	Y	1.3	Fail
D76	N	0.3	Fail
D77	Y	1.4	Fail
D78	N	0.3	Fail
D79	Y	1.4	Fail
D80	N	0.3	Fail
D81	Y	0.9	Fail
D82	N	0.3	Fail
D83	Y	1.7	Minimum
D84	N	0.3	Fail
D85	Y	1.4	Fail
D86	Y	6.0	High
D87	Y	1.5	Minimum
D103	Y	8.3	High
D104	Y	4.3	High
D111	Y	8.3	High
D112	Y	3.5	Medium
D161	Y	8.3	High
D162	Y	4.5	High
D168	Y	4.9	High
D169	Y	5.3	High
D206	Y	6.3	High
D207	Y	5.1	High
D208	Y	6.3	High
D209	Y	5.1	High
D210	Y	6.3	High
D211	Y	5.1	High
D212	Y	6.3	High

Sunlight Hours - Duplex Units			
	Primary window within 90° South		
Unit ID	LKD window within 90° South	No. sunlight hours on 21st March	Compliance
D213	Y	6.1	High
D214	Y	6.3	High
D215	Y	5.3	High
D216	Y	6.3	High
D217	Y	5.3	High
D218	Y	6.2	High
D219	Y	5.0	High
D220	Y	6.2	High
D221	Y	5.0	High
D222	Y	6.2	High
D223	Y	5.0	High
D224	Y	6.2	High
D225	Y	5.9	High
D226	Y	6.2	High
D227	Y	5.2	High
D228	Y	6.2	High
D229	Y	5.2	High
D230	Y	6.1	High
D231	Y	4.8	High
D232	Y	6.1	High
D233	Y	4.8	High
D234	Y	6.1	High
D235	Y	4.8	High
D236	Y	6.1	High
D237	Y	5.8	High
D238	Y	6.1	High
D239	Y	5.1	High
D240	Y	6.1	High
D241	Y	5.1	High
D265	Y	3.1	Medium
D266	Y	9.3	High
D271	Y	2.8	Minimum
D272	Y	9.3	High
D276	Y	5.0	High
D277	Y	9.3	High
D282	Y	2.8	Minimum
D283	Y	9.3	High
D288	Y	5.3	High
D289	N	0.3	Fail
D294	Y	4.8	High
D295	N	0.0	Fail

Table 44: Sunlight Hours - Duplex Units

Appendix D

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750091	30 Aug 2022 21:28:06	Common Pipistrelle	Custom	11	50.3	73.1	47.8	3	75	53.4391
3750101	30 Aug 2022 21:29:51	Common Pipistrelle	Custom	14	45.3	53.2	44.7	3	90	53.4391
3750089	30 Aug 2022 21:28:03	Common Pipistrelle	Custom	17	49.6	61.9	47.7	3	83	53.4391
3750088	30 Aug 2022 21:27:59	Common Pipistrelle	Custom	17	49.6	60.6	47.6	2	75	53.43909
3750045	30 Aug 2022 21:05:00	Common Pipistrelle	Custom	33	46	72.9	45.3	4	80	53.43802
3750104	30 Aug 2022 21:30:56	Common Pipistrelle	Custom	12	44.8	53.6	43.9	4	190	53.43942
3750093	30 Aug 2022 21:28:11	Common Pipistrelle	Custom	25	48.1	63.3	47	3	80	53.4391
3750020	30 Aug 2022 20:54:31	Common Pipistrelle	Custom	18	44.2	57	43.2	6	85	53.43855
3750022	30 Aug 2022 20:55:02	Common Pipistrelle	Custom	16	45.1	53.2	44	3	90	53.43841
3750111	30 Aug 2022 21:35:25	Common Pipistrelle	Custom	24	44.1	53.8	43.3	7	104	53.44096
3750021	30 Aug 2022 20:54:54	Common Pipistrelle	Custom	2	48.2	58.7	46.3	2.7	66	53.43846

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750096	30 Aug 2022 21:28:18	Common Pipistrelle	Custom	9	48.5	57.8	47.2	3	80	53.43911
03750106_1	30 Aug 2022 21:31:10	Leisler's Bat	Custom	54	44.5	60.2	43.9	4	90	53.43947
3750124	30 Aug 2022 22:15:08	Leisler's Bat	Reviewed	4	24.9	25.6	24	8.9	433	53.43927
3750123	30 Aug 2022 22:15:07	Leisler's Bat	Reviewed	5	24.4	24.8	23.3	7	274	53.43927
03750106_2	30 Aug 2022 21:31:10	Leisler's Bat	Reviewed	3	23.4	24.4	22.3	12.6	541	53.43947
3750125	30 Aug 2022 22:15:12	Leisler's Bat	Reviewed	4	24.3	25	23.3	9.3	267	53.43928
3750041	30 Aug 2022 21:03:10	Leisler's Bat	Reviewed	6	24.5	28.8	23.3	10	265	53.43749
3750017	30 Aug 2022 20:50:16	Leisler's Bat	Reviewed	25	24.8	28	23.7	14	235	53.43882
3750042	30 Aug 2022 21:03:11	Leisler's Bat	Reviewed	23	25.5	30.8	24.6	10	234	53.43749
3750008	30 Aug 2022 20:42:04	Leisler's Bat	Reviewed	6	23.1	24.7	22.1	14	412	53.43823
3750095	30 Aug 2022 21:28:17	Soprano Pipistrelle	Custom	6	49.9	62.1	47.2	4	60	53.43911
3750040	30 Aug 2022 21:02:29	Soprano Pipistrelle	Custom	12	45	61.5	44.3	6	90	53.43768

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750097	30 Aug 2022 21:28:24	Soprano Pipistrelle	Custom	5	48.2	59.1	47.2	4	181	53.43912
3750098	30 Aug 2022 21:29:18	Soprano Pipistrelle	Custom	27	48.5	68.6	46.8	4	86	53.43909
3750099	30 Aug 2022 21:29:26	Soprano Pipistrelle	Custom	34	48.5	80	46.8	5	90	53.43909
3750034	30 Aug 2022 20:59:25	Soprano Pipistrelle	Custom	19	55.1	76.7	54.4	3	65	53.43837
3750039	30 Aug 2022 21:02:26	Soprano Pipistrelle	Custom	15	45.3	49.2	44.8	5	96	53.43767
3750038	30 Aug 2022 21:02:04	Soprano Pipistrelle	Custom	2	47.1	58.7	46.1	2.7	102	53.43779
3750103	30 Aug 2022 21:30:46	Soprano Pipistrelle	Custom	10	44.7	51.2	44.3	3	90	53.43938
3750037	30 Aug 2022 21:01:37	Soprano Pipistrelle	Custom	47	47.6	87.9	47	4	84	53.43791
3750036	30 Aug 2022 21:01:23	Soprano Pipistrelle	Custom	27	48.5	84.5	47.6	4	80	53.43792
3750035	30 Aug 2022 21:00:25	Soprano Pipistrelle	Custom	15	46.7	98.4	46	4	90	53.43809
3750100	30 Aug 2022 21:29:39	Soprano Pipistrelle	Custom	20	47.2	63.2	46.5	4	100	53.43908
3750033	30 Aug 2022 20:56:18	Soprano Pipistrelle	Custom	14	48.2	61.1	47.3	3	84	53.43836

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750032	30 Aug 2022 20:56:13	Soprano Pipistrelle	Custom	16	48	61.7	46.9	3	95	53.43836
3750110	30 Aug 2022 21:34:40	Soprano Pipistrelle	Custom	20	49.4	80	48.7	5	87	53.44073
3750031	30 Aug 2022 20:56:05	Soprano Pipistrelle	Custom	16	49.5	60.2	48.5	3	70	53.43837
3750112	30 Aug 2022 21:43:17	Soprano Pipistrelle	Custom	18	48.5	56.1	47.8	5	95	53.44067
3750029	30 Aug 2022 20:55:54	Soprano Pipistrelle	Custom	19	49.4	57.5	48.3	2	80	53.43839
3750028	30 Aug 2022 20:55:49	Soprano Pipistrelle	Custom	13	50	60.9	49.1	2	70	53.43839
3750027	30 Aug 2022 20:55:46	Soprano Pipistrelle	Custom	14	49	57.7	47.9	3	90	53.43839
3750026	30 Aug 2022 20:55:41	Soprano Pipistrelle	Custom	11	49.5	55.2	47.9	2	90	53.43839
3750025	30 Aug 2022 20:55:32	Soprano Pipistrelle	Custom	42	50	61.8	48.5	3	83	53.43838
3750024	30 Aug 2022 20:55:23	Soprano Pipistrelle	Custom	46	49.1	82.1	47.3	4	85	53.43839
03750023_2	30 Aug 2022 20:55:20	Soprano Pipistrelle	Custom	2	68.1	88.7	52.1	2.1	271	53.43839
03750023_1	30 Aug 2022 20:55:20	Soprano Pipistrelle	Custom	8	52.9	80.3	50.6	3	193	53.43839

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750121	30 Aug 2022 22:12:03	Soprano Pipistrelle	Custom	13	46.4	51.7	45.4	7	200	53.43927
3750107	30 Aug 2022 21:31:30	Soprano Pipistrelle	Custom	18	56.1	62	55.3	3	90	53.43957
3750094	30 Aug 2022 21:28:15	Soprano Pipistrelle	Custom	10	48.9	67.1	47.2	4	80	53.4391
3750050	30 Aug 2022 21:05:38	Soprano Pipistrelle	Custom	23	46	70.6	45.3	3	80	53.43824
3750092	30 Aug 2022 21:28:08	Soprano Pipistrelle	Custom	7	48.1	63.5	47.1	3	80	53.4391
3750049	30 Aug 2022 21:05:31	Soprano Pipistrelle	Custom	30	45.8	80	45.1	4	70	53.43818
3750048	30 Aug 2022 21:05:18	Soprano Pipistrelle	Custom	74	45.5	86.3	44.8	4	90	53.43812
3750047	30 Aug 2022 21:05:11	Soprano Pipistrelle	Custom	27	45.8	83.6	45.1	4	80	53.43807
3750046	30 Aug 2022 21:05:05	Soprano Pipistrelle	Custom	16	45.8	86.3	45.1	4	90	53.43804
3750065	30 Aug 2022 21:25:35	Soprano Pipistrelle	Custom	10	55.8	62.4	54.8	4	80	53.43909
3750066	30 Aug 2022 21:25:41	Soprano Pipistrelle	Custom	20	49.1	60.3	48.4	4	90	53.43909
3750067	30 Aug 2022 21:25:48	Soprano Pipistrelle	Custom	5	55.9	61.6	55.1	3	186	53.43909

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750068	30 Aug 2022 21:25:57	Soprano Pipistrelle	Custom	18	54.8	61.9	53.7	6	90	53.4391
3750069	30 Aug 2022 21:26:29	Soprano Pipistrelle	Custom	2	51.9	68.8	47.4	4.3	67	53.43911
3750070	30 Aug 2022 21:26:32	Soprano Pipistrelle	Custom	13	48.7	58.7	47.5	3	80	53.4391
3750071	30 Aug 2022 21:26:36	Soprano Pipistrelle	Custom	9	48.3	57.7	46.8	3	80	53.4391
3750072	30 Aug 2022 21:26:41	Soprano Pipistrelle	Custom	5	48.5	56.6	46.7	3	92	53.4391
3750073	30 Aug 2022 21:26:54	Soprano Pipistrelle	Custom	6	48.2	57.8	47.1	4	243	53.43909
3750074	30 Aug 2022 21:26:55	Soprano Pipistrelle	Custom	28	55	69.4	53.6	3	75	53.43909
3750057	30 Aug 2022 21:13:17	Soprano Pipistrelle	Custom	19	48.8	60.6	48	3	80	53.43889
3750075	30 Aug 2022 21:26:59	Soprano Pipistrelle	Custom	21	56.4	87.4	55.4	3	76	53.43908
3750077	30 Aug 2022 21:27:11	Soprano Pipistrelle	Custom	16	48	67	47.1	3	74	53.43909
3750078	30 Aug 2022 21:27:15	Soprano Pipistrelle	Custom	20	48.3	60.4	47.2	3	80	53.43909
3750079	30 Aug 2022 21:27:19	Soprano Pipistrelle	Custom	26	48.7	66.1	47.3	3	70	53.43909

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750080	30 Aug 2022 21:27:23	Soprano Pipistrelle	Custom	25	48.4	62.2	47	3	75	53.43909
3750081	30 Aug 2022 21:27:28	Soprano Pipistrelle	Custom	21	48	63.3	46.8	3	85	53.43909
3750082	30 Aug 2022 21:27:32	Soprano Pipistrelle	Custom	20	47.9	65.3	46.7	3	85	53.43909
3750083	30 Aug 2022 21:27:36	Soprano Pipistrelle	Custom	24	47.9	61.8	46.9	3	80	53.43909
3750084	30 Aug 2022 21:27:40	Soprano Pipistrelle	Custom	18	48	61.9	47	3	84	53.43909
3750085	30 Aug 2022 21:27:43	Soprano Pipistrelle	Custom	9	47.5	55.7	46.8	3	80	53.4391
3750086	30 Aug 2022 21:27:45	Soprano Pipistrelle	Custom	35	48.5	61.7	47.3	4	64	53.43909
3750087	30 Aug 2022 21:27:51	Soprano Pipistrelle	Custom	44	50.8	90.9	48.1	4	90	53.43909
3750044	30 Aug 2022 21:04:52	Soprano Pipistrelle	Custom	27	46.3	68.2	45.5	3	90	53.43798
3750043	30 Aug 2022 21:03:45	Soprano Pipistrelle	Custom	13	53.5	57.3	52.5	5	180	53.4375
3750090	30 Aug 2022 21:28:05	Soprano Pipistrelle	Custom	8	50.3	59.6	48.2	3	80	53.4391
3750076	30 Aug 2022 21:27:06	Soprano Pipistrelle	Custom	20	48	92.1	46.9	5	95	53.43908

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
3750062	30 Aug 2022 21:19:19	Soprano Pipistrelle	Custom	16	43.1	62.8	42.3	6	100	53.43928
2180014	26 Sep 2022 19:50:32	Leisler's Bat	Custom	16	25	28	23.8	14	230	53.43909
2180015	26 Sep 2022 19:50:38	Leisler's Bat	Custom	4	24.4	25.9	23.2	10.9	229	53.43909
2180013	26 Sep 2022 19:50:30	Leisler's Bat	Custom	4	25.2	27.4	23.7	7.9	304	53.43908
2180011	26 Sep 2022 19:48:13	Leisler's Bat	Custom	3	23.5	25.5	21.6	10.5	443	53.43939
2180052	26 Sep 2022 20:20:24	Soprano Pipistrelle	Custom	12	55.9	66.6	55.2	4	158	53.44041
2180051	26 Sep 2022 20:20:19	Soprano Pipistrelle	Custom	9	54.9	62.2	54.3	5	206	53.44042
2180050	26 Sep 2022 20:20:13	Soprano Pipistrelle	Custom	5	54.8	58.8	54.3	5	87	53.44045
2180046	26 Sep 2022 20:05:53	Soprano Pipistrelle	Custom	29	48.1	90.8	46.8	4	90	53.44107
2180047	26 Sep 2022 20:06:15	Soprano Pipistrelle	Custom	9	44.7	77	44.1	6	187	53.44114
2180045	26 Sep 2022 20:05:17	Soprano Pipistrelle	Custom	35	45.9	50.8	45	6	100	53.44087
2180053	26 Sep 2022 20:20:29	Soprano Pipistrelle	Custom	24	54.9	67.6	54	6	90	53.4404

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
2180048	26 Sep 2022 20:11:12	Soprano Pipistrelle	Custom	4	23.1	25.7	19.1	4	422	53.44131
2180054	26 Sep 2022 20:20:41	Soprano Pipistrelle	Custom	52	55.2	78.5	54.5	5	80	53.44038
2180063	26 Sep 2022 20:29:35	Soprano Pipistrelle	Custom	3	52.6	56.4	52.1	5.7	270	53.43969
2180056	26 Sep 2022 20:22:02	Soprano Pipistrelle	Custom	17	55.5	82.1	54.8	5	90	53.44018
2180057	26 Sep 2022 20:26:37	Soprano Pipistrelle	Custom	1	52.9	63	52.1	5.9	0	53.43967
2180058	26 Sep 2022 20:28:24	Soprano Pipistrelle	Custom	3	46.8	50.6	46	4.6	209	53.43968
2180059	26 Sep 2022 20:28:34	Soprano Pipistrelle	Custom	31	46.7	59.5	45.9	6	100	53.43969
2180060	26 Sep 2022 20:28:50	Soprano Pipistrelle	Custom	13	46.8	51.1	46.2	4	218	53.43968
2180061	26 Sep 2022 20:28:56	Soprano Pipistrelle	Custom	39	49.2	66.5	48.3	5	104	53.43969
2180062	26 Sep 2022 20:29:25	Soprano Pipistrelle	Custom	16	47.3	70.3	46.1	6	90	53.43969
2180044	26 Sep 2022 20:04:50	Soprano Pipistrelle	Custom	15	46.9	69.6	46	5	220	53.44087
2180064	26 Sep 2022 20:29:50	Soprano Pipistrelle	Custom	10	46	60.1	45.1	6	175	53.43969

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
2180066	26 Sep 2022 20:33:29	Soprano Pipistrelle	Custom	13	46.4	54.9	45.7	6	104	53.43966
2180055	26 Sep 2022 20:21:21	Soprano Pipistrelle	Custom	12	55.9	88.8	55.2	4	75	53.44036
2180043	26 Sep 2022 20:04:26	Soprano Pipistrelle	Custom	38	47.3	70.2	46.4	5	90	53.44096
2180034	26 Sep 2022 20:01:05	Soprano Pipistrelle	Custom	12	46.3	53.2	45.3	4	90	53.4403
2180041	26 Sep 2022 20:03:47	Soprano Pipistrelle	Custom	21	47.7	71.1	46.9	4	80	53.44082
2180017	26 Sep 2022 19:53:34	Soprano Pipistrelle	Custom	2	53.6	58.9	53.1	2.9	145	53.4391
2180018	26 Sep 2022 19:53:50	Soprano Pipistrelle	Custom	1	54	67.1	53.6	3.7	0	53.4391
2180019	26 Sep 2022 19:54:34	Soprano Pipistrelle	Custom	2	52.3	59.8	51.8	5.1	140	53.43917
2180020	26 Sep 2022 19:54:44	Soprano Pipistrelle	Custom	19	52.5	61.4	51.6	6	90	53.43921
2180021	26 Sep 2022 19:55:03	Soprano Pipistrelle	Custom	17	52.9	58.3	52.3	4	90	53.43929
2180022	26 Sep 2022 19:55:10	Soprano Pipistrelle	Custom	31	52.6	64.5	51.9	5	84	53.43931
2180023	26 Sep 2022 19:55:36	Soprano Pipistrelle	Custom	13	45.7	55.1	45.1	5	95	53.43945

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
2180024	26 Sep 2022 19:55:56	Soprano Pipistrelle	Custom	1	52.5	54.4	51.8	4.3	0	53.43956
2180025	26 Sep 2022 19:56:11	Soprano Pipistrelle	Custom	15	52.2	57.5	51.4	5	93	53.43963
2180026	26 Sep 2022 19:58:51	Soprano Pipistrelle	Custom	8	55	62.4	54.3	4	80	53.44041
2180027	26 Sep 2022 20:00:09	Soprano Pipistrelle	Custom	3	46.4	55	45.5	6.8	140	53.44051
2180028	26 Sep 2022 20:00:16	Soprano Pipistrelle	Custom	33	48.2	73.1	47.3	4	84	53.44046
2180029	26 Sep 2022 20:00:25	Soprano Pipistrelle	Custom	6	50.6	66.7	47	5	196	53.44038
2180030	26 Sep 2022 20:00:28	Soprano Pipistrelle	Custom	11	47.5	62.4	46.7	4	232	53.44036
2180031	26 Sep 2022 20:00:36	Soprano Pipistrelle	Custom	25	55.1	70.1	54.2	5	90	53.44028
2180032	26 Sep 2022 20:00:54	Soprano Pipistrelle	Custom	8	47	53.8	46.2	4	249	53.44027
2180033	26 Sep 2022 20:00:59	Soprano Pipistrelle	Custom	15	47.7	72.9	46.7	5	206	53.44028
2180035	26 Sep 2022 20:01:32	Soprano Pipistrelle	Custom	73	48.5	76.2	46.6	5	70	53.44042
2180036	26 Sep 2022 20:01:47	Soprano Pipistrelle	Custom	11	46.6	61	45.8	4	84	53.44043

Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
2180037	26 Sep 2022 20:01:49	Soprano Pipistrelle	Custom	69	47.1	72.1	46	6	85	53.44044
2180038	26 Sep 2022 20:02:04	Soprano Pipistrelle	Custom	12	46.9	72.7	46.1	5	85	53.44046
2180039	26 Sep 2022 20:02:51	Soprano Pipistrelle	Custom	9	54.7	64.6	53.3	6.2	226	53.44061
2180040	26 Sep 2022 20:03:19	Soprano Pipistrelle	Custom	11	47.1	53.1	46.4	4	70	53.44064
2180042	26 Sep 2022 20:04:03	Soprano Pipistrelle	Custom	24	47.9	73.8	46.8	4	80	53.44094
2180069	26 Sep 2022 20:47:00	Soprano Pipistrelle	Custom	2	48.4	51.6	47.4	8.3	278	53.43934

