Energy Statement & Building Life Cycle Report

Dunlo Strategic Housing Development, Ballinasloe, Co. Galway

10th August 2022

Completed by

A-Tech Energy Engineering

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1.0 INTRODUCTION

This report prepared by A-Tech Energy Engineering is to form part of the planning submission documentation to An Bord Pleanala and aims to demonstrate how the design and construction of the proposed Strategic Housing Development at Dunlo, Ballinasloe, Co Galway will meet or exceed legislative requirements set out in 'Technical Guidance Document Part L - Conservation of Fuel and Energy 2021 - Dwellings'.

Provisional Building Energy Ratings (BER) have been prepared to demonstrate compliance to TGD Part L 2021 and NZEB using the Dwelling Energy Assessment Procedure (DEAP) version 4.2. The overall energy strategy of the proposed design incorporates an enhanced building fabric with strong emphasis on thermal bridging and reduction of air infiltration, installing renewable energy technologies such as heat pumps, and low energy ventilation methods. A target BER rating of A2 has been put in place for all new dwelling units.

This Report also includes a Building Lifecycle Assessment and will outline measures that have been considered to effectively manage and reduce costs for the benefit of all residents. This report will outline measures in relation to Property management, Building materials, Landscaping, Health & Well Being, Waste Management and Transport.

2.0 DEVELOPMENT DESCRIPTION

The proposed development consists of residential development (c. 15,820 m2 gross floor area), consisting of 165 No residential units and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works.

The development will consist of:

- Block A1 and A2, each consisting of 6 No Two-Bed Ground Floor apartments, 1 No One-Bed ground Floor apartment, 6 No Three-Bed First Floor Duplex Units, and 1 No Three-Bed Second Floor apartment.
- Blocks B1 to B3 and B6 to B13 inclusive, each consisting of 2 No Two-Bed Ground Floor Duplex Units, 2 No Three-Bed Ground Floor Duplex Units, 1 No Two-Bed Second Floor apartment, and 1 No One-Bed Second Floor apartment,
- Blocks B4 and B5 inclusive, each consisting of 1 No Two-Bed Ground Floor Duplex Unit, 2 No Three-Bed Ground Floor Duplex Units, 1 No Two-Bed Second Floor Apartment and 1 No One-Bed Second Floor apartment.
- House Type C : 32 No Two-Bed units in semi-detached pairs
- House Type E : 27 No Three-Bed units in triplet arrangements
- provision of 281 No. on-site car parking spaces incorporating 163 No. spaces for residents of the apartment/duplexes, and 118 No in-curtilage car parking spaces for the housing units
- Provision of all water, surface water, foul drainage, utility ducting and public lighting and all associated siteworks and ancillary services.
- All ancillary site development works including access roadways, footpaths, cycle ways, pedestrian links, Bicycle Sheds, waste storage areas, communal and open space, site landscaping, and boundary treatments.

Figure 1: Proposed Site Layout 01

Figure 2: Proposed Site Layout 02

3.0 ENERGY STATEMENT

3.1 Part L Requirements:

The requirements regarding the conservation of fuel and energy in dwellings and requirements to achieve Nearly Zero Energy Buildings (NZEB) performance as required by Article 4 (1) of the Directive are specified in the Technical Guidance Document Part L 2021 (TGD L) of the Building Regulations. The document states the requirements on minimum performance of the building fabric, minimum air permeability requirements, use of renewable energy sources, the maximum carbon dioxide emissions permitted, and the maximum primary energy usage permitted.

Part L was updated in 2019 to include the Energy Performance in Buildings Directive (EPBD) requirement for Nearly Zero Energy Buildings.

The definition for Nearly Zero Energy Buildings in the EPBD is:

"a very high energy performance, as determined in accordance with Annex 1. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby".

For new dwellings, NZEB is equivalent to a 25% improvement on the 2011 Building Regulations. It requires the following as calculated in DEAP:

- Maximum Permitted Energy Performance Coefficient (MPEPC) of 0.3
- Maximum Carbon Performance Coefficient (MPCPC) of 0.35
- Renewable Energy Ratio (RER) of 20%

3.2 2021 Updates to Building Regulations Part L:

The Energy Performance of Buildings Regulations 2021 (S.I. 393 of 2021) came into effect on 27th July 2021. The main provisions of these regulations are:

- Electric Vehicle (EV) Recharging Infrastructure for new buildings and buildings undergoing Major Renovation with more than 10 parking spaces.
- Building Automation and Control Systems (BACs) and EV Recharging Points (for buildings with more than 20 car parking spaces), for existing non-residential buildings by 2025.
- Self-regulating devices in new buildings, and in existing buildings when heat generators are replaced.