Appendix E

Date	Survey No.	Species common name	Species latin name	BTO code	No. Recorded	Total	Flight only	Notes
26/10/2022	1	Grey heron	*Ardea cinerea*	H.		0		Flew SW over site
26/10/2022	1	Pheasant	*Phasianus colchicus*	PH		0		
26/10/2022	1	Sparrowhawk	*Accipiter nisus*	SH		0		
26/10/2022	1	Mistle thrush	*Turdus viscivorus*	M.		0		
26/10/2022	1	Buzzard	*Buteo buteo*	BZ		0		
26/10/2022	1	Jay	*Garrulus glandarius*	J.		0		
26/10/2022	1	Hooded crow	*Corvus cornix*	HC		0		
26/10/2022	1	Lesser Redpoll	*Carduelis flammea*	LR		0		
26/10/2022	1	Goldfinch	*Carduelis carduelis*	GO		0		
26/10/2022	1	Chaffinch	*Fringilla coelebs*	CH		0		
26/10/2022	1	Wren	*Troglodytes troglodytes*	WR		0		
26/10/2022	1	Robin	*Erithacus rubecula*	R.		0		
26/10/2022	1	Bluetit	*Cyanistes caeruleus*	BT		0		
26/10/2022	1	Woodpigeon	*Columba palumbus*	WP		0		
04/11/2022	2	Fieldfare	*Turdus pilaris*	FF		0		
04/11/2022	2	Redwing	*Turdus iliacus*	RE		0		
04/11/2022	2	Grey heron	*Ardea cinerea*	H.		0		
01/12/2022	3	Snipe	*Gallinago gallinago*	SN	5	5		Flushed before landing again
01/12/2022	3	Black-headed gull	*Chroicocephalus ridibundus*	BH	1	1	1	Flyover north
01/12/2022	3	Merlin	*Falco columbarius*	ML	1	1	1	Flew through the site. Female/juv type. East to north over site and then flew off west.
01/12/2022	3	Goldfinch	*Carduelis carduelis*	GO		0		
01/12/2022	3	Jay	*Garrulus glandarius*	J.		0		
01/12/2022	3	Rook	*Corvus frugilegus*	RO		0		

Date	Survey No.	Species common name	Species latin name	BTO code	No. Recorded	Total	Flight only	Notes
01/12/2022	3	Robin	*Erithacus rubecula*	R.		0		
01/12/2022	3	Hooded crow	*Corvus cornix*	HC		0		
01/12/2022	3	Jackdaw	*Corvus monedula*	JD		0		
01/12/2022	3	Woodpigeon	*Columba palumbus*	WP		0		
01/12/2022	3	Chaffinch	*Fringilla coelebs*	CH		0		
01/12/2022	3	Starling	*Sturnus vulgaris*	SG		0		
01/12/2022	3	Wren	*Troglodytes troglodytes*	WR		0		
01/12/2022	3	Meadow pipit	*Anthus pratensis*	MP		0		
01/12/2022	3	Bluetit	*Cyanistes caeruleus*	BT		0		
01/12/2022	3	Long-tailed tit	*Aegithalos caudatus*	LT		0		
01/12/2022	3	Grey wagtail	*Motacilla cinerea*	GL		0		
01/12/2022	3	Goldcrest	*Regulus regulus*	GC		0		
01/12/2022	3	Redwing	*Turdus iliacus*	RE		0		
01/12/2022	3	Great spotted woodpecker	*Dendrocopus major*	GS		0		
01/12/2022	3	Sparrowhawk	*Accipiter nisus*	SH		0		
01/12/2022	3	Kestrel	*Falco tinnunculus*	K.		0		
01/12/2022	3	Mistle thrush	*Turdus viscivorus*	M.		0		
01/12/2022	3	Song thrush	*Turdus philomelos*	ST		0		
01/12/2022	3	Magpie	*Pica pica*	MG		0		
01/12/2022	3	Fieldfare	*Turdus pilaris*	FF		0		
19/01/2023	4	Snipe	*Gallinago gallinago*	SN	2	2		Flushed before landing on the far side of the road
19/01/2023	4	Black-headed gull	*Chroicocephalus ridibundus*	BH	1	1	1	Flying north over the Site
19/01/2023	4	Grey wagtail	*Motacilla cinerea*	GL		0		
19/01/2023	4	Meadow pipit	*Anthus pratensis*	MP		0		

Date	Survey No.	Species common name	Species latin name	BTO code	No. Recorded	Total	Flight only	Notes
19/01/2023	4	Bullfinch	*Pyrrhula pyrrhula*	BF		0		
19/01/2023	4	Chaffinch	*Fringilla coelebs*	CH		0		
19/01/2023	4	Siskin	*Carduelis spinus*	SK		0		
19/01/2023	4	Coal tit	*Periparus ater*	CT		0		
19/01/2023	4	Bluetit	*Cyanistes caeruleus*	BT		0		
19/01/2023	4	Great tit	*Parus major*	GT		0		
19/01/2023	4	Long-tailed tit	*Aegithalos caudatus*	LT		0		
19/01/2023	4	Dunnock	*Prunella modularis*	D.		0		
19/01/2023	4	Robin	*Erithacus rubecula*	R.		0		
19/01/2023	4	Wren	*Troglodytes troglodytes*	WR		0		
19/01/2023	4	Blackbird	*Turdus merula*	B.		0		
19/01/2023	4	Redwing	*Turdus iliacus*	RE		0		
19/01/2023	4	Song thrush	*Turdus philomelos*	ST		0		
19/01/2023	4	Starling	*Sturnus vulgaris*	SG		0		
19/01/2023	4	Woodpigeon	*Columba palumbus*	WP		0		
19/01/2023	4	Collared dove	*Streptopelia decaocto*	CD		0		
19/01/2023	4	Goldfinch	*Carduelis carduelis*	GO		0		
19/01/2023	4	Goldcrest	*Regulus regulus*	GC		0		
19/01/2023	4	Jackdaw	*Corvus monedula*	JD		0		
19/01/2023	4	Raven	*Corvus corax*	RN		0		
19/01/2023	4	Rook	*Corvus frugilegus*	RO		0		
19/01/2023	4	Magpie	*Pica pica*	MG		0		
19/01/2023	4	Hooded crow	*Corvus cornix*	HC		0		
02/03/2023	5	kestrel	*Falco tinnunculus*	K.		0		
02/03/2023	5	Sparrowhawk	*Accipiter nisus*	SH		0		
02/03/2023	5	Long-tailed tit	*Aegithalos caudatus*	LT		0		
02/03/2023	5	Bluetit	*Cyanistes caeruleus*	BT		0		

Date	Survey No.	Species common name	Species latin name	BTO code	No. Recorded	Total	Flight only	Notes
02/03/2023	5	great tit	*Parus major*	GT		0		
02/03/2023	5	Robin	*Erithacus rubecula*	R.		0		
02/03/2023	5	Dunnock	*Prunella modularis*	D.		0		
02/03/2023	5	Wren	*Troglodytes troglodytes*	WR		0		
02/03/2023	5	Song thrush	*Turdus philomelos*	ST		0		
02/03/2023	5	Redwing	*Turdus iliacus*	RE		0		
02/03/2023	5	Mistle thrush	*Turdus viscivorus*	M.		0		
02/03/2023	5	Starling	*Sturnus vulgaris*	SG		0		
02/03/2023	5	Woodpigeon	*Columba palumbus*	WP		0		
02/03/2023	5	Siskin	*Carduelis spinus*	SK		0		
02/03/2023	5	Magpie	*Pica pica*	MG		0		
02/03/2023	5	Goldcrest	*Regulus regulus*	GC		0		
02/03/2023	5	Hooded crow	*Corvus cornix*	HC		0		
02/03/2023	5	rook	*Corvus frugilegus*	RO		0		
02/03/2023	5	Jackdaw	*Corvus monedula*	JD		0		
02/03/2023	5	Collared dove	*Streptopelia decaocto*	CD		0		

Survey Number	Date	Duration (Hrs)	Weather Conditions	
			Start	End
1	26/10/2022	6hrs	Fresh breeze, 100% cloud cover, 14oC, excellent visibility	Gentle breeze, <25% cloud cover, 13oC, excellent visibillty
2	04/11/2022	6hrs	Light breeze, 75% cloud cover, 9oC, excellent visibility	Light breeze, 100% cloud cover, 9oC, excelleny visibility
3	01/12/2022	6hrs	Gentle breeze, 100% cloud cover, 10oC, excellent visibility	Gentle breeze, 100% cloud cover, 10oC, excellent visibility
4	19/01/2023	3hrs	Light air, <25% cloud cover, 3oC, excellent visibility	Light air, <25% cloud cover, 3oC, excellent visibility

Survey Number	Date	Duration (Hrs)	Weather Conditions	
			Start	End
5	02/03/2023	3 hrs	light breeze, <25% cloud cover,8oC dry, excellent visibility	gentle breeze, <25% cloud cover, 8oC, dry, excellent visibility

Appendix F

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Proposed Residential Development,

Glasson Road, Athlone

Co. Westmeath

Geotechnical Investigation

Report No: **22-1074**

Document Control

Project Title	Proposed residential development, Glasson Road, Athlone
Document Title	Factual report on Geotechnical Investigations
Reference	22-1074

Revision	Status	Author(s)	Reviewed by	Approved by	Issue Date
01	F	JK			22/08/2022

Contents **Page No.**

The works were conducted in accordance with:

- Specification: Site Investigation in Construction Pt 3 - Specification for Ground Investigation (ICE, 1993)
- British Standards Institute (1999) BS 5930:1999;*Code of practice for site investigations* incorporating amendment No.1 of December 2007, as partially replaced by:
    - BS EN 1997-2:2007: *Geotechnical Design. Ground Investigation and Testing*
    - BS EN ISO 22475-1:2006: *Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution.*
    - BS EN ISO 14688-1:2004: *Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.*
    - BS EN ISO 14689-1:2003: *Geotechnical investigation and testing. Identification and classification of soil. Identification and description.*
    - BS EN ISO 22476-2:2005: *Geotechnical investigation and testing. Field testing. Dynamic probing.*
    - BS EN ISO 22476-3:2005: *Geotechnical investigation and testing. Field testing. Standard penetration test.*

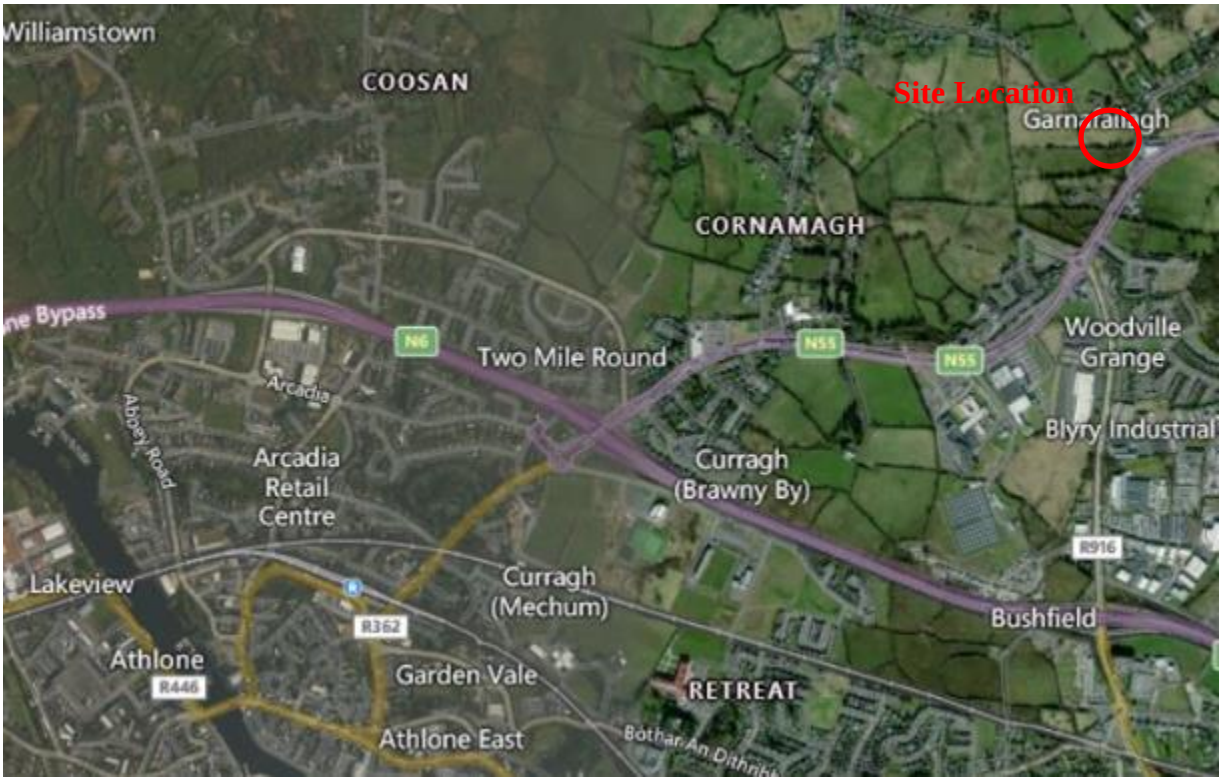
1.0 Introduction

On the instruction of Comer Group, Stratex Ltd. was appointed to undertake a geotechnical investigation in relation to the proposed development at the site located at Glasson Road, Athlone.

The encountered ground conditions are described in accordance with BS 5930, British Standard Code of Practice for Site Investigations. All comments made in this report are done so on the assumption that the findings are representative of the site area as a whole. This report details the work carried out on site; it contains a description of the site and the works undertaken, with the exploratory hole logs. A discussion on the recommendations for further work is also provided. All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved. This report was prepared by Stratex Ltd Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in report do so at their own risk and any duty of care to those parties is excluded.

2.0 Site Description

The site as located in the image is currently undeveloped. The site itself is located within a predominately agricultural area and bounded by some residential and commercial units on the outskirts of Athlone.



Source: Bing Maps

Site layout is shown in Figure 1.

Testing was undertaken at the chosen locations to gain a spread of information across the proposed construction area (shown in Figure 1). As such this report assumes that its findings are representative of the ground as a whole.

3. Ground Investigation

a. Percussion Boreholes

Three boreholes were sunk using a percussion boring rig employing R168mm diameter temporary casing and boring tools. Boreholes were extended to depths ranging between 4.0m at BH1, 3.5m at BH2 and 2.7m at BH3 at which point they were terminated on a technical refusal.

Representative undisturbed samples were taken at intervals or at each change of stratum in the boreholes for classification and geotechnical laboratory testing purposes.

Standard penetration tests were conducted at regular intervals in each borehole, where appropriate. The borehole logs report whether the split spoon sampler (SPT) or solid cone (CPT) was used. The overall penetration is stated for those tests for which the full 150mm seating or 300mm test drives were not possible.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded.

Logs of the boreholes are provided in Appendix A.

b. Trial Pits

Ten trial pits were undertaken using an excavator. Trial pits were terminated at depths ranging between 2.6m and 3.2m.

Pits were excavated to the depths required to facilitate the required investigative works, the ground logged and the pits sampled and backfilled.

Logs of the trial pits are attached in Appendix A.

4. Discussion

a. Geology

Figure 2 and 3 presents excerpts of the 1:100 000 Geological Survey Ireland Spatial Resources, Bedrock Geology (GSI, 2016) and Geological Survey Ireland Spatial Resources, Teagasc Soils (GSI, 2016).

The drift or surface geology shows the site to be located within an area of *shallow rocky, peaty/non peaty mineral complexes (Mainly basic).*

The solid geology of the site and the surrounding area is shown to be Waulsortian Limestone comprising massive unbedded lime-mudstone.

b. Ground Conditions

Peat:

Peat was encountered at test locations BH1 (0-0.9), BH2 (0-0.4), TP2 (0-0.3), TP9 (0-0.56 & 1.3-1.5) and TP10 (0-0.45). Peat was generally encountered from ground level.

Drift:

Drift material was encountered at all test locations and was generally encountered in the form of clays, silts, sands and gravels. These test locations were generally terminated within boulder deposits upon refusal.

Bedrock:

Bedrock was not seemingly encountered during the site investigation works.

Groundwater:

Groundwater strikes were encountered during the site investigation works. Groundwater was encountered within TP1 (1.3m), TP4 (1.6m) and TP (2.7m). Standing water levels within the Boreholes were encountered in BH1 (1.2m) and BH3 (1.6m).

It should be appreciated that groundwater levels are subject to both seasonal and weather induced variations. Other effects such as construction activities may also change groundwater levels.

c. Testing

Geotechnical testing consisted of insitu SPT tests, results are shown on the logs, Appendix A.

5. Recommendations

a. Development Details

It is understood that the development proposals are for the construction of new residential properties.

No further details were available to Stratex Ltd at the time of writing.

b. Excavations

The area is in general not suitable for any major unsupported excavations, with the underlying natural deposits partial to collapse to its natural angle of repose. As such no operatives should be placed near unsupported excavations.

c. Foundations and floors

The structural loads of the building should be transferred below any made ground, peat or soft / loose natural materials to bear on the underlying firm to stiff / dense deposits.

The table below gives indicative depths and bearing capacities at each test location.

Test No.	Depth to 120kPa (m)	Water strike (m)	Foundation Type	Remarks
BH1	1.9	1.2 (standing level)	Trench fill / Pile foundations.	Peat encountered to a depth of 0.9m.
BH2	1.7	n/a	Trench fill / Pile foundations.	Peat encountered to a depth of 0.4m.
BH3	1.0	1.6 (standing level)	Trench fill / Pile foundations.	No Peat encountered.
TP1	1.0	1.3	Trench fill / Pile foundations.	No Peat encountered.
TP2	1.0	n/a	Trench fill / Pile foundations.	Peat encountered to a depth of 0.3m.
TP3	1.5	n/a	Trench fill / Pile foundations.	No Peat encountered (however organics encountered to a depth of 1.5m).
TP4	1.0	1.6m	Trench fill / Pile foundations.	No Peat encountered.
TP5	Not established	n/a	Trench fill / Pile foundations.	No Peat encountered (however organics encountered to a depth of 1.6m).
TP6	Not established	n/a	Trench fill / Pile foundations.	No Peat encountered.
TP7	Not established	n/a	Trench fill / Pile foundations.	No Peat encountered.
TP8	Not established	n/a	Trench fill / Pile foundations.	No Peat encountered.
TP9	Not established	2.7m	Trench fill / Pile foundations.	Peat encountered from 0.0-0.56m and 1.3-1.5m (and organics encountered to s depth of 2.7m).
TP10	Not established	n/a	Trench fill / Pile foundations.	Peat encountered from 0.0-0.45m.

Given the depth to a suitable bearing capacity based on in-situ test results, trench fill or pile foundations are considered to be the most suitable.

Trench fill is required to extend to an approximate depth ranging between 1.0-1.9m below existing levels to reach a suitable bearing stratum. If trench fill is used the base of excavations for foundations should be thoroughly inspected to ensure a consistent bearing stratum. Any pockets of soft/very loose soil should be excavated with the resultant void backfilled with Grade ST1 concrete. The incorporation of nominal steel reinforcement as a precaution may be advisable to minimise the effects of any potential differential movement.

Trench fill is required to extend to approximate depths of up to 1.9m below existing levels to reach a suitable bearing stratum. This may not be achievable due to shallow ground water levels and susceptibility of wall collapse during excavation where piles may be adopted as an alternative, more economical solution, this is left to the discretion of the client / building contractor.

Driven piles installed to a predetermined set – of precast concrete or steel/ductile iron are likely to be the most cost effective option. As such it is likely that bored piles e.g. continuous flight auger (CFA) piles or continuous helical displacement (CHD) piles would be used only if vibration or environmental concerns arise.

The detailed design of piles should be undertaken in conjunction with specialist piling contractors. Their proposals should include the means to verify that the required load capacity has been achieved: for example, dynamic pile tests and/or static load tests. The design of piles should allow for negative friction arising from settlements caused by any raising of the site ground levels including the site's existing Peat / soft natural deposits.

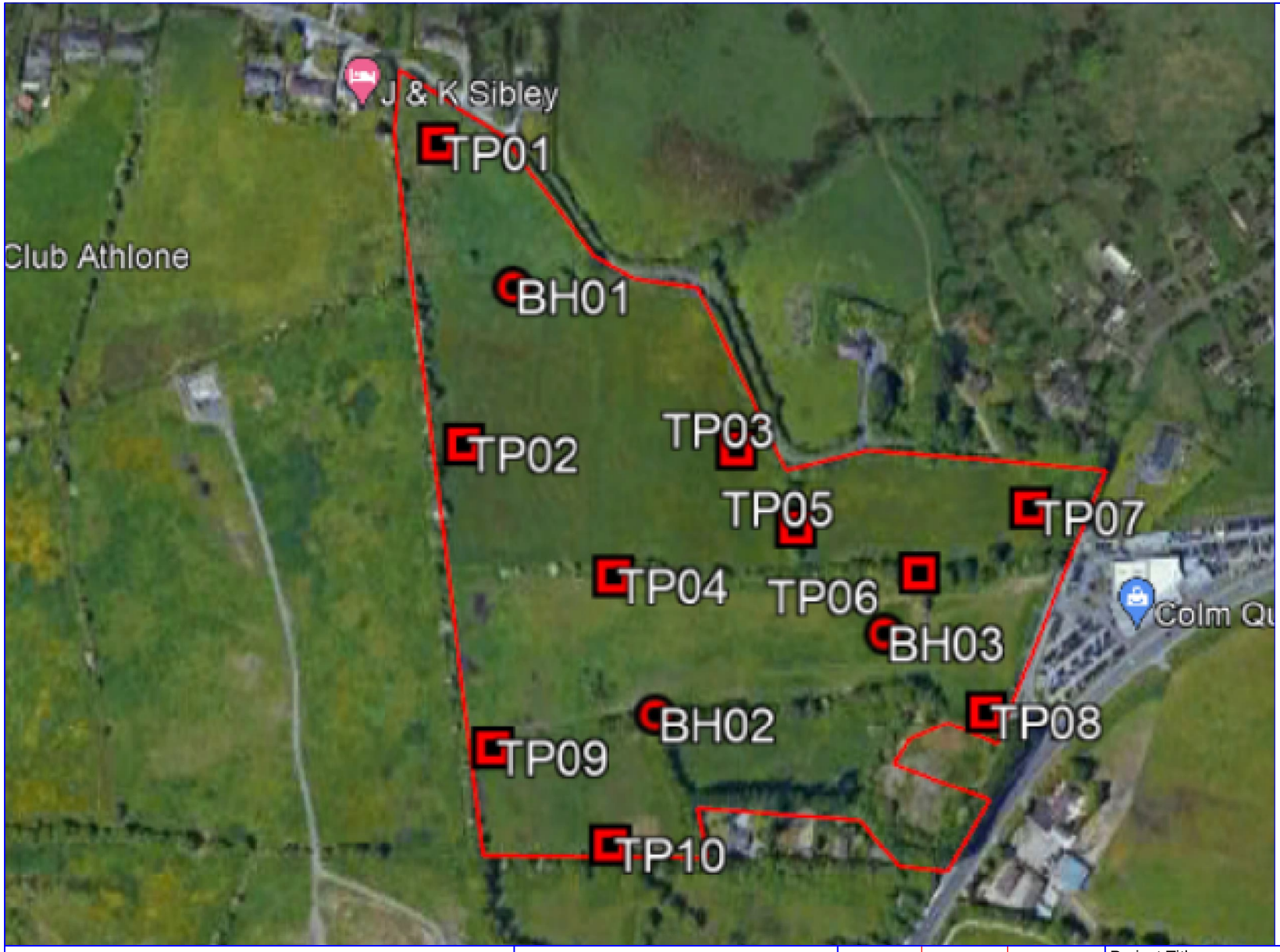
If during excavation any materials are identified which are soft, obviously organic/peaty, or which vary significantly from those identified in the boreholes it is recommended that excavation be suspended and the advice of a geologist/geotechnical specialist be sought.

Suspended floor slabs should be adopted. These should span stub walls coming from trench fill or from ring beams spanning piles.

End of Report dated 22 August 2022

Stratex Ltd

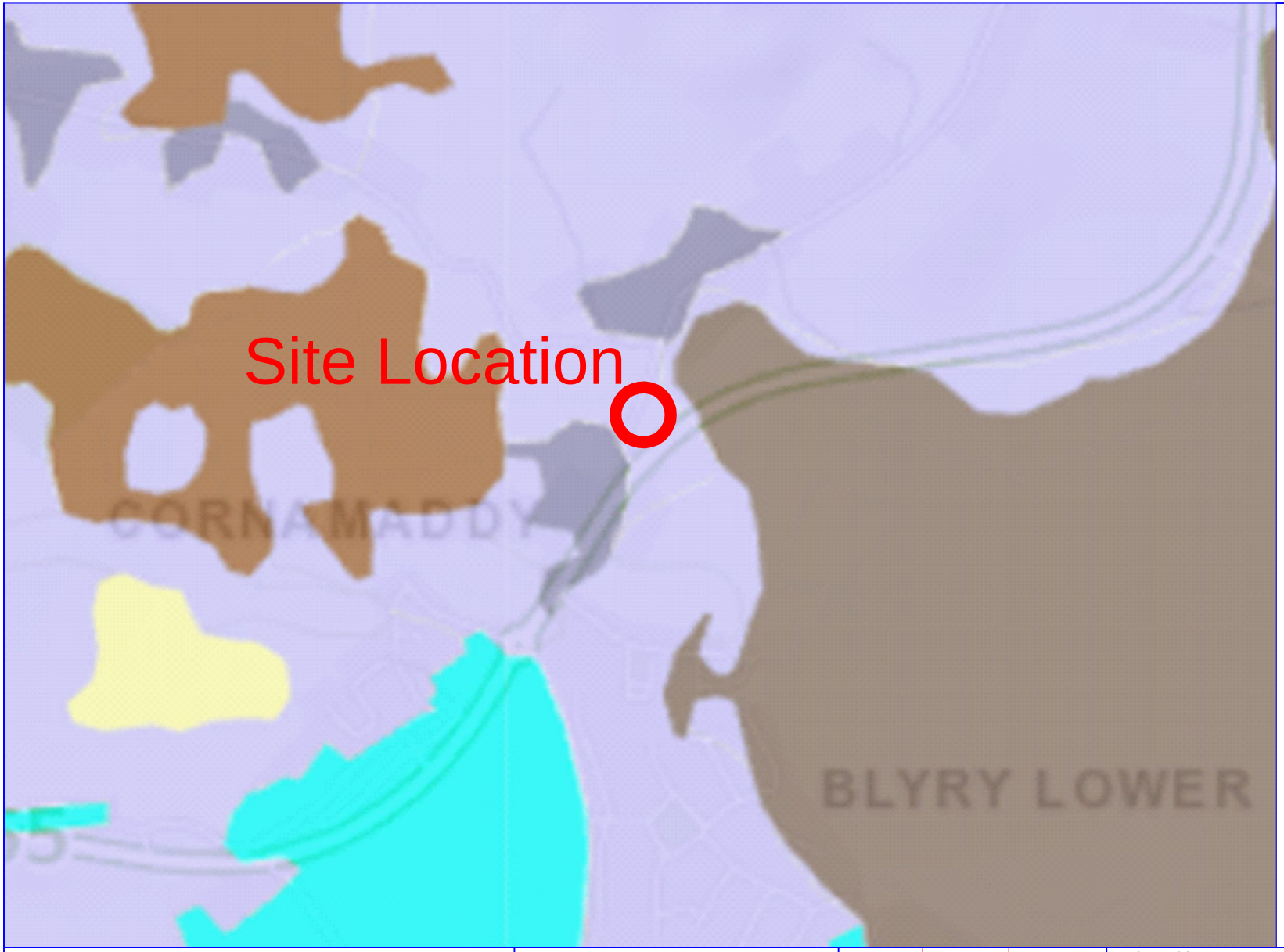
Figure 1
Exploratory hole location plan



Stratex Ltd.
Tel: (028) 85567157

Designed:		Date:	Project Title: Glasson Road, Athlone	Drawing Title: Test Locations	
Drawn: JK		Date: 19.08.22	Client: Comer Group	Scale: NTS	Project No: 22-1074
Approved:		Date:		Drawing No: SK22-1074-01	Rev: 0

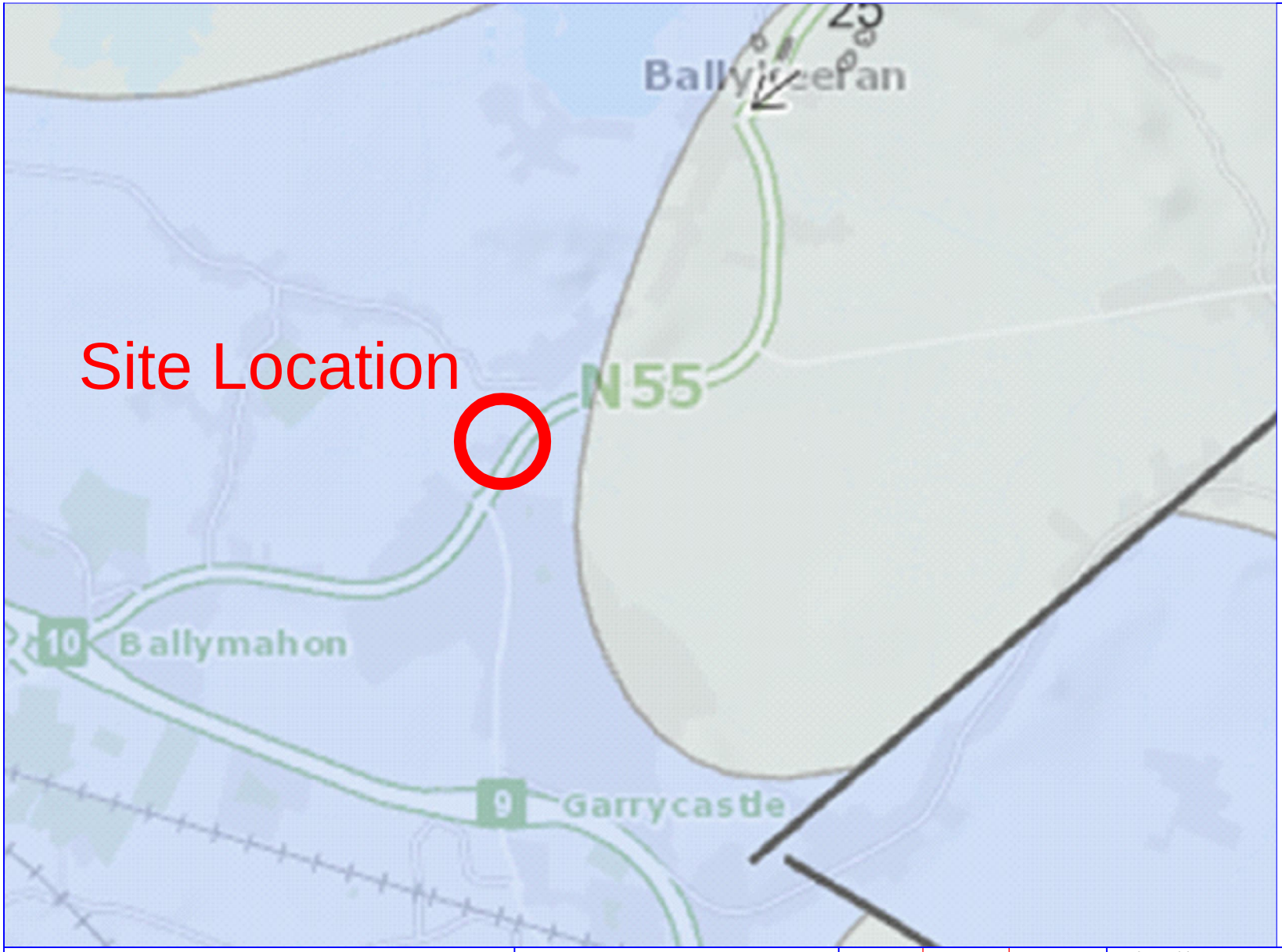
Figure 2 and 3
Geology Maps



Shallow rocky peaty/no peaty mineral complexes (Mainly basic)

Stratex Ltd.
Tel: (028) 85567157

Designed:		Date:	Project Title: Glasson Road, Athlone	Drawing Title: Drift Geology	
Drawn: JK		Date: 19.08.22	Client: Comer Group	Scale: NTS	Project No: 22-1074
Approved:		Date:		Drawing No: SK22-1074-02	Rev: 0



Waulsortian Limestone

Stratex Ltd. Tel: (028) 85567157		Designed:		Date:	Project Title: Glasson Road, Athlone Client: Comer Group
		Drawn: JK		Date: 19.08.22	
		Approved:		Date:	

Drawing Title: Solid Geology	
Scale: NTS	Project No: 22- 1074
Drawing No: SK22-1074-03	Rev: 0

Appendix A

Borehole and Trial Pit Logs

Stratex Ltd 02871417541 joe.kerlin@stratexni.com	Borehole RECORD	Borehole Number
Site: Glasson Road, Athlone		**Drilling Equipment:** Percussive Boring	**BH1**
Client: Comer Group	**Elevation AOD:**	**Start:** **Finish:** 14/07/2022	**Scale: -** NTS

GROUND WATER			SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well	Depth (m)	Depth/ Type (m)	Standard Penetration Testing	Environmental Samples	Depth (m)	Description	Key
						0.0	Brown white PEAT	
			1	N = 9		0.9	Firm blue grey very sandy very gravelly clayey SILT	
▼		1.2				1.3	Loose blue grey sandy SILT with some gravels	
			2	N = 14		1.9	Medium dense to very dense light grey very sandy SILT with gravels	
			3	N = 70				
			3.5	n/a		3.3	Very dense grey brown fine to medium SAND	
			4.0	N=16		4.0	Borehole terminated at 4.0m.	
			4.5	N=15				
			5	N=19				
			5.5	N=29				
			6	N=27				
			6.5	N=24				
			7	N=22				
			7.5	N=11				
			8	N=23				
			8.5	N=68				

Remarks / Well installation / Casing Details

Standing water level post drill at 1.2m.
Installation: 0.5m plain and 3m slotted
Continuous SPT's taken at base of hole from 4.0m to 8.5m

U Undisturbed Sample
Standing Water Depth ▼
Depth to Water Strike ⬇

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Borehole RECORD

Borehole Number

BH2

Site:
Glasson Road, Athlone

Drilling Equipment:
Percussive Boring

Client:
Comer Group

Elevation AOD:

Start: **Finish:**
14/07/2022

Scale: -
NTS

GROUND WATER			SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well	Depth (m)	Depth/ Type (m)	Standard Penetration Testing	Environmental Samples	Depth (m)	Description	Key
						0.0	Dark PEAT	
			1	N = 7		0.4	Soft to firm blue grey slightly sandy clayey SILT	
			2	N = 33		1.7	Loose to medium medium light grey very gravelly silty SAND	
			3	N = 24				
			3.5	N=42		3.5	Borehole refusal at 3.5m (possible boulder)	
			4.0	N=20 (50mm)				

Remarks / Well installation / Casing Details

Borehole moist at 1.7m.
Installation: 0.9m plain and 2.6m slotted
Continuous SPT's taken at base of hole from 3.5m to 4.0m

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
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joe.kerlin@stratexni.com

Borehole RECORD

Borehole Number

BH3

Site: Glasson Road, Athlone

Drilling Equipment: Percussive Boring

Client: Comer Group

Elevation AOD:

Start: 14/07/2022 **Finish:**

Scale: - NTS

GROUND WATER			SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well	Depth (m)	Depth/ Type (m)	Standard Penetration Testing	Environmental Samples	Depth (m)	Description	Key
						0.0	Firm brown grey slightly sandy clayey SILT	
			1	N = 20		1.0	Medium dense grey brown gravelly slightly silty SAND	
▼		1.6						
			2	N = 12		2.0	Medium dense grey brown slightly gravelly very sandy SILT	
						2.5	Medium dense grey brown gravelly SAND	
			2.7	N=67 (100mm)		2.7	Borehole refusal at 2.7m (possible boulder)	

Remarks / Well installation / Casing Details

Standing water level at 1.6m.
Installation: 0.5m plain and 2.0m slotted

U Undisturbed Sample
Standing Water Depth ▼
Depth to Water Strike ▼

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP01

Site: Glasson Road, Athlone

Drilling Equipment: Excavator

Client: Comer Group

Elevation AOD:

Start: **Finish:** July 2022

Scale: - NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
⬇				1.3		1,5,9,16,18,14		0	Firm brown slightly peaty gravely very sandy silty CLAY	
								0.3	Dense blue grey slightly clayey very sandy GRAVEL with high boulder content	
								1.3	Dense blue gravelly slightly clayey silty SAND with medium boulder content	
								2.6	Trial Pit Terminated at 2.6m	

Remarks / Well installation / Casing Details

Water strike at 1.3m.

U Undisturbed Sample

Standing Water Depth ▽

Depth to Water Strike ⬇

WLS - Windowless Sampler

WS - Window Sampler

Stratex Ltd 02871417541 joe.kerlin@stratexni.com	Trial Pit RECORD	Trial Pit Number
Site: Glasson Road, Athlone		**Drilling Equipment:** Excavator	**TP02**
Client: Comer Group	**Elevation AOD:**	**Start:** **Finish:** July 2022	**Scale: -** NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
						2,5,9,15,19,26,23		0	Brown black PEAT	
								0.3	Dense grey brown fine to coarse very sany GRAVEL with high boulder content (up to 1.0m in size)	
								1.2	Dense blue gravelly slightly clayey silty SAND with medium boulder content	
								1.9	Dense brown grey very sandy fine to coarse GRAVEL with medium boulder content	
								2.1	Dense brown very sandy GRAVEL with medium boulder content	
								2.7	Trial Pit Terminated at 2.7m	

Remarks / Well installation / Casing Details

Groundwater not encountered.

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP03

Site: Glasson Road, Athlone

Drilling Equipment: Excavator

Client: Comer Group

Elevation AOD:

Start: **Finish:** July 2022

Scale: - NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
						4,7,14,18,21,25		0	Firm brown gravelly very sandy slightly silty CLAY	
								0.3	Stiff grey brown sandy clayey SILT with organics	
								1.1	Firm brown grey sandy silty CLAY with organics	
								1.5	Grey brown sandy SILT with medium boulder content	
								2	Grey blue sandy SILT with medium boulder content	
								2.6	Trial Pit Terminated due to collapse at 2.6m	

Remarks / Well installation / Casing Details

Groundwater not encountered.

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP04

Site:
Glasson Road, Athlone

Drilling Equipment:
Excavator

Client:
Comer Group

Elevation AOD:

Start: **Finish:**
July 2022

Scale: -
NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
						4,5,8,11,16,22,26		0	Firm brown gravelly very sandy slightly silty CLAY	
								0.35	Dense grey brown very sandy GRAVEL	
								0.8	Stiff blue brown sandy silty CLAY	
								1	Grey brown slightly silty very sandy fine to coarse GRAVEL with medium boulder content	
⬇				1.6				1.55	Brown very sandy GRAVEL with medium boulder content	
								1.9	Grey brown slightly silty very sandy GRAVEL with high boulder content	
								2.7	Trial Pit Terminated at 2.7m	

Remarks / Well installation / Casing Details

Water strike at 1.6m

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd 02871417541 joe.kerlin@stratexni.com	Trial Pit RECORD	Trial Pit Number
Site: Glasson Road, Athlone		**Drilling Equipment:** Excavator	**TP05**
Client: Comer Group	**Elevation AOD:**	**Start:** **Finish:** July 2022	**Scale: -** NTS

GROUND WATER				SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well		Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
					5,2,3,5,6,6,6		0	Firm brown very sandy slightly silty CLAY with some organics and rootlets	
							0.4	Firm brown grey very sandy silty CLAY with some organics	
							1	Brown grey sandy silty CLAY	
							1.5	Grey blue sandy SILT with organics	
							1.6	Grey blue fine to coarse slightly silty slightly clayey sandy GRAVEL with high boulder content	
							2.7	Trial Pit Terminated at 2.7m	

Remarks / Well installation / Casing Details

Groundwater not encountered

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP06

Site:
Glasson Road, Athlone

Drilling Equipment:
Excavator

Client:
Comer Group

Elevation AOD:

Start: **Finish:**
July 2022

Scale: -
NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD	
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
						7,6,2,1,2,4		0	Firm brown gravelly very sandy slightly silty CLAY	
								0.25	Soft brown grey gravelly very sandy slightly silty CLAY	
								0.35	Soft brown grey gravelly very sandy clayey SILT with medium boulder content	
								0.75	Firm brown gravelly very sandy clayey SILT with medium boulder content (up to 0.7m)	
								1.5	Grey brown very sandy fine to coarse GRAVEL with medium boulder content	
								2.8	Trial Pit Terminated at 2.8m	

Remarks / Well installation / Casing Details

Groundwater not encountered

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP07

Site: Glasson Road, Athlone

Drilling Equipment: Excavator

Client: Comer Group

Elevation AOD:

Start: July 2022 **Finish:**

Scale: - NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
								0	Brown gravelly very sandy slightly silty CLAY with rootlets	
								0.5	Grey brown SAND	
								0.7	Brown grey very sandy slightly silty CLAY with medium boulder content	
								1.8	Brown grey sandy clayey SILT	
								2.5	Grey brown sandy clayey SILT with low boulder content	
								3	Trial Pit Terminated at 3.0m	

Remarks / Well installation / Casing Details

Groundwater not encountered

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd 02871417541 joe.kerlin@stratexni.com	Trial Pit RECORD	Trial Pit Number
Site: Glasson Road, Athlone		**Drilling Equipment:** Excavator **TP08**
Client: Comer Group	**Elevation AOD:**	**Start:** **Finish:** July 2022 **Scale:** - NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
								0	Brown slightly gravelly sandy silty CLAY	
								0.2	Grey brown fine to medium silty clayey SAND	
								0.5	Brown grey slightly sandy clayey SILT	
								1.6	Brown grey very sandy clayey SILT	
								2	Grey sandy slightly clayey SILT	
								2.7	Trial Pit Terminated due to refusal at 2.7m	

Remarks / Well installation / Casing Details

Groundwater not encountered

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd 02871417541 joe.kerlin@stratexni.com	Trial Pit RECORD	Trial Pit Number
Site: Glasson Road, Athlone		**Drilling Equipment:** Excavator **TP09**
Client: Comer Group	**Elevation AOD:**	**Start:** **Finish:** July 2022 **Scale:** - NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
								0	Dark brown black PEAT	
								0.56	Grey blue gravelly sandy clayey SILT with organics and low boulder content	
								1.3	PEAT	
								1.5	Blue grey sandy SILT with organics	
⬇					2.7					
								2.7	Brown fine to medium silty SAND	
								2.8	Grey blue very sandy GRAVEL	
								3.2	Trial Pit Terminated at 3.2m	

Remarks / Well installation / Casing Details

Water strike at 2.7m.