3.3 Dunlo SHD Part L Compliance

The proposed apartments, duplex and terrace/ semi-detached dwellings have been assessed using the Sustainable Energy Authority of Ireland's (SEAI) Dwelling Energy Assessment Procedure (DEAP) software version 4.2. This software is used in Ireland to demonstrate compliance with the main requirements of Part L of the Building Regulations. The proposed development at Dunlo, Ballinasloe will meet or exceed the minimum requirements of TGD Part L 2021 in respect to the minimum performance of the building fabric, air permeability, MPEPC, MPCPC and RER. The design will also demonstrate compliance with other items in order to satisfy Part L such as limiting thermal bridging, hot water conservation, low energy lighting, low energy ventilation systems, efficient space heating system and hot water controls, Insulation of Hot Water Storage Vessels, Pipes and Ducts, overheating analysis and provisions for subsequent installation of recharging points for electric vehicles.

3.3.1 Building Fabric

Before considering the type of heat source to heat a dwelling, the heat loss fabric of the dwelling must be carefully designed. Using the "Fabric First Approach" and designing a high-performance building envelope with a strong emphasis on heat retention, will significantly reduce energy consumption and C02 emissions, associated with any proposed heating system. Using high performance insulation/ windows & doors, improved air permeability and continuity of insulation are critical in reducing heat loss.

The proposed design with meet or exceed the maximum area weighted elemental U-Values as stated in Table 1 of TGD Part L 2021. Table 1 below outlines the proposed maximum average elemental U-Value for the Dunlo SHD (column 1). Column 2 in the table below provides the maximum permitted average elemental U-Value from TGD Part L 2021 for new dwellings.

Element	Proposed Dunlo SHD Target average area weighted elemental U-Values (W/m^{2}K)	Part L 2021 (NZEB) Backstop average area weighted elemental U-Values (W/m^{2}K)
Ground Floor/ Exposed Floor	0.15	0.18 *(0.15 for underfloor heating)*
External Walls	0.18	0.18
Pitched Roofs- Flat Ceilings	0.13	0.16
Flat Roofs	0.16	0.2
External Windows	1.2	1.4
External Doors	1.4	1.4

Table 1- External Fabric U-Values

Air Permeability

Air infiltration or air leakage can have a significant impact on energy usage in dwellings. In addition to fabric heat loss through all external elements, careful consideration will be given during the design and construction of all dwellings proposed in this development with respect to reducing unwanted air leakage. Reducing air infiltration and unnecessary heat loss also greatly reduces overall energy usage and C02 emissions, while also improving thermal comfort.

Figure 3: Air tight taping around window ope

The design and construction of each dwelling unit will incorporate approved air-tight sealants, tapes and membranes at all relevant junctions/ openings of the building fabric. The “Acceptable Construction Details 2021”, which are published the Department of Housing and Local Government, provide guidance in achieving low levels of air infiltration at all key junctions. These construction details will be used for this proposed development. An on-site inspection regime and related quality control procedures will also be implemented at construction stage so as to ensure that the design intention is achieved in practice.

Air permeability testing will also be carried out on the proposed development to ensure all dwelling comply with the minimum Part L requirements. The current Part L backstop value for air permeability testing is 5.0 $m^3/hr.m^2$. The proposed development design intent is to have an air permeability target of 3.0 $m^3/hr.m^2$ or less for all dwelling units. All air permeability tests will be carried out by a person certified by an independent third party, e.g. Irish National Accreditation Board (INAB), National Standards Authority of Ireland (NSAI) certified or equivalent.