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

Stratex Ltd
02871417541
joe.kerlin@stratexni.com

Trial Pit RECORD

Trial Pit Number

TP10

Site:
Glasson Road, Athlone

Drilling Equipment:
Excavator

Client:
Comer Group

Elevation AOD:

Start: **Finish:**
July 2022

Scale: -
NTS

GROUND WATER					SAMPLES & IN SITU TESTING			STRATA RECORD		
Strike	Well			Depth (m)	Depth/ Type (m)	Dynamic Cone Penetrometer Tesitng (150mm icrements)	Sampler / Recovery	Depth (m)	Description	Key
								0	Dark brown PEAT with low boulder content.	
								0.45	Brown grey gravelly sandy clayey SILT	
								0.65	Grey blue gravelly sandy slightly clayey SILT	
								1.4	Brown grey silty very sandy GRAVEL with edium boulder content	
								3	Trial Pit Terminated at 3.0m (refusal on borehole)	

Remarks / Well installation / Casing Details

Pit becomes moist wet at 1.6m.

U Undisturbed Sample
Standing Water Depth
Depth to Water Strike

WLS - Windowless Sampler
WS - Window Sampler

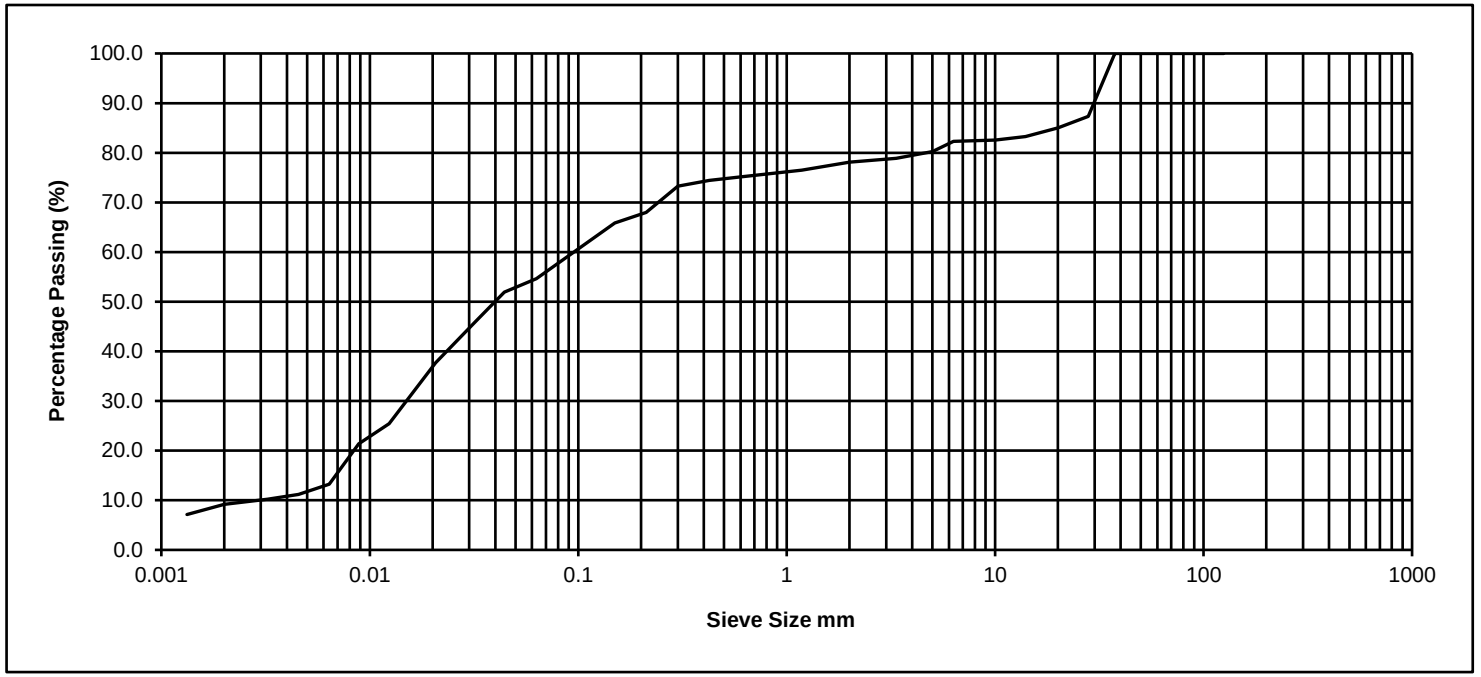
Appendix B

Laboratory Test Results

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	87.3
20.000	85.0
14.000	83.3
10.000	82.5
6.300	82.3
5.000	80.2
3.350	78.9
2.000	78.1
1.180	76.5
0.600	75.2
0.425	74.4
0.300	73.3
0.212	68.0
0.150	65.9
0.063	54.7
0.044	51.9
0.032	45.8
0.021	37.7
0.012	25.5
0.009	21.4
0.006	13.2
0.005	11.2
0.003	10.2
0.002	9.2
0.001	7.1



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
9.2		45.5			23.4			21.9		0.0	0.0

Sample Description Gravelly sandy clayey SILT

Project Athlone

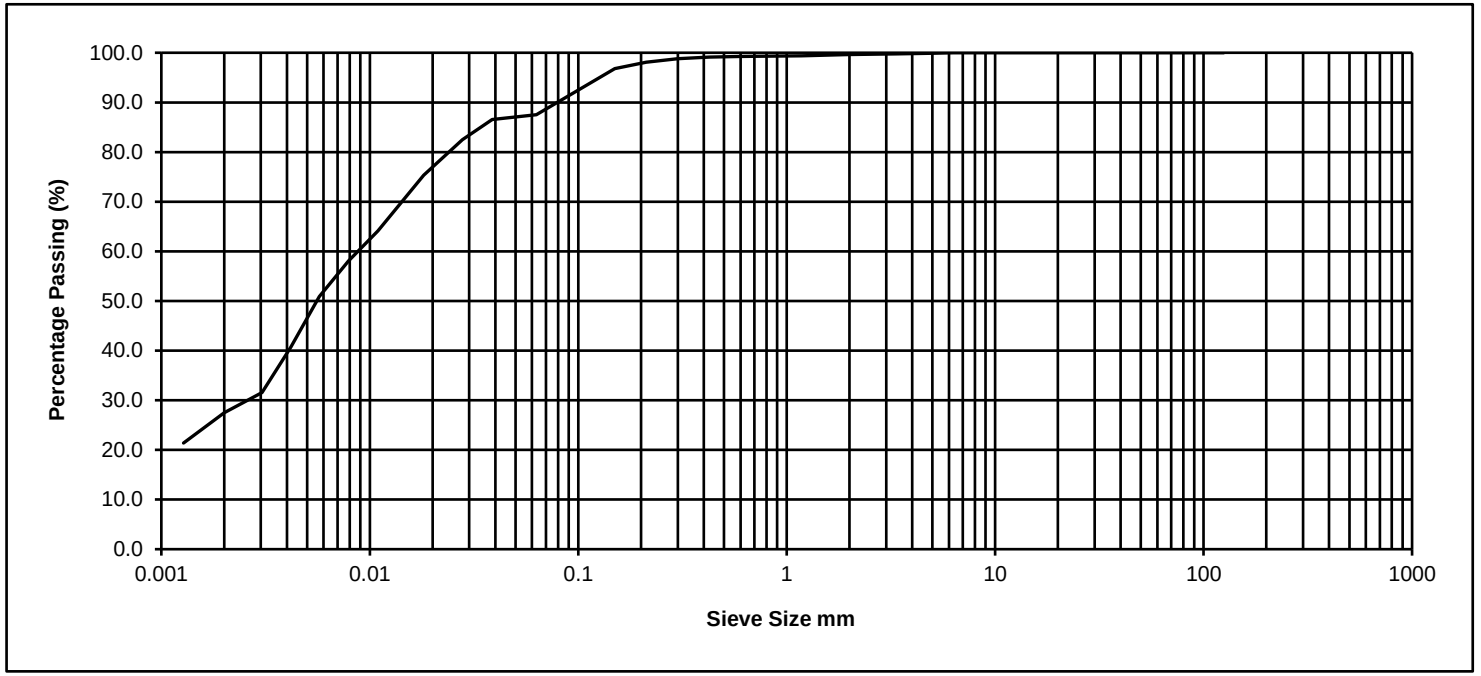
Operator	SS	Checked	VS	Approved	VS	Date sample tested	23/07/2022

Project No.	Athlone
BH/TP No.	BH1
Sample No.	
Depth	1.0m

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	99.9
3.350	99.8
2.000	99.7
1.180	99.4
0.600	99.3
0.425	99.1
0.300	98.8
0.212	98.1
0.150	96.8
0.063	87.5
0.039	86.5
0.028	82.5
0.018	75.3
0.011	64.1
0.008	58.0
0.006	50.9
0.004	40.7
0.003	31.6
0.002	27.5
0.001	21.4



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
27.5		60.0			12.1			0.3		0.0	0.0

Sample Description Sandy clayey SILT

Project Athlone

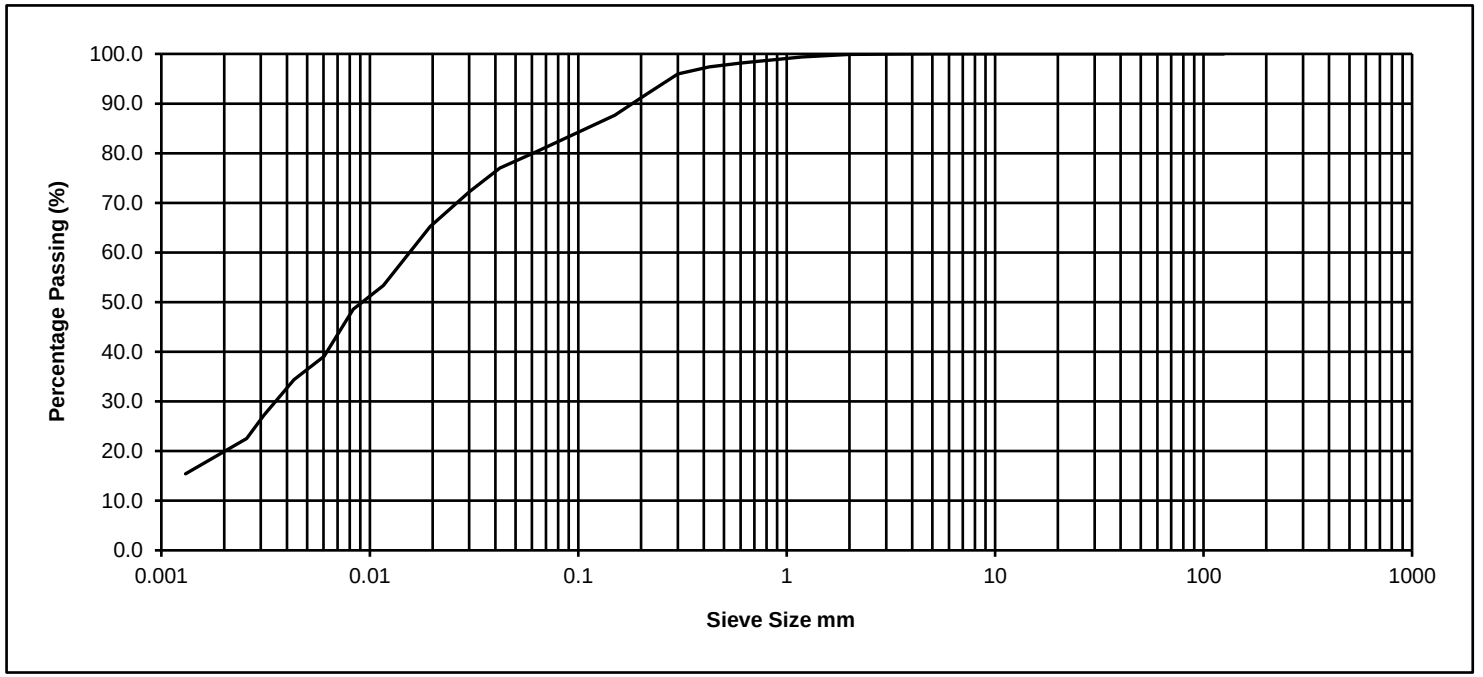
Operator	SS	Checked	VS	Approved	VS	Date sample tested	23/07/2022

Project No.	Athlone
BH/TP No.	BH2
Sample No.	
Depth	1.5m

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	100.0
3.350	100.0
2.000	99.9
1.180	99.4
0.600	98.2
0.425	97.4
0.300	95.9
0.212	91.9
0.150	87.7
0.063	80.3
0.042	77.0
0.030	72.3
0.019	65.2
0.012	53.3
0.008	48.6
0.006	39.1
0.004	34.4
0.003	27.3
0.003	22.5
0.001	15.4



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
22.5		57.8			19.6			0.1		0.0	0.0

Sample Description Sandy clayey SILT

Project No. Athlone

BH/TP No. BH3

Project Athlone

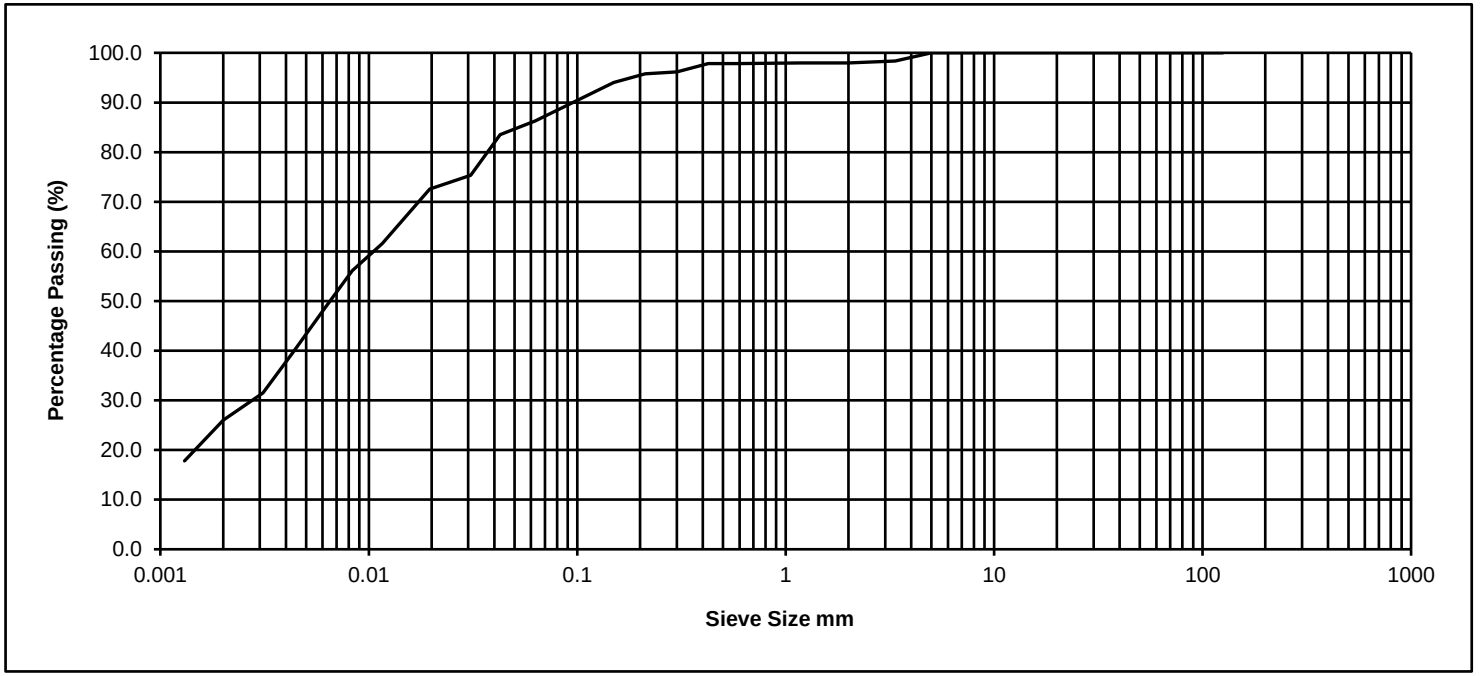
Sample No.

Operator	SS	Checked	VS	Approved	VS	Date sample tested	23/07/2022	Depth	0.5m

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	100.0
3.350	98.3
2.000	97.9
1.180	98.0
0.600	97.8
0.425	97.8
0.300	96.2
0.212	95.8
0.150	94.1
0.063	86.3
0.043	83.5
0.031	75.3
0.020	72.6
0.012	61.6
0.008	56.1
0.006	47.9
0.004	39.7
0.003	31.5
0.002	26.0
0.001	17.8



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
26.0		60.3			11.7			2.1		0.0	0.0

Sample Description Sandy clayey SILT

Project Athlone

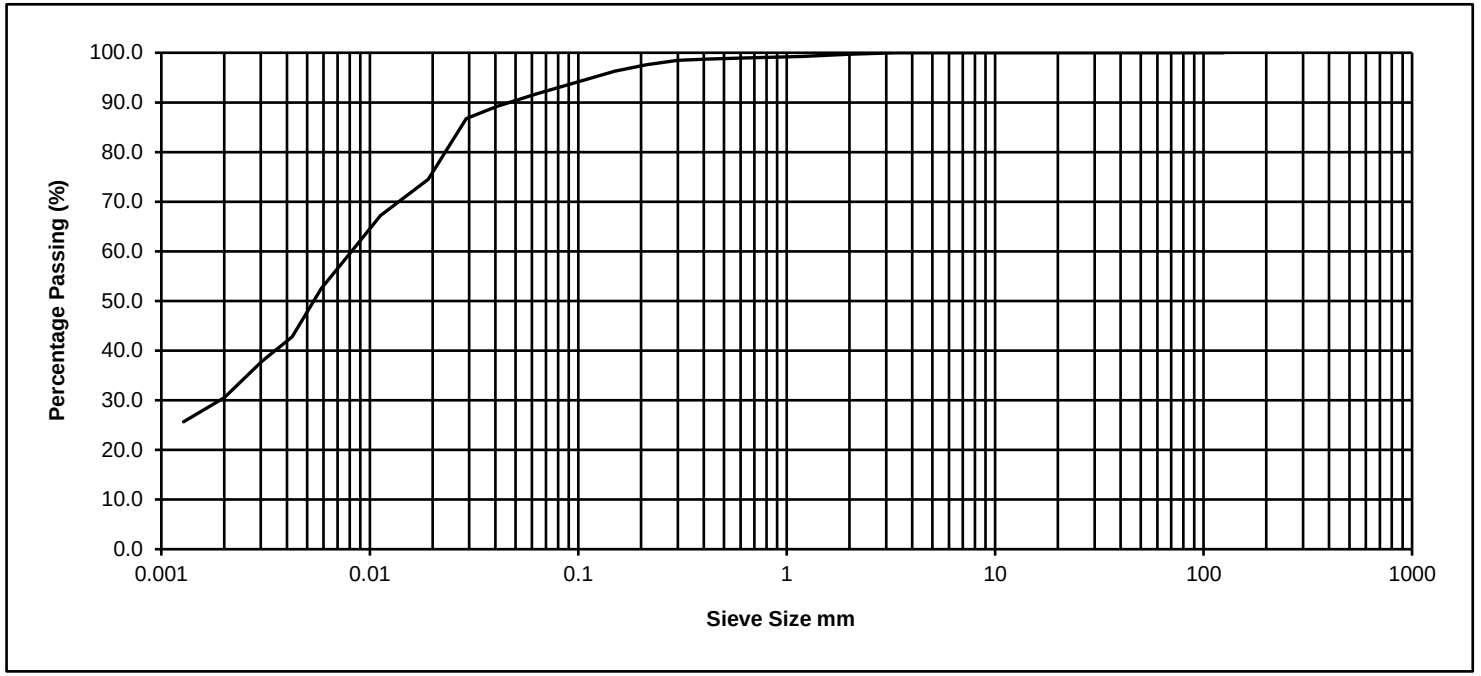
Operator	SS	Checked	VS	Approved	VS	Date sample tested	23/07/2022

Project No.	Athlone
BH/TP No.	TP8
Sample No.	
Depth	1.2m

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	100.0
3.350	100.0
2.000	99.7
1.180	99.2
0.600	99.0
0.425	98.7
0.300	98.5
0.212	97.6
0.150	96.3
0.063	91.7
0.041	89.2
0.029	86.7
0.019	74.5
0.011	67.2
0.008	59.9
0.006	52.5
0.004	42.8
0.003	37.9
0.002	30.5
0.001	25.7



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
30.5		61.2			8.0			0.3		0.0	0.0

Sample Description Sandy clayey SILT

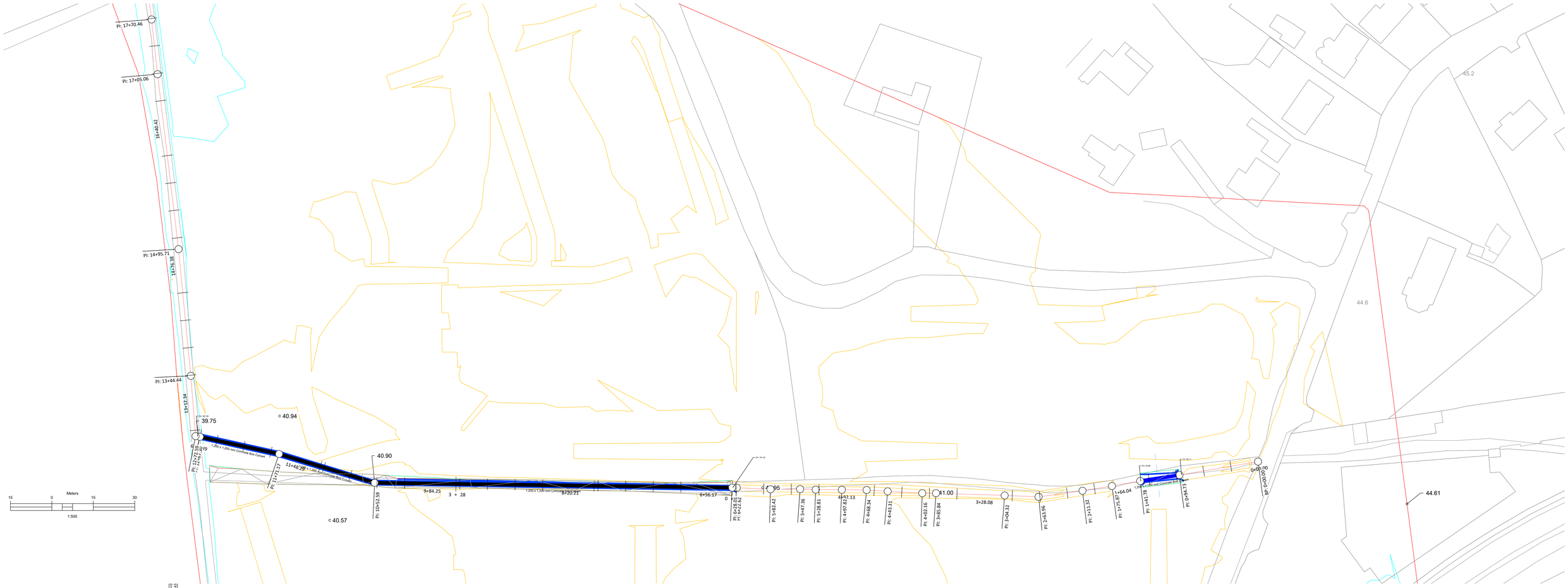
Project Athlone

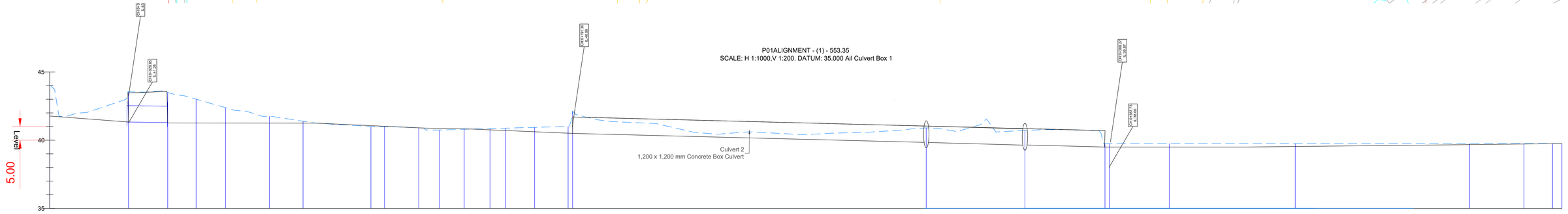
Operator	SS	Checked	VS	Approved	VS	Date sample tested	23/07/2022

Project No.	Athlone
BH/TP No.	TP8
Sample No.	
Depth	2.6m

Appendix G

Akiyda Developments Ltd.





Link Name	Culvert 1	Culvert 2	Culvert 3	Culvert 4
Section Type	1200mm	1200mm	1200mm	1200mm
Slope (1:X)	1:346	1:195	1:178	1:195
Cover Level	42.534	41.700	41.036	40.850
Invert Level	41.291 41.334	39.836 40.500	39.633 39.836	39.500 39.650
Length	14.800	129.446	36.113	29.302

NOTES:
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FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE.
EOB MANAGEMENT SERVICES TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.
THIS DRAWING IS FOR PLANNING PURPOSES ONLY.

A0

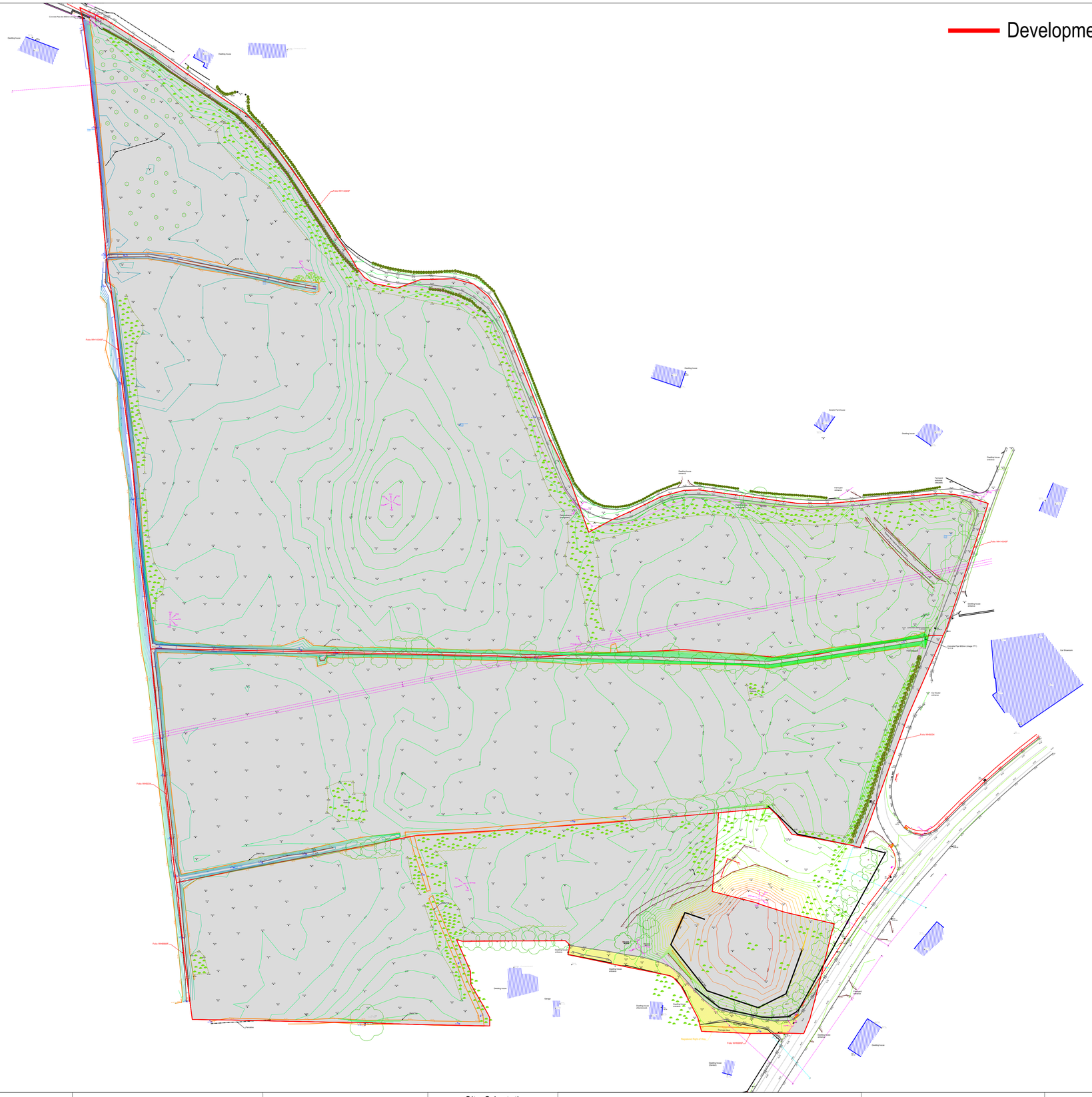
Revision Description:	Rev:	By:	Date:

EOB MANAGEMENT SERVICES
11 The Crescent
O'Connell Street
Limerick
Tel: 061-253118
Fax: 061-253119
Mobile: 086-8167404
email: pat@eobms.com

TTITLE: BALLYKEERAN STREAM

CLIENT: Akiyda Developments Ltd.
PROJECT: Akiyda Developments Ltd.
Date: 10/02/202
Drawn By: CMC
Checked By: --
Scale: AS SHOWN
22-017-1101

Development Site Area = 11.7610 Ha / 29.062 Acres



N

GRID NORTH

SURVEY KEY

SERVICES

MHS	MANHOLE SQUARE	MHR	MANHOLE ROUND
EMH	ESB MANHOLE	TEL	TELECOM MANHOLE
IC	INSPECTION CHAMBER	GY	GULLY
SV	SLUICE VALVE	SC	STOP COCK
WM	WATER METER	FH	FIRE HYDRANT
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
AV	AIR VALVE		

HEIGHTS

IL	INVERT LEVEL	BL	BED LEVEL
WL	WATER LEVEL	CL	COVER LEVEL
WH	WALL HEIGHT	FT	HEIGHT OF FENCE
TH	TREE HEIGHT	FFL	FINISHED FLOOR LEVEL
HOW	HEIGHT OF OVERHEAD WIRES		

MISCELLANEOUS

STN	SURVEY STATION	BM	BENCH MARK
RS	ROAD SIGN	LS	LAMP STANDARD
U/G	UNDERGOUND	TL	TRAFFIC LIGHT
SPR	SPREAD OF TREE	GIR	GIRTH OF TREE
BOL	BOLLARD		

LINE TYPE

- BUILDING LINE
- FENCE LINE
- EDGE OF CONCRETE
- WALL
- SOD & STONE WALL
- CL OF BOUNDARY
- ROAD
- KERB
- O/H ESB WIRES
- O/H TELECOM WIRES
- BANK BOTTOM
- BANK TOP
- TRACK
- EDGE OF VEGETATION
- DRIP LINE
- 25 MAJOR CONTOUR
- INTERVAL CONTOUR
- PIPE
- TANK

NOTES

- ALL LEVELS RELATE TO ORDANANCE SURVEY DATUM (MALIN HEAD DATUM)
- CORDINATES RELATE TO IRISH NATIONAL GRID,NORTH REFERS TO GRID NORTH.
- ALL DIMENSIONS ARE IN METERS
- DO NOT SCALE FROM PLOT

SITE TBM

TBM_LOCATION

Project Address:	Client :	Drawing Status:	Site Orientation :
Proposed Residential Development, Cormamaddy, Athlone, Co.Westmeath	Rocktop Asset Management	For Planning	N W E Winter Summer S

ROCKTOP
Moneyquid
Killeigh
Co. Offaly
Tel: (057) 93 44897
Fax: (057) 93 44951
Email: info@rocktop.ie
www.rocktop.ie

Drawing Title:	Date:	Drawing By:	Scale:	Drawing Reference Number :	Revision:
Topographical Survey Sheet 1	3rd Mar 2020	RCK	NTS @ A3	2020-P302-100	0
	Date:	Checked By:	1:2000 @ A1		
	3rd Mar 2020	RCK			

N

GRID NORTH

SURVEY KEY

SERVICES

MHS	MANHOLE SQUARE	MHR	MANHOLE ROUND
EMH	ESB MANHOLE	TEL	TELECOM MANHOLE
IC	INSPECTION CHAMBER	GY	GULLY
SV	SLUICE VALVE	SC	STOP COCK
WM	WATER METER	FH	FIRE HYDRANT
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
AV	AIR VALVE		

HEIGHTS

IL	INVERT LEVEL	BL	BED LEVEL
WL	WATER LEVEL	CL	COVER LEVEL
WH	WALL HEIGHT	FT	HEIGHT OF FENCE
TH	TREE HEIGHT	FFL	FINISHED FLOOR LEVEL
HOW	HEIGHT OF OVERHEAD WIRES		

MISCELLANEOUS

STN	SURVEY STATION	BM	BENCH MARK
RS	ROAD SIGN	LS	LAMP STANDARD
U/G	UNDERGOUND	TL	TRAFFIC LIGHT
SPR	SPREAD OF TREE	GIR	GIRTH OF TREE
BOL	BOLLARD		

LINE TYPE

- BUILDING LINE
- FENCE LINE
- EDGE OF CONCRETE
- WALL
- SOD & STONE WALL
- CL OF BOUNDARY
- ROAD
- KERB
- O/H ESB WIRES
- O/H TELECOM WIRES
- BANK BOTTOM
- BANK TOP
- TRACK
- EDGE OF VEGETATION
- DRIP LINE
- 25 MAJOR CONTOUR
- INTERVAL CONTOUR
- PIPE
- TANK

NOTES

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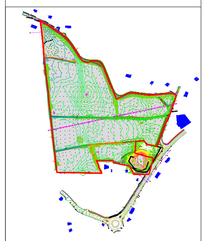
- ALL DIMENSIONS ARE IN METERS
- DO NOT SCALE FROM PLOT

SITE TBM

TBM_LOCATION



Key Plan
NTS

Project Address:	Client :	Drawing Status:	Site Orientation :
Proposed Residential Development, Cormamaddy, Athlone, Co.Westmeath	Rocktop Asset Management	For Planning	N W E S Winter Summer

ROCKTOP
Moneyquid
Killeigh
Co. Offaly
Tel: (057) 93 44897
Fax: (057) 93 44951
Email: info@rocktop.ie
www.rocktop.ie

Drawing Title:	Date:	Drawing By:	Scale:	Drawing Reference Number :	Revision:
Topographical Survey Sheet 2	3rd Mar 2020	RCK	NTS @ A3	2020-P302-101	0
	Date:	Checked By:	1:500 @ A1		
	3rd Mar 2020	RCK			

N

GRID NORTH

SURVEY KEY

SERVICES

MHS	MANHOLE SQUARE	MHR	MANHOLE ROUND
EMH	ESB MANHOLE	TEL	TELECOM MANHOLE
IC	INSPECTION CHAMBER	GY	GULLY
SV	SLUICE VALVE	SC	STOP COCK
WM	WATER METER	FH	FIRE HYDRANT
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
AV	AIR VALVE		

HEIGHTS

IL	INVERT LEVEL	BL	BED LEVEL
WL	WATER LEVEL	CL	COVER LEVEL
WH	WALL HEIGHT	FT	HEIGHT OF FENCE
TH	TREE HEIGHT	FFL	FINISHED FLOOR LEVEL
HOW	HEIGHT OF OVERHEAD WIRES		

MISCELLANEOUS

STN	SURVEY STATION	BM	BENCH MARK
RS	ROAD SIGN	LS	LAMP STANDARD
U/G	UNDERGOUND	TL	TRAFFIC LIGHT
SPR	SPREAD OF TREE	GIR	GIRTH OF TREE
BOL	BOLLARD		

LINE TYPE

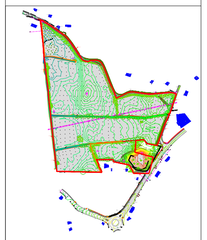
- BUILDING LINE
- FENCE LINE
- EDGE OF CONCRETE
- WALL
- SOD & STONE WALL
- CL OF BOUNDARY
- ROAD
- KERB
- O/H ESB WIRES
- O/H TELECOM WIRES
- BANK BOTTOM
- BANK TOP
- TRACK
- EDGE OF VEGETATION
- DRIP LINE
- 25 MAJOR CONTOUR
- INTERVAL CONTOUR
- PIPE
- TANK

NOTES

- ALL LEVELS RELATE TO ORDANANCE SURVEY DATUM (MALIN HEAD DATUM)
- CORDINATES RELATE TO IRISH NATIONAL GRID,NORTH REFERS TO GRID NORTH.
- ALL DIMENSIONS ARE IN METERS
- DO NOT SCALE FROM PLOT

SITE TBM

TBM_LOCATION



Key Plan
NTS

Project Address:	Client :	Drawing Status:	Site Orientation :
Proposed Residential Development, Cormamaddy, Athlone, Co.Westmeath	Rocktop Asset Management	For Planning	N W E Winter Summer S

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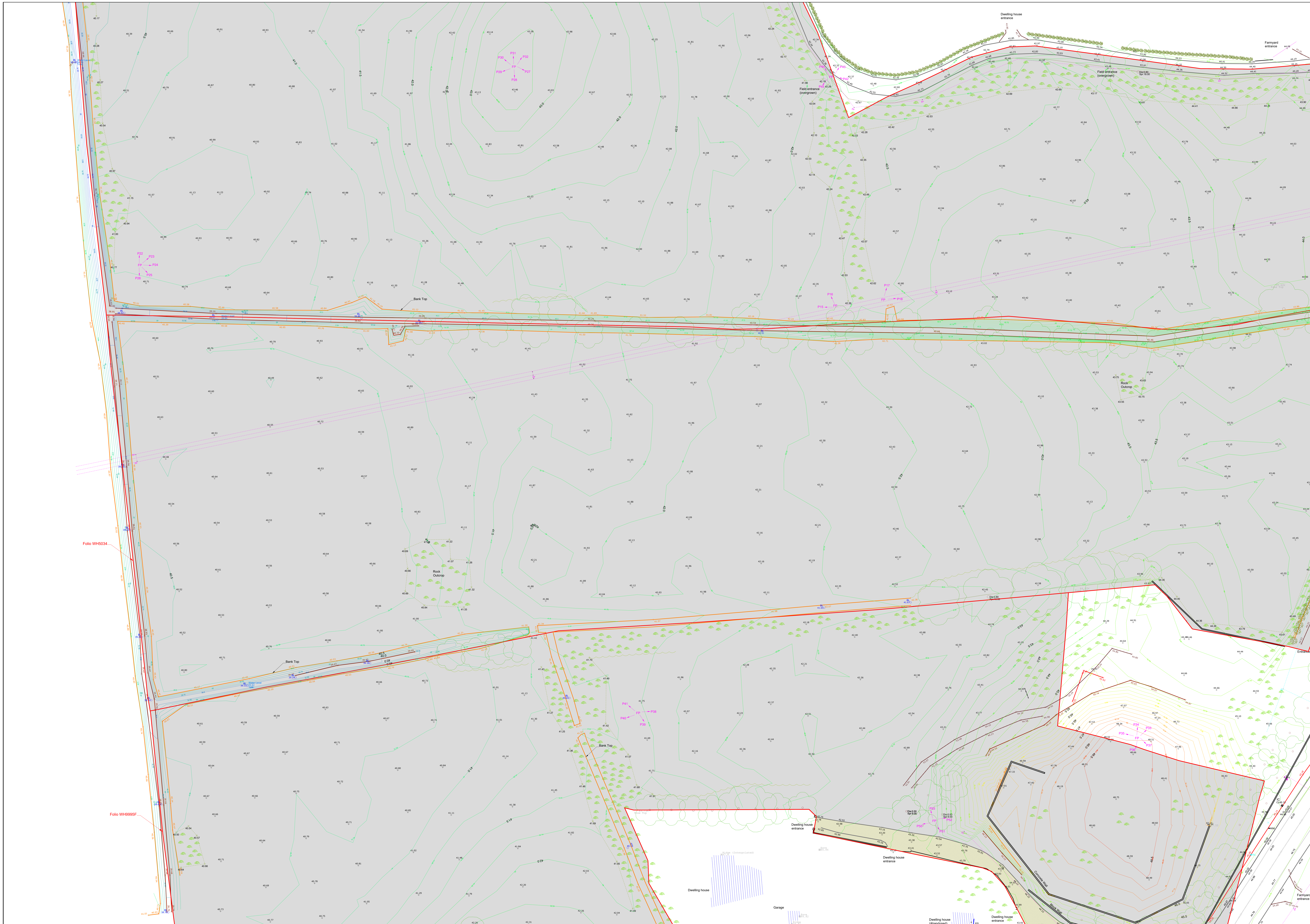
Drawing Title:	Date:	Drawing By:	Scale:	Drawing Reference Number :	Revision:
Topographical Survey Sheet 3	3rd Mar 2020	RCK	NTS @ A3	2020-P302-102	0
	Date:	Checked By:	1:500 @ A1		
	3rd Mar 2020	RCK			



GRID NORTH

SURVEY KEY

SERVICES

MHS	MANHOLE SQUARE	MHR	MANHOLE ROUND
EMH	ESB MANHOLE	TEL	TELECOM MANHOLE
IC	INSPECTION CHAMBER	GY	GULLY
SV	SLUICE VALVE	SC	STOP COCK
WM	WATER METER	FH	FIRE HYDRANT
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
AV	AIR VALVE		

HEIGHTS

IL	INVERTLEVEL	BL	BED LEVEL
WL	WATER LEVEL	CL	COVER LEVEL
WH	WALL HEIGHT	FT	HEIGHT OF FENCE
TH	TREE HEIGHT	FFL	FINISHED FLOOR LEVEL
HOW	HEIGHT OF OVERHEAD WIRES		

MISCELLANEOUS

STN	SURVEY STATION	BM	BENCH MARK
RS	ROAD SIGN	LS	LAMP STANDARD
U/G	UNDERGOUND	TL	TRAFFIC LIGHT
SPR	SPREAD OF TREE	GIR	GIRTH OF TREE
BOL	BOLLARD		

LINE TYPE

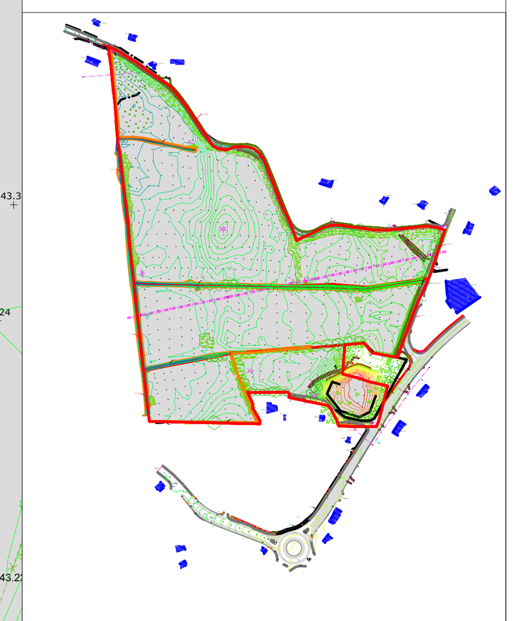
- BUILDING LINE
- FENCE LINE
- EDGE OF CONCRETE
- WALL
- SOD & STONE WALL
- CL OF BOUNDARY
- ROAD
- KERB
- O/H ESB WIRES
- O/H TELECOM WIRES
- BANK BOTTOM
- BANK TOP
- TRACK
- EDGE OF VEGETATION
- DRIP LINE
- 25 MAJOR CONTOUR
- INTERVAL CONTOUR
- PIPE
- TANK

NOTES

- ALL LEVELS RELATE TO ORDANANCE SURVEY DATUM (MALIN HEAD DATUM)
- CORDINATES RELATE TO IRISH NATIONAL GRID,NORTH REFERS TO GRID NORTH.
- ALL DIMENSIONS ARE IN METERS
- DO NOT SCALE FROM PLOT

SITE TBM

TBM_LOCATION



Key Plan NTS

Project Address:	Client :	Drawing Status:	Site Orientation :
Proposed Residential Development, Cormamaddy, Athlone, Co.Westmeath	Rocktop Asset Management	For Planning	N W E S Winter Summer

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Drawing Title:	Date:	Drawing By:	Scale:	Drawing Reference Number :	Revision:
Topographical Survey Sheet 4	3rd Mar 2020	RCK	NTS @ A3	2020-P302-103	0
	Date:	Checked By:	1:500 @ A1		
	3rd Mar 2020	RCK			

N

GRID NORTH

SURVEY KEY

SERVICES

MHS	MANHOLE SQUARE	MHR	MANHOLE ROUND
EMH	ESB MANHOLE	TEL	TELECOM MANHOLE
IC	INSPECTION CHAMBER	GY	GULLY
SV	SLUICE VALVE	SC	STOP COCK
WM	WATER METER	FH	FIRE HYDRANT
EP	ELECTRICITY POLE	TP	TELEGRAPH POLE
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MISCELLANEOUS

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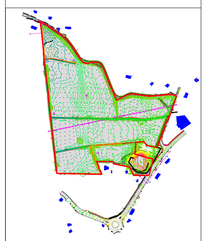
SITE TBM

TBM_LOCATION



Key Plan
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Drawing Title:	Date:	Drawing By:	Scale:	Drawing Reference Number :	Revision:
Topographical Survey Sheet 5	3rd Mar 2020	RCK	NTS @ A3	2020-P302-104	0
	Date:	Checked By:	1:500 @ A1		
	3rd Mar 2020	RCK			

Appendix H

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ATHLONE LARGE-SCALE RESIDENTIAL DEVELOPMENT

INWARD NOISE IMPACT ASSESSMENT

Technical Report Prepared For

Akiyda Ltd.