Thermal Bridging

Thermal bridging typically occurs at the junctions between planar building elements, e.g. at wall/roof and wall/floor junctions, and around openings, e.g. at window jambs, where the continuity of the insulation is interrupted. Thermal bridging can have a large contribution to heat loss within a dwelling if not dealt with appropriately at design stage. As with the air permeability measures previously mentioned, the "Acceptable Construction Details 2021" will again be adopted to design and construction of all standard key junctions within each dwelling unit. For all bespoke junctions that are not covered by the "Acceptable Construction Details 2021", these junctions will be thermally modelled by an NSAI registered thermal modeller in order to calculate a non-default thermal bridging factor, known as the "y-factor" in DEAP. A y-value of 0.08 W/m^2K or less is proposed for all dwelling units, which will have a significant positive impact in reducing the overall EPC & CPC for each dwelling type.

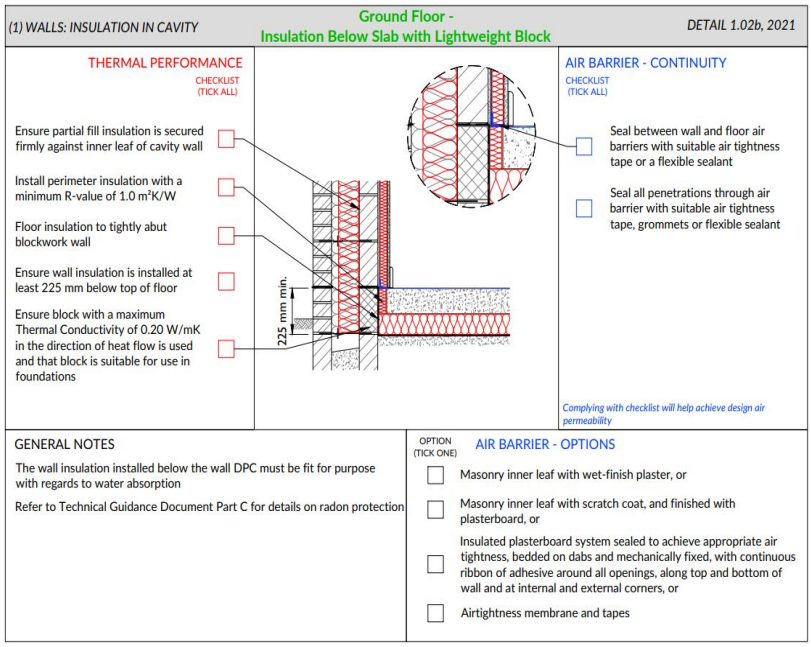

Figure 4: Typical "Acceptable Construction Detail for Ground Floor to Wall Junction

As with the air permeability measures, an on-site inspection regime and related quality control procedures will also be implemented at construction stage so as to ensure that the design intention is achieved in practice.

3.3.2 Building Services

Heat Pump Technology

Space heating and Hot Water to all proposed dwelling will be provided by a renewable energy source. All terrace/ semi-detached dwellings and duplex apartments will be heated by a high efficiency Air Source Heat Pump (ASHP). The space heating and hot water in all proposed apartments will be provided by high efficiency Exhaust Air Heat Pump (EAHP) technology.

An air to water heat pump system harnesses energy from free the external air. Electrical heat pumps use a compressor to draw heat from the external air to heat the dwelling. Heat is distributed through radiators and underfloor heating and they can also produce hot water.

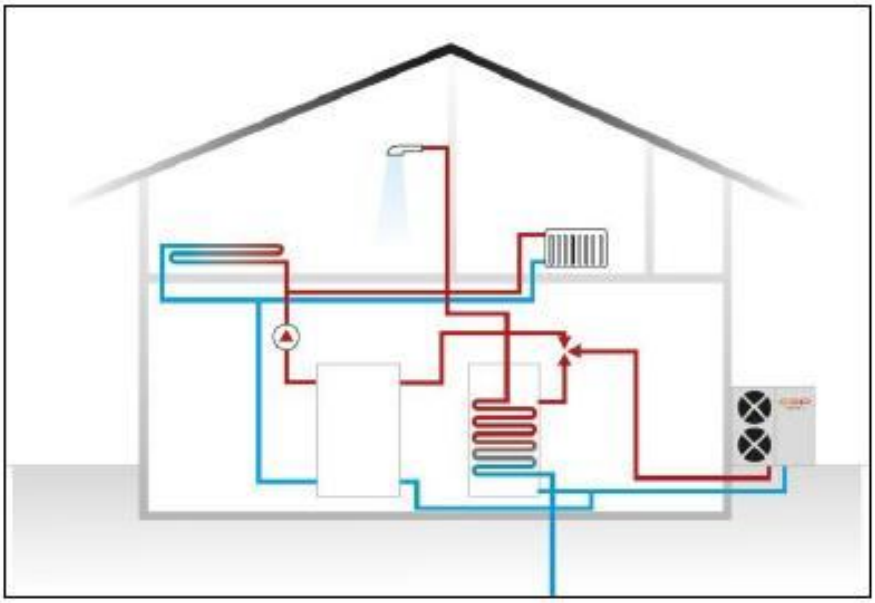

Figure 5 – Air to Water heat pump system

Exhaust-air to water heat pump systems are similar to air to water but include mechanical extract ventilation and recover heat from air drawn from the dwelling.

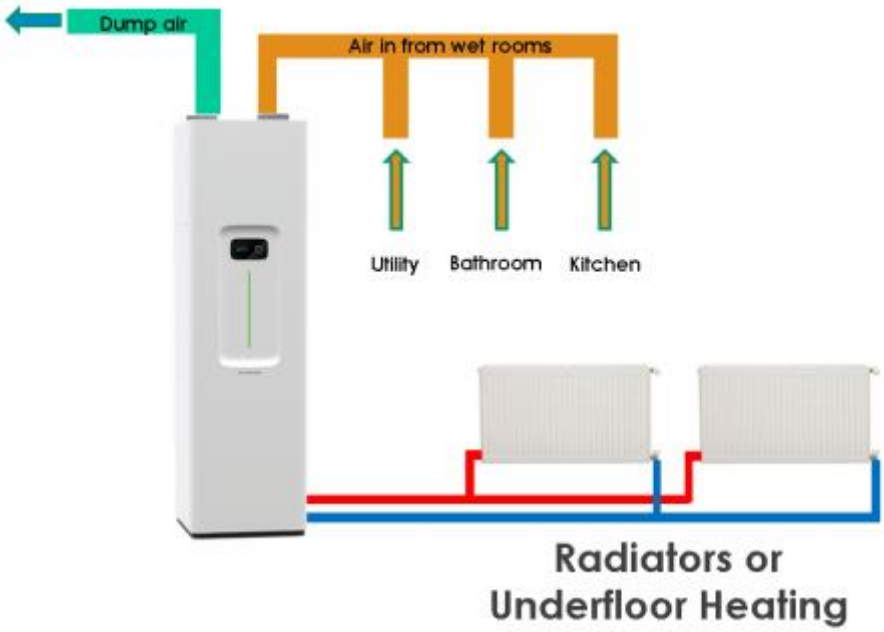

Figure 6 – Exhaust Air to Water heat pump system

Underfloor heating is proposed at ground floor level for all terrace/ semi-detached dwellings and duplex apartments, with high efficiency radiators at first floor level. Underfloor heating is also proposed in all Block B Apartments. For this particular development, the space heating efficiency for both air to water and exhaust air to water heat pump can reach 500% efficiency, and over 250% for domestic hot water generation.

The heating design will also incorporate a highly insulated hot water storage tank and all primary pipework from the heat source (in the case of the external heat pump) to the hot water storage will also be highly insulated, therefore reducing heat loss of the main hot water system.

All heating systems proposed will also satisfy the minimum renewable energy requirement as set out in TGD Part L 2021, with most dwelling units greatly exceeding the minimum RER of 0.2.

All pumps associated with the central heating system will be low energy or A-Rated with an EEI of 0.20 or less.

Space Heating & Domestic Hot Water Controls

The design intent to provide the following minimum level of control of both space heating and hot water generation:

- Full time and temperature zone control with digital programable (24hr/ 7 day time control) room thermostats in each zone.
- Weather or Load compensation
- Separate time and temperature control of Domestic hot water, allowing the heat pump to stop delivering heat to the indoor storage cylinder once the water temperature reaches the required temperature, therefore saving energy.

The dwelling owner will also be provided with sufficient information in relation to the heating and hot water system controls and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.