Technical Report Prepared By

Donogh Casey, CCBAM

Our Reference

227501.0443NR01

Date of Issue

10 October 2022

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Document History

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Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
Name	Donogh Casey	Leo Williams
Title	Acoustic Consultant	Senior Acoustic Consultant
Date	10 October 2022	10 October 2022

EXECUTIVE SUMMARY

AWN Consulting has been commissioned to carry out a study in relation to the potential inward noise impact on the proposed large-scale residential development at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath. This document presents the noise review of the proposed development site with respect to the inward noise impacts.

Baseline noise levels have been measured across the development site in order to assess the potential for noise impacts on the proposed development.

The majority of habitable rooms within the development achieve a good internal noise environment with standard double glazing. For the facades in the east and south-eastern sector of the proposed development site overlooking the N55, it will be necessary to provide appropriate glazing and vents to ensure that when windows are closed and vents are open, the internal noise environment achieves the adopted noise design criteria within BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings.*

Review of predicted noise levels determines that all inhabitants will have access to quiet external areas that are screened from road traffic by the on-site development buildings.

CONTENTS

1.0 INTRODUCTION

AWN Consulting has been commissioned to carry out a study on the potential inward noise impacts on the proposed residential development at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath.

Figure 1 presents the proposed development site and context.

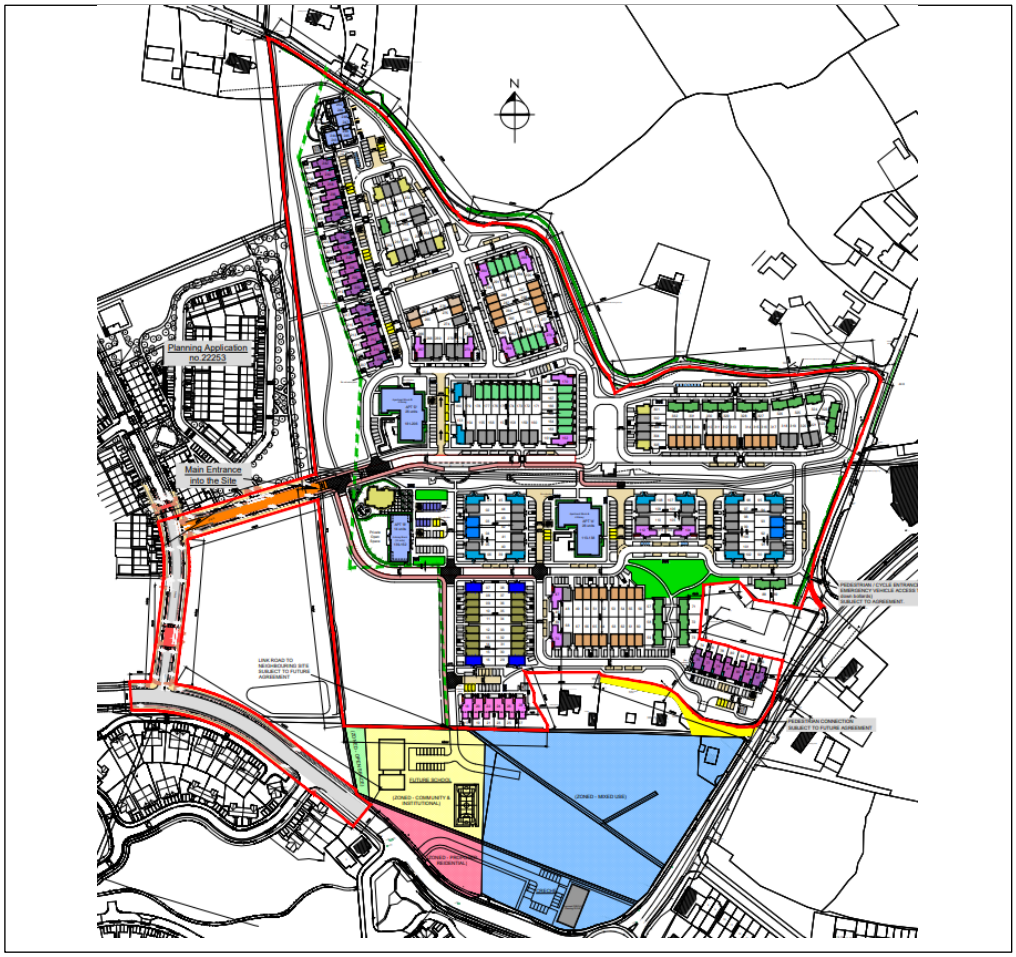


Figure 1 Location of Proposed Development

The proposed development consists of 332 no. residential units, comprised of 198 no. 2 story houses, 60 no. duplexes and 74 no. apartments units and 1 no. 2 storey building (creche).

The dwelling mix consists of the provision of a total of 172no. 2storey residential dwellings which will consisting of 152no. 3 bed units and 20no. 4 bed units.

The apartment mix consists of a total of 160no. apartments/duplex units consisting of 36no.1 bed units, 99no.2bed units and 25no. 3bed units. The apartment blocks range in height from 2 storey to 4 storey and the duplex blocks range from 2 storey to 3 storey in height.

2.0 RELEVANT CRITERIA AND GUIDANCE

2.1 County Westmeath Noise Action Plan 2018-2023

The County Westmeath Noise Action Plan 2018 – 2023 Appendix B E.U and National Legislation and guidance under the planning Noise Guidance section states the following with respect to assessing the noise impact on new residential development:

"The various ProPG documents represent a very good source of guidance and a best practice approach to the assessment and management of noise in a planning context. Westmeath County Council will consider the use of ProPG planning and noise guidance note in our planning process. A noise planning policy will be considered as part of the next County Development Plan currently being prepared."

As per the NAP reference has also been made to guidance note *ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise.*

2.2 ProPG: Planning & Noise

The *Professional Guidance on Planning & Noise*: New Residential Development (ProPG) and associated supplementary documents[1] were published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.
The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment
    - Element 4 - Other Relevant Issues

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, so as the planning authority can make an informed decision on the permission. ProPG outlines the following possible recommendations in relation to the findings of the ADS:

A. Planning consent may be granted without any need for noise conditions;
B. Planning consent may be granted subject to the inclusion of suitable noise conditions;
C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or,

[1] PropG Supplementary Document 1 (May 2017) on Planning and Noise Policy and Guidance and PropG Supplementary Document 2 (May 2017) on Good Acoustic Design for Residential Development

D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Section 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS).

A summary of the ProPG approach is illustrated in Figure 2.

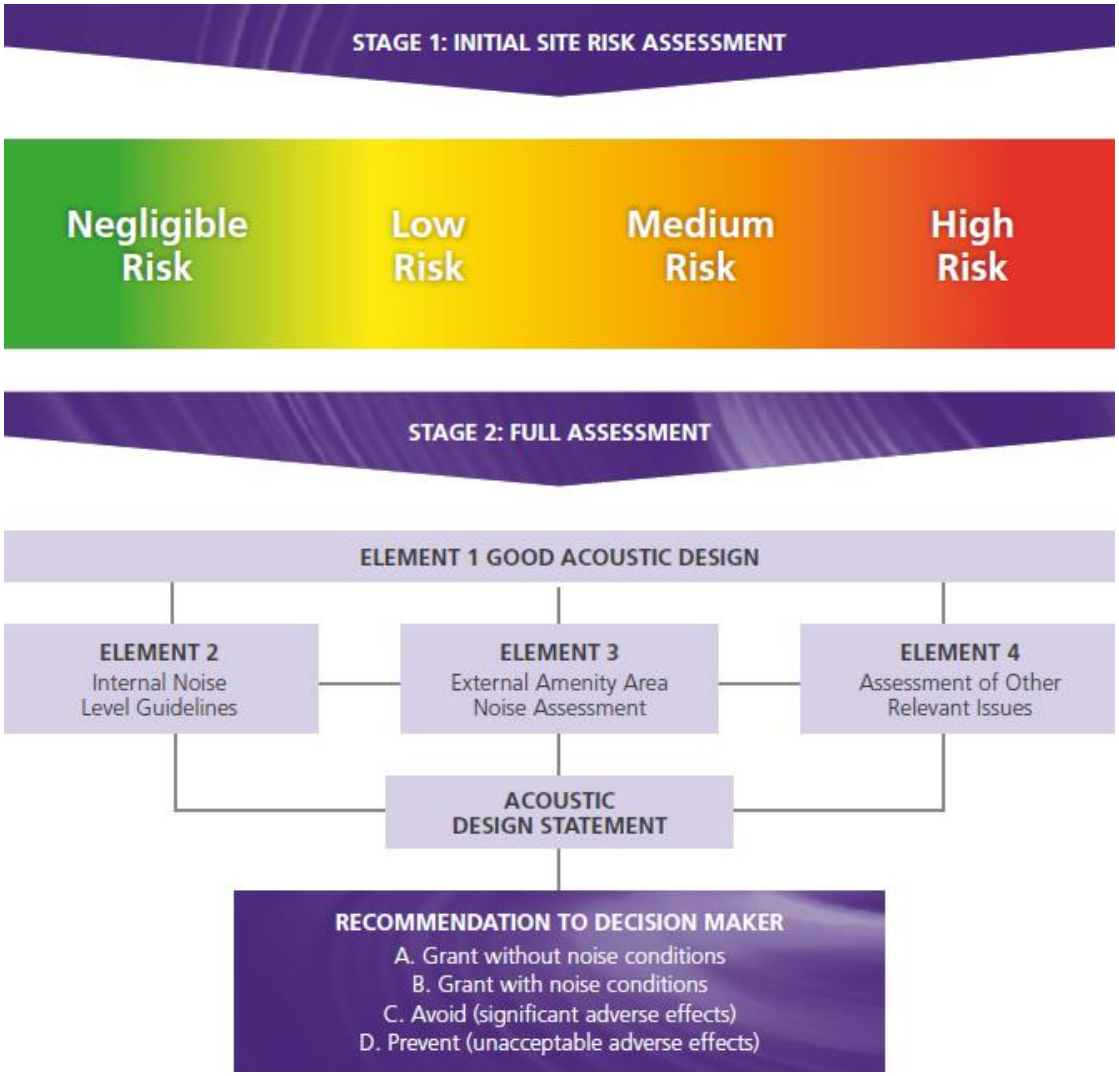


Figure 2 ProPG Approach (Source: ProPG)

2.3 British Standard BS 8233:2014

2.3.1 Internal Noise

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels in dwellings. In this instance, reference is made to BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings.*

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule

of noise control measures. The recommended indoor ambient noise levels for residential dwellings and other spaces are set out in Table 1.

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (Daytime resting)	Bedroom	35	30
Commercial	Open plan office	40	-

Table 1 Indoor Ambient Noise Levels for Dwellings from BS8233: 2014

BS 8233 also provides some guidance on individual noise events, it states:

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax}, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Typically, a 45 dB L_{AFmax} criterion is applied to individual noise events within bedrooms at night. This criterion is generally considered a noise level that should not typically be exceeded.

2.3.2 External Noise

BS 8233 also provides desirable noise levels for external amenity areas such as gardens, patios, and balconies. It states:

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

3.0 STAGE 1 – NOISE RISK ASSESSMENT

3.1 Methodology

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium, or high risk based on the pre-existing noise environment. Figure 3 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

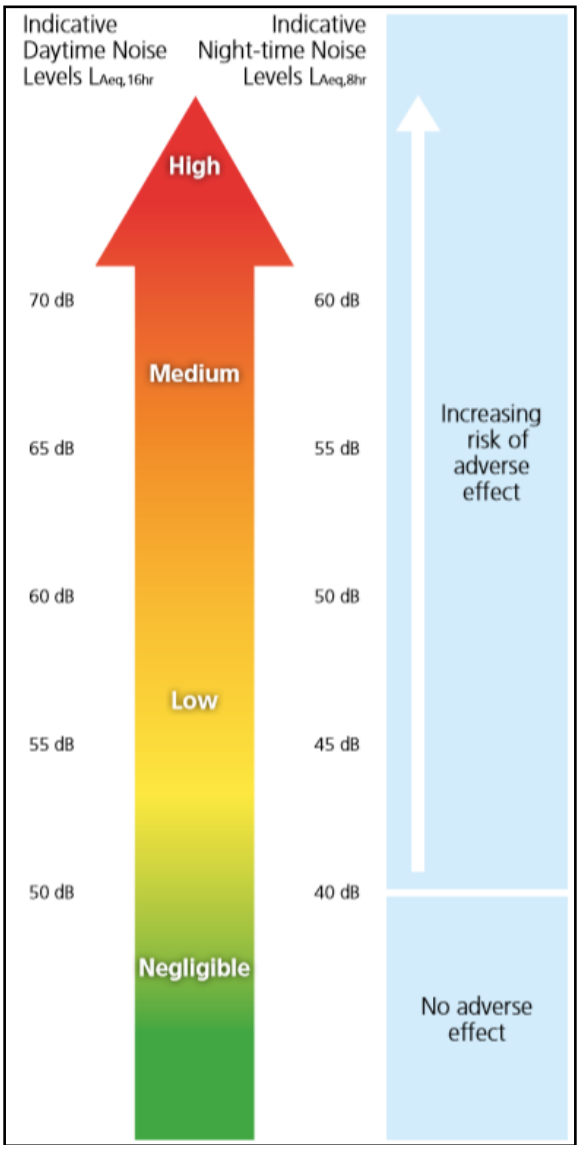


Figure 3 ProPG Stage 1 - Initial Noise Risk Assessment

It should be noted that a site should not be considered a negligible risk if more than 10 no. L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

3.2 Baseline Noise Environment

3.2.1 Baseline Noise Survey

Environmental noise surveys have been conducted in order to quantify noise emissions across the existing site. The external survey was conducted in general accordance with ISO1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise -- Determination of Environmental Noise Levels*. Specific details are set out in the following sections.

3.2.2 Survey Methodology

An unattended continuous environmental noise survey was conducted at the site from 16 August to 19 August 2022 by AWN Consulting in order to quantify the existing noise environment. Additional attended 'spot' measurements were undertaken on installation of the unattended noise monitor. The approximate noise measurement locations were selected at the proposed site as shown in Figure 4.

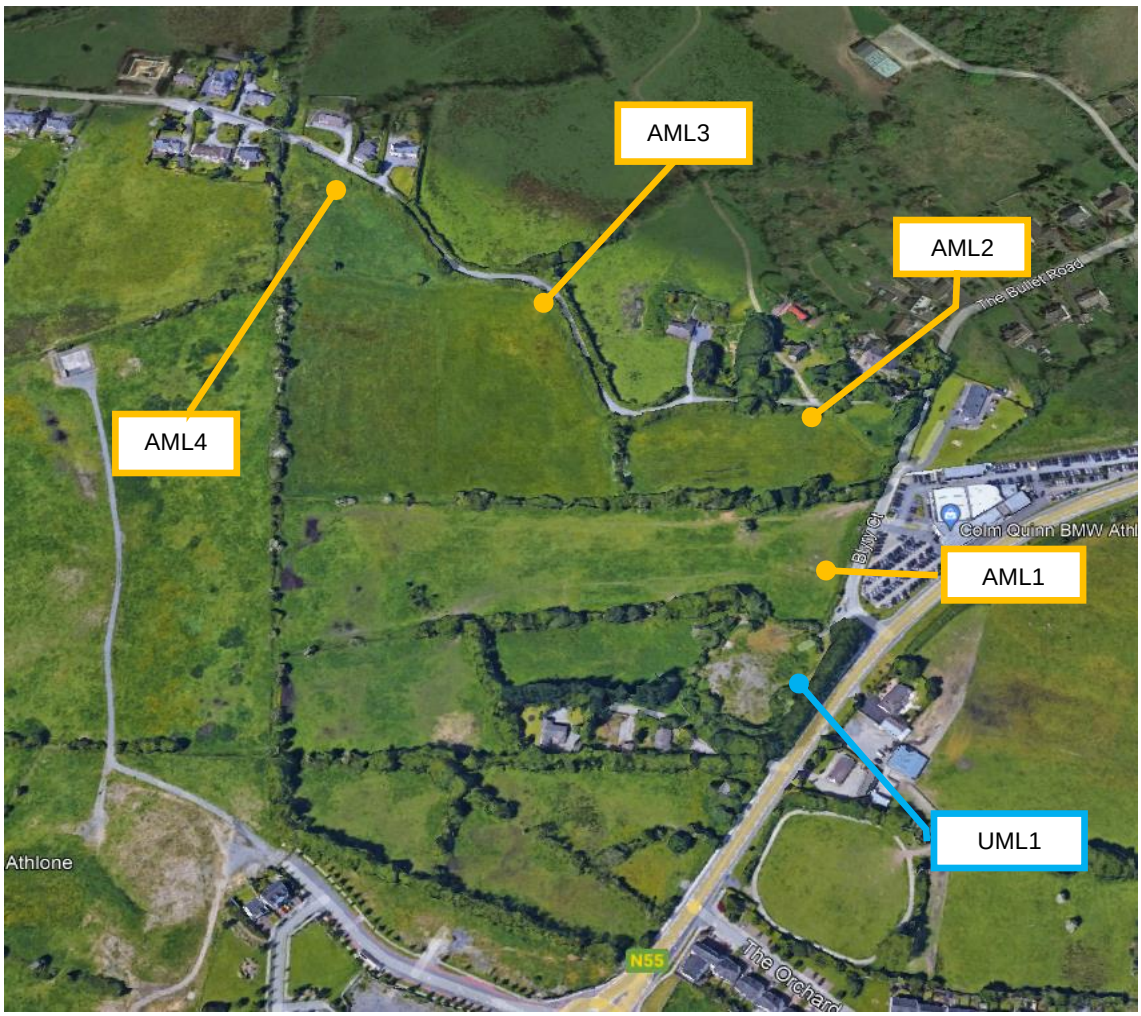


Figure 4 Noise Monitoring Locations

AML1 Attended measurement, inside eastern site boundary.

AML2 Attended measurement, inside north-eastern site boundary.

AML3 Attended measurement, inside northern site boundary.

AML4 Attended measurement, inside north-western site boundary.

UML1 Unattended noise monitor at 4m height, located inside south-eastern site boundary.

3.2.3 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{AFmax} is the maximum sound pressure level recorded during the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

3.2.4 Instrumentation

A Brüel & Kjær 2250 sound level meter (SLM) was used for the attended noise survey. Attended surveys were conducted between the hours of 11:34hrs and 15:38hrs on 16 August 2022. A Rion NL-52 SLM was used for the unattended noise survey. The instrument was set to log overall broadband noise parameters and 1/3 octave spectrum data over 15-minute intervals, these measurements were conducted between 11:15hrs on the 16 August 2022 to 11:45hrs on the 19 August 2022.

Before and after each survey the SLMs and measurement system was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

3.2.5 Survey Results

Location AML1

The table below summarises the attended noise measurements at AML1.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
16 August 2022	11:34 –11:49	49	68	44
	13:18 – 13:33	51	61	46
	14:42 – 14:53	51	64	47

Table 2 Summary of Attended Measured Noise Levels at Location AML1

The noise environment at this location was dictated by road traffic noise from N55. There was some additional noise from truck activity from nearby car dealership during the first measurement. Other noise sources included bird song and foliage noise. Ambient noise levels were in the range of 42 – 49 dB $L_{Aeq,15min.}$ Background noise levels were in the range 36 – 44 dB $L_{A90,15min}$.

Location AML2

The table below summarises the attended noise measurements at AML2.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
16 August 2022	12:15 – 12:30	49	78	42
	13:36 – 13:49	46	64	43
	15:03 – 15:18	44	58	41

Table 3 Summary of Attended Measured Noise Levels at Location AML2

The noise environment at this location comprised of distant road traffic noise, bird song and foliage noise. Livestock noise from a cow shed nearby also effected the measurements. Ambient noise levels were in the range of 44 – 49 dB $L_{Aeq,15min.}$ Background noise levels were in the range 41 – 43 dB $L_{A90,15min}$.

Location AML3

The table below summarises the attended noise measurements at AML3.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
16 August 2022	12:35 – 12:50	43	69	35
	13:57 – 14:12	40	54	37
	15:23 – 15:38	43	68	37

Table 4 Summary of Attended Measured Noise Levels at Location AML3

The noise environment at this location comprised mainly of distant road traffic noise from N55, a small amount of local road traffic noise, bird song and foliage noise. Livestock from a cow although distance was still also audible. Ambient noise levels were in the range of 40 – 43 dB $L_{Aeq,15min}$. Background noise levels were in the range 35 – 37 dB $L_{A90,15min}$.

Location AML4

The table below summarises the attended noise measurements at AML4.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
16 August 2022	12:54 – 13:09	42	62	36
	14:18 – 14:33	43	59	36
	15:42 – 15:53	41	67	36

Table 5 Summary of Attended Measured Noise Levels at Location AML4

The noise environment at this location comprised mainly of foliage noise and birdsong, with a small amount of local road traffic. Ambient noise levels were in the range of 41 – 43 dB $L_{Aeq,15min.}$ Background noise levels were in the order 36 dB $L_{A90,15min}$.

Location UML1

Table 6 presents a summary of noise levels measured during the unattended noise survey at UML1 over the 16-hour daytime period (07:00 to 23:00hrs) and the 8-hour night-time period (23:00 to 07:00hrs) between 16 August and 19 August 2022.

Date	Period	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
16 Aug	Day	62	70 – 80	55
	Night	58	70 – 76	44
17 Aug	Day	64	70 – 86	51
	Night	58	70 – 77	47
18 Aug	Day	65	72 – 77	54
	Night	57	69 – 76	50
19 Aug	Day	66	74 – 87	53
	Night	58	69 – 76	41
Average	Day	65	72 – 83	53
	Night	58	70 – 76	46

Table 6 Summary of Unattended Measured Noise Levels at Location UML1

The prevailing noise environment at this location is dominated by traffic noise on the N55. There was also noise from breeze in trees and foliage noise. L_{AFmax} values were measured at 15-minute intervals over the duration of the unattended monitoring survey. Figure 5 presents the number of measured L_{AFmax} events for various decibel levels during the night period.

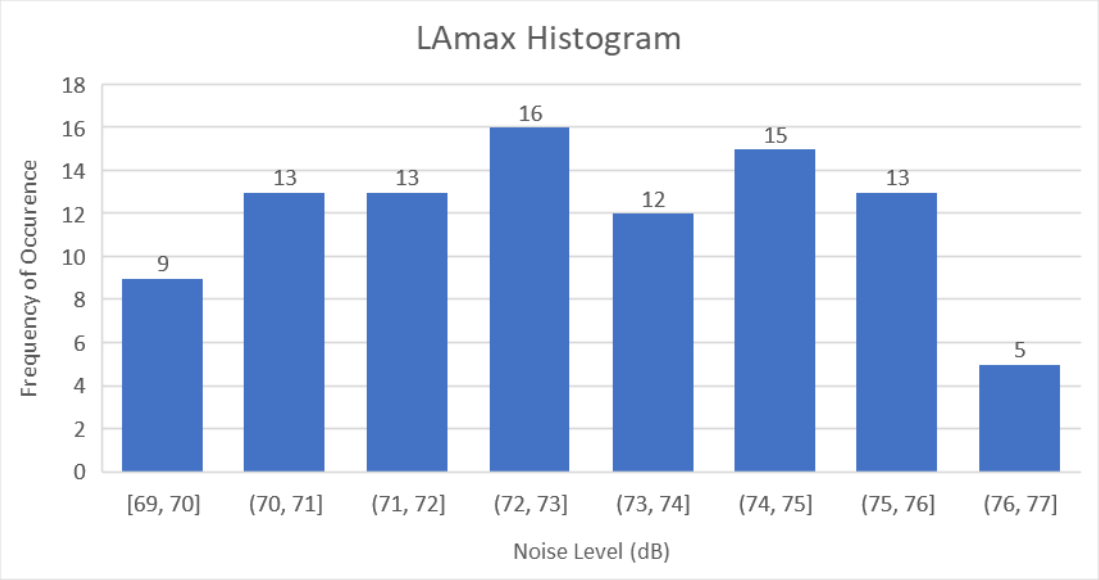
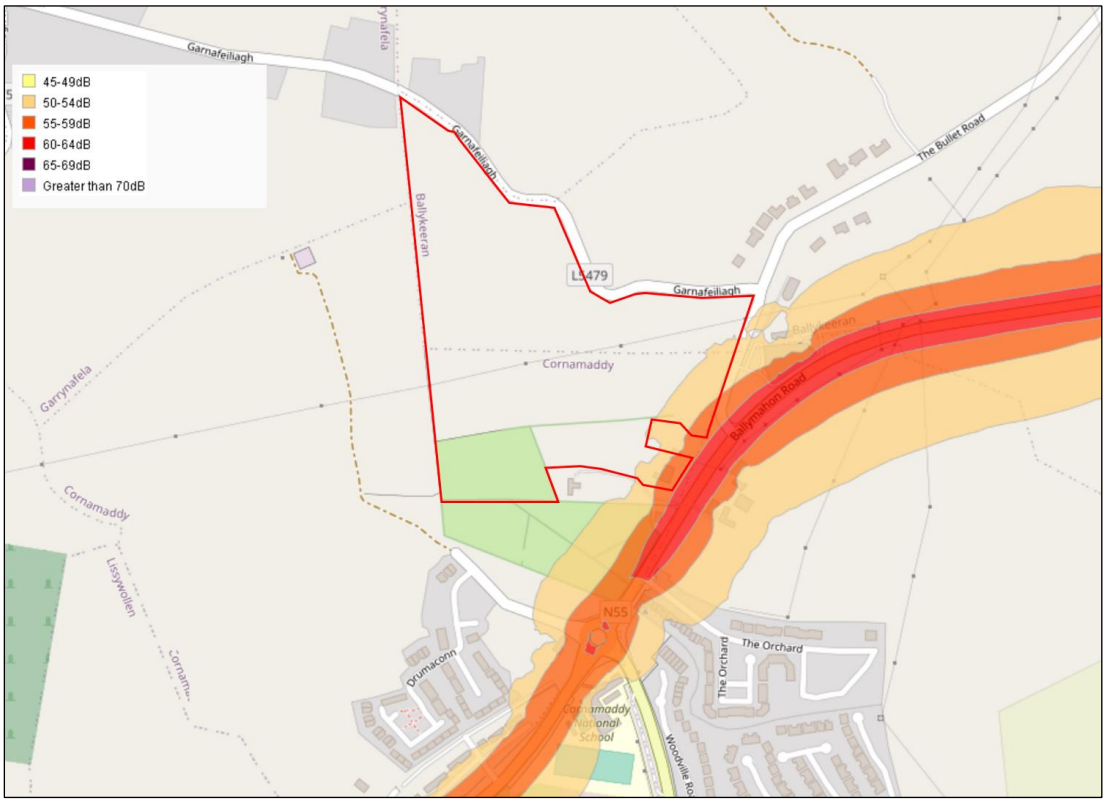


Figure 5 Distribution of the magnitude of L_{AFmax} events

The L_{AFmax} values range from < 69 to 77 dB during the night period. For the purposes of assessment, the value of 75 dB L_{Amax} is used. This value is not exceeded on average more than 3 times per night. Review of the graph above indicates this level is not regularly exceeded on a given night.

In addition to the baseline noise surveys measured on site, reference has been made to the most recent Round 3 noise maps published by the EPA (http://gis.epa.ie) for road traffic levels. The published noise maps are provided for the overall day-evening-night period in terms of L_{den} and for the night-time period in terms of L_{night}. For this assessment, reference is made to the L_{night} mapping information to compare against the relevant parameters of the ProPG assessment.

Figure 6 presents the mapped noise levels across the development site for road traffic during the night-time periods using the L_{night} parameter. The outline of the site is marked in red.



L_{night} Noise Contours for Road Traffic across the site

The noise mapping indicates a road traffic noise level between 55 to 59 dB L_{night} along the most southern eastern boundary facing the N55, which aligns with noise levels recorded at Location UML1 which sits within this contour. Within the mid-southern to eastern portion of the site traffic noise levels are mapped within the 50 to 54 dB L_{night} contour. Further into the site road traffic noise levels are reducing to below 45 dB L_{night}.

3.3 Noise Risk Assessment Conclusion

With reference to the Noise Risk Assessment outlined in ProPG the noise levels for relevant periods have been derived in order to classify the proposed development site. Table 7 summarises the predicted noise levels at the most exposed proposed building facades, as per the proposed site layout.

Period	Measured/Predicted Noise Level (dB, $L_{Aeq,T}$)	"Risk Category"
Daytime	65	Low – Medium
Night-time	58	Low – Medium

Table 7 Categorising Proposed Site

Giving consideration to the baseline noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk on the site can be classified as a low to medium noise risk.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. The results indicate that the L_{AFmax} noise levels do not exceed 80 dB more than

20 times per night, and therefore does not exceed the threshold whereby ProPG recommends that the site is not considered as high risk, with respect to this aspect.

ProPG states the following with respect to low and medium risks:

Low Risk — *At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.*

Medium Risk — *As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*

Given the above it can be concluded that the development site may be categorised as *Low to Medium Risk* and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used:

> *"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk."*

Therefore, following the guidance contained in ProPG does not preclude residential development on sites that are identified as having medium noise risk. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitable designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

4.0 STAGE 2 – FULL ACOUSTIC ASSESSMENT

4.1 Element 1 – Good Acoustic Design (GAD) Process

4.1.1 ProPG Guidance

In practice, good acoustic design should deliver the optimum acoustic design for a particular site without adversely affecting residential amenity or the quality of life of occupants or compromising other sustainable design objectives. It is important to note that ProPG specifically states that good acoustic design is not equivalent to overdesign or "*gold plating"* of all new development but that it seeks to deliver the optimum acoustic environment for a given site.

Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design:

- Check the feasibility of relocating, or reducing noise levels from relevant sources;
- Consider options for planning the site or building layout;
- Consider the orientation of proposed building(s);
- Select construction types and methods for meeting building performance requirements;
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc;
- Assess the viability of alternative solutions; and,
- Assess external amenity area noise.

In the context of the proposed development, each of the considerations listed above have been addressed in the following subsections.

4.1.2 Application of GAD Process to Proposed Application

Relocation or Reduction of Noise from Source

The surrounding road network is located outside the redline boundary of the site and therefore it is beyond the scope of this development to introduce any noise mitigation at source.

Planning, Layout and Orientation

Review of the site layout shows that a row of houses in the south-east corner of the site are orientated such that both front and back facades will be more exposed to noise levels from the N55, two further unit directly north of this row and close to the proposed pedestrian entrance to the development will also be exposed to noise levels from the N55 at the rear facades. A second row of houses on the east side of the proposed development will also be exposed however, to a lesser extent with only the front façades of the houses exposed to the Blyry Ct road and N55.The remainder of the residential units and external amenity space or set back at a further distance from the road and in the majority of cases are well screened by the development itself.

The external amenity spaces have been located with large set-back distances from the nearby road and therefore less exposure to traffic noise.

Select Construction Types for meeting Building Regulations

Masonry constructions will be used in constructing the external walls of the development. The masonry construction type offers high levels of sound insulation performance. However, as is typically the case the glazed elements and any required ventilation paths to achieve compliance with Part F of the Building Regulations will be the weakest elements in the façade in terms of sound insulation performance.

Consideration will therefore be given to the provision of upgraded glazing and acoustic ventilators where required. For units where it will not be possible to achieve the desirable internal acoustic environments with windows open, the proposal here is to provide dwelling units with glazed elements and vents that have good acoustic insulation properties so that when the windows are closed the noise levels internally are good. Inhabitants will be able to open the windows if they wish, however, doing so will increase the internal noise level. This approach to mitigation is supported in ProPG where it states the following:

> "2.22 *Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided;* ***occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open****. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents* "
>
> *Note 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded*
>
> 2.34 *Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed,* ***which may be the case in urban areas and at sites adjacent to transportation noise sources****, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded*."

It is important to note that it is impractical to achieve the good internal noise levels with windows open across the vast majority of development sites in urban or suburban locations. Such sites would need to be classified as having a negligible risk in accordance with the ProPG noise risk assessment approach. For this reason, there are no guidance documents either at a local level or an international level that AWN is aware of which would support the approach of achieving the ideal internal noise levels only in the open window scenario. It is therefore considered entirely correct and

justifiable to provide building facades with a moderate degree of sound insulation such that with windows closed a good internal acoustic environment is achieved.

Impact of noise control measures on fire, health and safety etc

The good acoustic design measures that have been implemented on site, e.g. locating properties away from the road, placing outdoor space on the quiet side of buildings, are considered to be cost neutral and do not have any significant impact on other issues.

Assess External Amenity Area Noise

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

Noise levels across amenity areas is addressed in Section 4.3 below.

4.2 Element 2 – Internal Noise Levels

Internal Noise Criteria

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 1 and are based on annual average data.

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external WHO guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

Façade Noise Levels

The measured noise levels associated with road traffic have been used to derive an assessment noise level at the façades of the proposed development.

A noise spectrum for the assessment noise levels is presented below for daytime and night-time.

Facade	Period	Octave Band Centre Frequency (Hz							$L_{Aeq,T}$ dB
		63	125	250	500	1k	2k	4k	
South-East Boundary	Day	60.6	51.3	55.6	58.5	62.9	57.4	48.3	65
	Night	60.1	50.2	55.0	58.7	62.4	56.0	44.0	58

Table 8 Measured $L_{Aeq,T}$ Noise Levels External to Proposed Development

Discussion on Open/Closed Windows

The level of sound reduction offered by a partially open window is typically applied as 15 dB[2] to 18 dB.

Considering the design goals outlined in Table 1 and sound reduction across an open window of 15 dB, the free-field noise levels that would be required to ensure that internal noise levels do not exceed 'good' or 'reasonable' internal noise levels have been summarised in Table 9.

Level Desired	Day 07:00 to 23:00hrs	Night 23:00 to 07:00hrs
Good (i.e. at or below the internal noise levels)	50 – 55 dB $L_{Aeq,16hr}$	45 dB $L_{Aeq,8hr}$
Reasonable (i.e. 5 dB above the internal noise levels)	55 – 60 dB $L_{Aeq,16hr}$	50 dB $L_{Aeq,8hr}$

Table 9 External Noise Levels Required to Achieve Internal Noise Levels

Giving consideration to the external noise levels, it will be necessary to use appropriate glazing elements to meet the recommended internal noise levels. Regarding ventilation strategy, background ventilation via in-wall vents/ trickle vents is proposed and therefore there is not a requirement to open windows.

Based on the predicted external noise levels across the site, noise levels in rooms in the vast majority of units will be within the 'Good' and 'Reasonable' ranges set out above. In a small number of units, i.e. those along the east and south-east boundaries, should an occupant decide to open a window, noise levels internally will increase.

Recommend Façade Treatment

The British Standard BS EN 12354-3: 2017: *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provide a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, road traffic noise from the N55 is the dominant noise source along the south-east portion of the proposed site.

[2] Section 2.33 of ProPG, additional information can be found in the DEFRA NANR116: *'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows'*

Glazing

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance the facades will be provided with glazing that achieves the minimum sound insulation performance as set out in Table 10.

Glazing Specification	Octave Band Centre Frequency (Hz)						R_w	Vent
	125	250	500	1k	2k	4k		$D_{ne,w}$
Blue	29	25	32	34	36	38	34	34
No mark up	Standard double glazing							

Table 10 Sound Insulation Performance Requirements for Glazing, SRI (dB)

The overall R_w value outlined above are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 10 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

It is advised that the window supplier provides laboratory tests confirming the sound insulation performance. It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system when installed on site.

The glazing performance requirement for the various facades can be confirmed by reviewing the mark up presented in Figure 7.

Figure 7 Assigned Façade Glazing Types (Refer to Table 10)

Wall Construction

In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB R_w for this construction.

Ventilation

The ventilation strategy for the development is for background ventilation via wall/trickle vents. As noted above, on those facades where noise mitigation is provided by the higher specification glazing, the standard vents should be upgraded to achieve a sound insulation performance of 34 dB $D_{n,e,w}$.

Internal Noise Levels

Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated.

All locations are predicted to achieve good internal noise levels with windows closed.

4.3 Element 3 – External Amenity Areas

For this development the good acoustic design principles employed have ensured that the majority of private external spaces are positioned to benefit from the screening effect of the development buildings. With respect to the current layout, the vast majority of the private outdoor amenity space is predicted to achieve a noise level ≤55 dB $L_{Aeq,16hr}$.

Communal outdoor amenity space is also provided within the development. This space is located inside the western site boundary, set back from the N55 and the influence of traffic noise and screened by buildings within the development itself. Noise levels in the amenity space are predicted to be < 55 dB $L_{Aeq,16hr}$.

4.4 Element 4 – Assessment of Other Relevant Issues

Element 4 gives consideration to other factors that *may* prove pertinent to the assessment, these are defined in the document as:

- 4(i) compliance with relevant national and local policy
- 4(ii) magnitude and extent of compliance with ProPG
- 4(iii) likely occupants of the development
- 4(iv) acoustic design v unintended adverse consequences
- 4(v) acoustic design v wider planning objectives

Each is discussed in turn below.

4.4.1 Compliance with Relevant National and Local Policy

There are no national policy documents relating to the acoustic design of residential dwellings. Locally the County Westmeath Noise Action Plan 2018 - 2023 specifies that the guidance contained within ProPG should be used in assessing the noise impact on new residential developments.

This Acoustic Design Statement has been prepared in compliance with the requirements of ProPG and therefore complies with the requirements of local policy.

4.4.2 Magnitude and Extent of Compliance with ProPG

As discussed within this report the following conclusions have been drawn with regards to the extent of compliance with ProPG:

- All dwellings as part of the development have been designed to achieve the good level of internal noise levels specified within ProPG with windows closed and vents open.
- The vast majority of external amenity areas have been determined to have an external noise level that complies with the recommended criterion set out in ProPG.

Based on the preceding it is concluded that the proposed development is in compliance with the requirements of ProPG.

4.4.3 Likely Occupants of the Development

The criteria adopted as part of this assessment are based on those recommended for permanent dwellings and are therefore considered robust and appropriate for the likely occupants.

4.4.4 Acoustic Design v Unintended Adverse Consequences

Design aspects such as roadside barriers that remove views or prevent crossing roads, sealed facades that affect personal control over the internal environment etc., have been avoided through implementation of Good Acoustic Design principles.

4.4.5 Acoustic Design v Wider Planning Objectives

It is assumed that wider planning objectives have been adhered to during the process of developing the design for the subject development.

5.0 CONCLUSION

AWN Consulting has been commissioned to carry out a study in relation to the potential inward noise impacts on the proposed residential development at Ballykeeran Gardens, Cornamaddy, Athlone, County Westmeath. This document presents the noise review of the proposed development site with respect to the inward noise impacts.

A baseline noise survey has been undertaken at the development site to determine the existing noise environment at the site. An inward noise assessment has been undertaken based on the results of the noise survey as recommended in the ProPG: Planning & Noise guidance document.

The measured noise levels on the site have been used to calculate noise levels at specific facades of proposed residential properties and to predict the internal noise levels within living room and bedroom spaces, taking account of the proposed building envelope and conditions in the receiving rooms (e.g. volumes and room acoustic characteristics). Based on these noise levels, appropriate acoustic glazing and ventilators have been recommended to facades effected by noise levels from the N55.

Based on the implementation of the measures outlined in this assessment, the predicted noise levels conform to the criteria taken from BS8233:2014 for acceptable internal noise levels. It should be noted that the predicted internal noise levels detailed above assume that windows and doors will be closed, and vents will be open. As discussed in Section 4.1.2 there is no requirement for assessment of internal noise levels with windows open, however it is expected that a good portion of site will achieve at least ‘reasonable’ internal noise levels with windows open.

It is predicted that the majority of the amenity space will experience noise levels of ≤55 dB $L_{Aeq,16hr}$ in line with the recommended noise level.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY

Ambient noise — The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

Background noise — The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

dB — Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).

dB(A) — An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

$D_{n,e,w}$ — Weighted element-normalized level difference. This is the value of sound insulation performance of a ventilator measured under laboratory conditions. It is a weighted single figure index that is derived from values of sound insulation across a defined frequency spectrum. Technical literature for acoustic ventilators typically presents sound insulation data in terms of the $D_{n,e,w}$ parameter.

Hertz (Hz) — The unit of sound frequency in cycles per second.

$L_{Aeq,T}$ — This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} — The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

L_{AF90} — Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AF10} — Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10%

	of the measurement period. It is typically representative of traffic noise levels. Measured using the “Fast” time weighting.
L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.
L_{den}	The L_{den} (Day Evening Night Sound Level) is the average sound level over a 24 hour period, with a penalty of 5 dB added for the evening hours or 19:00 to 22:00, and a penalty of 10 dB added for the night-time hours of 22:00 to 07:00.
Octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

Appendix I

BUILDING LIFE CYCLE REPORT

BALLYKEERNIN GARDENS

Proposed Development of 332 no. Residential Units
on a site located on Lands at Cornamaddy, Athlone, County Westmeath.

Prepared by **Arnold Leahy Architects Limited**

On Behalf of **Akiyda Limited**

February 2023.

Contents

INTRODUCTION

The *Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities* (hereafter referred to as the Apartment Guidelines) was published in March 2018. This Document introduced a requirement to include details on the proposed management and maintenance of apartment schemes, set out in Section 6.11 to 6.14 - "Operation & Management of Apartment Developments", specifically Section 6.13.

Section 6.13 of the Apartment Guidelines 2018 requires that apartment applications shall:

> *"…. include a building lifecycle report, which in turn includes an assessment of long-term running and maintenance costs as they would apply on a per residential unit basis at the time of application"*
>
> *"…demonstrate what measures have been specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents."*

This Building Life Cycle Report aims to address the requirements of Section 6.13 of the Apartment Guidelines and includes an assessment of long-term running and maintenance costs as they would apply on a per residential unit basis at the time of this application, as well as demonstrating what measures have been specifically considered by the applicant to effectively manage and reduce costs for the benefit of residents.

This document is divided into two sections as follows:

Section 1 - An assessment of long-term running and maintenance costs as they would apply on a per residential unit basis at the time of application.

Section 2 - Measures specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents.

PROPOSED DEVELOPMENT

This report forms part of the planning submission for a proposed large scale residential Housing Development on lands Cornamaddy, Athlone, County Westmeath. It is prepared on behalf of Akiyda Limited.

The development will consist of the provision of a total of 332no. residential units along with provision of a crèche and ancillary infrastructure as follows:

a) 172 Houses:
- 4no. 3 bed Detached units
- 12no. 4 bed Semi-detached units
- 40no. 3 bed Semi-detached units
- 8no. 4 bed End Terrace units
- 108no. 3 bed Terrace units

b) 86 Duplexes:
- 25no. 3 bed Duplex hse.
- 43no. 2 bed Duplex apt.
- 18no. 1 bed Duplex apt.

c) 74 Apartments:
- 16no. 1 bed Apartments

58no. 2 bed Apartments

d) Provision of all private and communal open space, including balconies/terraces to be provided for each apartment; and communal open space areas including gardens.

e) Creche of c. 438 sqm with outdoor play area.

f) Vehicular set down area for crèche.

Proposed Development on lands at Cornamaddy, Athlone, County Westmeath.

SECTION 1

Dealing with an assessment of long-term running and maintenance costs as they would apply on a per residential unit basis at the time of application.

1.1 PROPERTY MANAGEMENT OF THE COMMON AREAS OF THE DEVELOPMENT

An Owners' Management Company will be established In accordance with the MUD Act 2011 to manage the proposed development. All future owners of residential units within the development will be entitled to membership of the Owner's Management Company on completion of the sale of each unit. The Applicant will ensure, at the time that the Owner's Management Company is established, that it will have all the powers necessary to perform all the functions conferred on it by the MUD Act 2011.

Relevant parts of any common areas of the Apartment/Duplex Blocks and any other relevant common open space areas within the wider development, will be transferred by deed (or otherwise) to the Owner's Management Company including: -

- Any right of way or access necessary for the reasonable use and enjoyment of the development.

- Any rights necessary to enable the owner of each residential unit to enjoy the quiet and peaceful occupation of the unit.
- All necessary amenities intended to be available for use in conjunction with the ownership and occupation of the residential units.

The Owners' Management Company will be responsible for the maintenance and management of all common areas and shall have rights (as set out under Section 13 of the MUD Act 2011) to carry out all necessary repairs or maintenance to ensure the safe and effective occupation of the multi-unit development.

The property management company will be involved at an early stage of the project to ensure that all property management functions are dealt with correctly and that the running and maintenance costs of the common areas of the development, including communal areas of open space, residential amenity facilities and any public areas not taken in charge by the local authority, are kept within the agreed annual operational budget.

The property management company will enter into a contract directly with the Owners Management Company (OMC) for the ongoing management of the built development. It is intended that this contract will be for a period of 15 years and in the form prescribed by the Property Services Regulatory Authority (PSRA).

The Property Management Company also has the following responsibilities for the apartment development once complete:

- Timely formation of an Owners Management Company (OMC) – which will be a company limited by guarantee having no share capital. All future purchasers will be obliged to become members of this OMC.
- Preparation of an annual service charge budget for the development common areas.
- Fair and equitable apportionment of the Annual operational charges in line with the Multi Units Development Act 2011 (MUD Act).
- Engagement of independent legal representation on behalf of the OMC in keeping with the MUD Act - including completion of Developer OMC Agreement and transfer of common areas.
- Transfer of documentation in line with Schedule 3 of the MUD Act.
- Estate Management.
- Accounting Services.
- Third Party Contractors Procurement and Management.
- OMC Reporting.
- Corporate Services.
- Insurance Management.
- Staff Administration.
- After Hours Services.

1.2 SERVICE CHARGE BUDGET

The property management company has a number of key responsibilities, primarily the compiling of the service charge budget for the development for agreement with the OMC. The service charge budget covers items such as cleaning, landscaping, refuse management, utility bills, insurance, maintenance of mechanical/electrical lifts, life safety systems, security, property management fee, etc., to the development common areas in accordance with the Multi Unit Developments Act 2011. This service charge budget also includes an allowance for a Sinking Fund and this allowance is determined following the review of the Building Investment Fund (BIF) report prepared for the OMC. A Sinking Fund allowance will account for future major maintenance and upgrade costs. A 10-year Planned Preventative Maintenance (PPM) strategy will determine the level of sinking fund required. The members of the OMC will determine and agree each year, at a General Meeting of the members, the contribution to be made to the Sinking Fund, having regard to the BIF report produced. This is in line with requirements of the MUD Act 2011. The BIF report once adopted by the OMC, determines an adequate estimated annual cost provision requirement based on the needs of the development over a 30-year cycle period. The BIF report will identify those works which are necessary to maintain, repair, and enhance the premises over the 30-year life cycle period, as required by the Multi Unit Development Act 2011.

1.3 SINKING FUND

It is expected that a sinking fund allowance will account for future major maintenance and upgrade costs. A 10-year Planned Preventative Maintenance (PPM) strategy will determine the level of sinking fund required. The Owners' Management Company shall establish a building investment fund (referred to under the MUD Act as a 'sinking fund') for the purpose of discharging expenditure reasonably incurred on refurbishment, improvement and maintenance of a non-recurring nature. Advice will be obtained from suitably qualified persons relating to these items of refurbishment, improvement and maintenance.

The owner of each unit in the multi-unit development shall be obliged to make payments to the sinking fund. The obligation to establish a sinking fund, and to make contributions to such a fund, shall apply on the passing of a period of 3 years since the first transfer of ownership. The contributions made towards the sinking fund shall be held in a separate account and in a manner which identifies these funds as belonging to the sinking fund (i.e. these funds shall not be used for general refurbishment, improvement and maintenance of an on-going nature) Any such expenditure will need to be certified by the OMC Board and approved by a meeting of OMC members in accordance with the MUDS act. This service charge budget includes an allowance for a Sinking Fund and this allowance is determined

following the review of the Building Investment Fund (BIF) report prepared for the OMC. The BIF report once adopted by the OMC, determines an adequate estimated annual cost provision requirement based on the needs of the development over a 30-year period. The BIF report will identify those works which are necessary to maintain, repair, and enhance the premises over the 30-year period, as required by the Multi Unit Development Act 2011. In line with the requirements of the MUD Act, the members of the OMC will determine and agree each year at a General Meeting of the members, the contribution to be made to the Sinking Fund, having regard to the BIF report produced.

SECTION 2

Dealing with measures intended to effectively manage and reduce costs for the benefit of residents.

2.1 ENERGY AND CARBON EMISSIONS

A number of strategies will be adopted within the development to maximise low energy use and low carbon emissions that will result in a reduction in maintenance and unit costs per resident. The following are an illustration of energy measures that are planned for the residential units that will result in reduced costs for the occupants:

Energy and Carbon Emissions

Measure	Description	Benefit
BER Certificates	**Energy Rating** Each dwelling will have a Building Energy Rating (BER) certificates outlining details of the energy performance of the dwellings. A BER is calculated through energy use for space and hot water heating, ventilation, and lighting and	Higher BER ratings reduce energy consumption and running costs.

	occupancy. All dwelling units will have an A2 rating. A1 -< 25 kwh/m2/yr with CO2 emissions circa 8kg CO2/m2 year. A2 - 25-50 kwh/m2/yr with CO2 emissions circa 10kg CO2/m2 year. A3 - >50 kwh/m2/yr with CO2 emissions circa 12kg CO2/m2 year.	
Building Fabric energy efficiency	**Building Fabric Performance** The U-values being investigated will be in line with the requirements set out by the current regulatory requirements of the Technical Guidance Documents Part L - "Conservation of Fuel and Energy Buildings other than Dwellings". The current regulation is Part L 2019. The dwellings built under this planning permission will be designed and constructed to meet the relevant regulation, as may be appropriate, in accordance with the transitional period. The U-Values that will be targeted for the dwellings in this development will exceed the minimum targets set out in Part L 2019.	Improved air tightness/ reduced U values will be targeted to further reduce heat loss through the building fabric which will reduce energy consumption with an associated reduction in carbon emissions.
	Air Tightness Reduction in air infiltration is key to reducing heat loss in the building fabric. In order to ensure that a sufficient level of air tightness is achieved, air permeability testing will be carried out on all dwellings. A design air permeability target of 3 m3/m2/hr has will be used for all houses and apartments. **Thermal Bridging** Thermal bridges occur at junctions between planar elements of the building fabric and are typically defined as areas where heat can escape the building fabric due to a lack of continuity of the insulation in the adjoining elements. Careful design and detailing of the manner in which insulation is installed at these junctions can reduce the rate at which the heat escapes. Standard good practice details are available and are known as Acceptable Construction Details (ACDs). Adherence to these details is known to reduce the rate at which heat is lost. The rate at which heat is lost is quantified by the Thermal Bridging Factor of the dwelling which is entered into the overall dwelling Part L calculation. It is intended that all building junctions will either be designed in accordance with the Acceptable Construction Details (issued by The Department of the Environment) or that thermal modelling will be carried out for all thermal bridges on the dwellings within the proposed development. The resultant Thermal Bridging Factor will be in the range of 0.04W/m2K to 0.08W/m2K.	
Energy Labelled	The white good package planned for provision in the apartments will be of a very high standard and have a	Use of Higher energy efficiency appliances

White Goods	high energy efficiency rating. It is expected that appliance ratings will be provided as follows: • Oven - A + • Fridge Freezer - A + • Dishwasher - AAA • Washer/Dryer – B	reduces electricity demand.
External Lighting	All external lighting will consist of; • LED fittings mounted on Columns • Low voltage LED Lamps • Minimal upward spill As per spec approved by Limerick City and County Council Light fittings will be controlled by Photoelectric Control Units (PECU) and timed on a dawn – dusk timing – leading to optimum operation and minimised cost.	Lighting is has been designed to reduce impact on flora and fauna whilst providing for a safe environment for cyclists, moving vehicles and deterring anti-social behaviour.

Low Energy Technologies Considered

Measure	Description	Benefit
ECAR charging points	Ducting shall be provided from a local landlord distribution board to designated E-car charging car park spaces for the apartments. This will enable the management company the option to install E-car charging points within the car park to cater for the E-car demand of residents. This system will operate on a single charge point access card. A full re-charge can take from one to eight hours using a standard charge point.	Providing the option of E-car charging points will allow occupants to avail of ever-improving efficient electric car technologies.
Exhaust Air heat pump	For heating, ventilation, and hot water - an exhaust air heat pump system is under consideration for the apartments. Air is drawn through ducts to the heat pump from the bathrooms, utility and kitchen areas. The cold waste air is discharged to outside through another duct, and condensation to a drain. Additional heat generated internally from lighting, people and domestic appliances is also utilized through heat recovery from outgoing exhaust air.	Heat pumps operate with efficiencies >400%. Exhaust air heat pumps utilize extract air as the air source for the heat pump. This will re-cycle the heat from the dwelling's ventilation system. These machines are ideal for apartments and more compact air-tight low energy or passive homes.
Central extract/demand-controlled ventilation	Central extract demand-controlled ventilation will be considered to provide ventilation with low energy usage. Central extract ventilation operates at a constant low trickle speed that ramps up in response to an increase in humidity.	Central extract ventilation provides continuous ventilation with low energy usage. Demand control ventilation incorporates automated wall vents which open/close dependent on internal humidity conditions.

Air Source Heat Pump	As part of the overall energy strategy for houses, the use of Air Source Heat Pumps is proposed. These systems extract heat energy from the outside air and, using a refrigerant cycle, raise the temperature of the heat energy using a refrigerant vapor compression cycle.	Heat pumps are an efficient method of generating heat energy for buildings. Additionally, as the electricity is taken from the grid if the method of supply to the grid improves it should provide additional savings to the end user.

2.2 MATERIALS/MATERIAL SPECIFICATION.

Part D Building Regulations.

Materials proposed for the development will be "fit for the use for which they are intended and for the conditions in which they are to be used". In addition, all materials proposed will:

(a) carry a CE Marking in accordance with the provisions of the Construction Products Regulation.

(b) comply with an appropriate harmonised standard or European Technical Assessment in accordance with the provisions of the Construction Products Regulation; or

(c) comply with an appropriate Irish Standard or Irish Agrément Certificate or with an alternative national technical specification of any State which is a contracting party to the Agreement on the European Economic Area, which provides in use an equivalent level of safety and suitability.

The use of high-quality materials throughout the development (as per the standards referred to above) will ensure long term durability and minimise future maintenance and repair costs for perspective residents whilst also increasing the life cycle expectancy of the proposed development.

Also, in compliance with Part D and in the interests of ensuring the proper use of all such materials (as referred to above), all workmanship during the construction phase of the proposed development will comply with all relevant standards. All persons engaged during the construction process will be vetted to ensure that they are competent and possess the sufficient training and have the relevant levels of experience and knowledge appropriate to the nature of the work he or she is required to perform and having particular regard to the size and complexity of any such works.

Buildings

The practical implementation of the Design and Material principles has informed design of building facades, internal layouts and detailing of the proposed apartment buildings.

The proposed envelope of the apartment/duplex buildings is a mix of brick and durable render finishes, with high-performance double or triple-glazed aluminium / uPVC windows. The proposed Green Roofs to the apartments will be warm roof construction consisting of concrete base insulation with PVC covering and the houses and duplexes will have slate finished pitched roofs. These materials, proven in an Irish environment over many years, are considered durable and will not require regular replacement or maintenance.

The Apartment Buildings are designed in accordance with the Building Regulations, in particular Part D 'Materials and Workmanship', which includes all elements of the construction. The Design Principles and Specification are applied to both the apartment units and the common parts of the building and specific measures taken include;

Daylighting to apartments	Where possible (as outlined in '*Sustainable Urban Housing: Design Standards for New Apartments: Guidelines for Planning Authorities'*) a quantitative performance approach has been undertaken to daylight provisions outlined in guides such as the BRE guide '*Site Layout Planning for Daylight and Sunlight'* (2nd Edition) or *BS 8206-2:2008 – 'Lighting for Building – Part 2: Code of Practice for Daylighting'.* The Daylight, Sunlight and Overshadowing Study undertaken by Integrated Environmental Solutions Limited (IES), as per the BRE guidance, demonstrates that most apartments/duplex units will meet the required daylight criteria and mitigation proposed for those that don't. Reducing the requirement and expense of continuous artificial lighting.
Dual aspect apartments	A majority of the units within the proposed development are dual aspect – maximizing the availability of sunlight and cross ventilation and minimizing heating costs and the need for mechanical ventilation.
Floor to ceiling heights	Floor to ceiling height standards are provided in accordance with the 2018 Apartment Guidelines which again have the effect of maximizing the availability of sunlight and cross ventilation and reducing heating and ventilation costs.
Own door access	The duplex apartments have been designed so that all have their own door access at ground floor level reducing the need for internal common areas and the associated expense and running costs of same.
Safety and Security	All aspects of the proposed development have been designed to maximize passive surveillance to open space and communal areas minimizing costs associated with theft, vandalism and anti-social behavior.

2.3 LANDSCAPING

The proposed landscaping design has been informed by the existing site context and the requirement to ensure the maximum retention of trees on site. Additional trees and planting will be carefully chosen so that they complement the existing site context and develop into soft landscaping that will require less maintenance. The selection of paving and other landscape materials has been determined by proposed function, longevity and durability.

Particular consideration has been given to;

- Site planning – the proposed landscape design creates a unique user experience designed around a pedestrianized core. Variety in type and scale will cater for a number of different user groups and activities such as play, exercise, seating areas and areas for community gatherings.

- Soft landscaping – all proposed planting species have been chosen on the basis of their suitability to their location and with the consideration that they can be maintained and managed at reasonable cost. There will be a net gain for biodiversity with priority given to native species. The soft landscaping has been designed to create interest and help to connect residents, in both a physical and visual sense, to the natural environment around them. Promoting wellbeing and encouraging residents to engage with each other.

- Hard landscaping – the use of high quality and sustainable materials is intended to provide durability that will reduce the need for ongoing maintenance costs. Consideration has been given to ensure hard landscaping elements have been sensitively integrated with soft landscaping elements to reduce their impact as much as possible.

- Accessibility – car parking spaces and cycle and pedestrian accessibility has been designed to create a good balance between all users. Designated car parking including accessible and visitor car parking reduces the travel distances for visitors with reduced mobility.

- Routine Management Programme – the early establishment of a routine maintenance programme will control and protect the soft landscape elements and minimise the potential for damage to hard landscaping elements if tree and shrub growth is left unchecked.

2.4 WASTE MANAGEMENT

A waste management plan has been prepared that aims to provide a robust strategy for storing, handling, collecting, and transporting waste generated by the proposed development at both construction and operational stage. There is a strong emphasis on

maximising recycling, reuse and recovery of waste with avoidance of landfill wherever possible. The following measures demonstrate the intentions for the management of waste;

- Provision of several covered and locked bin storage areas located in proximity to each apartment/duplex block that will reduce the potential for littering of the development.
- A domestic waste management strategy will be implemented through the use of grey, brown and green bin distinction that will reduce the amount of waste going to landfill.

2.5 HEALTH AND WELL BEING

A number of design strategies have been employed to ensure maximum consideration is given to the health and well-being of future residents including;

- Accessibility - all residential units and common areas will comply with the requirements of Part M / K reducing the need for costly adaptation by individual residents.

- Natural light - consideration has been given to the design and orientation of all buildings to provide maximum levels of natural day light – maximising well-being and reducing reliance on costly artificial lighting.

- Amenity - priority has been given throughout the proposed development to the provision of both private and shared amenity spaces in the form of gardens, balconies and shared play and interaction spaces. Increased time spent outdoors promotes community interaction and benefits overall health and well being.

- Security - all public spaces are well overlooked and benefit from passive surveillance. This will give residents a heightened sense of security and reduce potential costs associated with crime or anti-social behaviour. Lighting of the site will also provide an added sense of security with the management team ensuring that all lights are maintained, and bulbs are changes whenever required.

2.6 TRANSPORT

The development site is located to the north-east of Athlone and is accessible via the N55/Ballymahon Road and Junction 9 on the N6. A bus top is located 350m to the southeast of the site on the Woodville Road which provides a service to Athlone. It is only 7 minutes by bus from this bus stop to Athlone. The existing N55/Ballymahon Road provides pedestrian and cyclist infrastructure leading towards Athlone town centre. There are existing cycle paths that link to the Greenway (the old Mullingar rail line) located on the southern side of the N6. Athlone is serviced by the Galway/Dublin Train. Athlone railway station is approximately 3km from the site entrance.

- Permeable connections – the development is within walking distance of a number of residential developments and is linked to the Woodville Road a public transport corridor with dedicated cycle lanes that will contribute to a reduction in reliance on motor vehicles for all journey types.

- Access to Services/Facilities – Proximity and ease of access to a range of nearby social, commercial, recreational and community amenities will reduce reliance on private motor vehicles for all journey types. Key nearby amenities include; supermarkets, pharmacy, post office, cinema and several retail, leisure and dining facilities.

- Bicycle storage – The provision of high-quality secure bicycle parking facilities, for both short and long term use, will accommodate the uptake of cycling and reduce the reliance on motor vehicles.

- EV Charging Points – It is proposed as part of the development to;
    - install 4 no. electric visitor vehicle charge points.
    - to duct all remaining car park spaces serving the apartments to allow for future connection for electric car charging.
    - to duct all grouped and dwelling spaces to allow for future connection for electric car charging.

2.7 MANAGEMENT

Consideration has been given to ensuring that each new homeowner has a clear understanding of their property. Once a purchaser completes their sale, they will be given a Homeowner Package that includes;

- A Homeowner Manual providing key information relating to their new property such as; MPRN and GRRN, information in relation to connections with utilities and communications providers, contact details for all relevant suppliers and user instructions for all appliances and devices in the property.

- A Residents Pack prepared by the OMC which will provide such things as; contact details for the Managing Agent, emergency contact information, clear instruction as to all relevant rules and regulations and information on transport links and key services in the area.

CONCLUSION

In conclusion, a management team will be appointed to ensure that the development is maintained. Best practice design strategies will be employed, and the building will be constructed with durable, high quality, robust materials that will enhance the visual aesthetic of the proposed development and reduce maintenance costs for the residents over time.