Insulation of Hot Water Storage Vessels, Pipes and Ducts

Adequate insulation of hot water storage vessels can be achieved by the use of a storage vessel with factory applied insulation of such characteristics that, when tested on a 120 litre cylinder complying with I.S. 161: 1975 using the method specified in Annex B of BS 1566-1:2002+A1:2011, standing heat losses are restricted to 0.8 W/litre. Use of a storage vessel with 50mm, factory applied coating of PU-foam having zero ozone depletion potential and a minimum density of 30kg/m3 satisfies this criterion when installed within the normally heated area of the dwelling. Water pipes and storage vessels in unheated areas will be insulated for the purpose of protecting against freezing. Pipes and ducts which are incorporated into wall, floor or roof construction will be insulated.

Hot Water Usage- Flow Restrictors

The Design proposal also includes for installing flow restrictors on all showers in all dwelling units. Restrictors can reduce flow rates to 6 Litre/ min which can have a significant impact on reducing domestic hot water energy demand, thus reducing the EPC & CPC for each dwelling.

Low Energy Ventilation

A Mechanical Extract Ventilation system (MEV) is proposed for all terrace/ semi-detached and duplex units, which will include a low energy extract fan drawing all from all wetrooms, while also introducing fresh air from outside via demand controlled wall vents. The Exhaust Air Heat Pump proposed for all apartments will also provide ventilation in the same manner. The Specific Fan power for the proposed MEV systems are very low, less than 0.3 W/l/s for the exhaust air heat pump system in the apartments and less than 0.2 W/l/s in all other dwellings. The ducting installed will comply with all BRE requirements as stated on their Product Characteristics Database (PCDB).

Low Energy Lighting

All proposed lighting within all dwellings units will be low energy CFL or LED lighting, resulting in low energy usage. A full lighting design calculation can also be entered into DEAP 4.2 which will yield better BER Rating results.

3.3.3 Overheating analysis

DEAP 4.2 Software gives an indication of the likelihood of high internal temperatures during hot weather in summer (whole house calculation).

An overheating analysis has been carried out on all dwelling types using DEAP 4.2. For most dwellings, the threshold internal temperature is below 20.5 ^{o}C, meaning there is little risk of overheating. For dwelling units with a threshold internal temperature of between 20.5 ^{o}C and 22 ^{o}C, there is a slight risk of overheating. These calculations are based on an Air change rate of 1 ACH in summer (windows slightly open with cross ventilation possible- two storey dwellings) and with Light Coloured Roller Blinds/ Curtains on all windows.

3.3.4 Electric Vehicle Recharging Infrastructure

Part L 2021 stipulates:

A building (containing one, or more than one, dwelling), which has more than 10 car parking spaces, that is:

(i) new; or

(ii) subject to subparagraph (g), undergoing major renovation,

shall have installed ducting infrastructure (consisting of conduits for electric cables) for each car parking space to enable the subsequent installation of recharging points for electric vehicles.

The above requirement will be met for this proposed development along with all other requirements set out on TGD Part L 2021 section 1.4.6.

3.3.5 Commissioning of Services

To ensure efficient operation of all systems with each dwelling, heat pumps and mechanical ventilation systems will be commissioned. This ensures that the sustainable energy-design can be fully realised, with less operational issues during the dwelling's lifetime. Commissioning of all systems will be carried out by the appropriate qualified personnel.

4.0 BUILDING LIFECYCLE ASSESSMENT

4.1 Property Management

The Sustainable Urban Housing Guidelines Development Act 2020 Section 6.14 outlines the legal requirements regarding the management of apartment developments. It is advised that when granting permission for such developments, planning authorities attach appropriate planning conditions that require:

• Compliance with the MUD Act

• Establishment of an Owners Management Company (OMC)

• Establishment and ongoing maintenance of a sinking fund commensurate with the facilities in a development that require ongoing maintenance and renewal

A property management company will be engaged at an early stage of the development to ensure that all property management functions are dealt with for the development and that the running and maintenance costs of the common areas of the development are kept within the

agreed Annual operational budget.

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

• Timely formation of an Owners Management Company (OMC) this will be a company limited by

guarantee having no share capital. All future purchasers of residential units will be

obliged to become members of this OMC

• Estate Management

• Accounting Services

• Corporate Services

• Insurance Management

• Third Party Contractors Procurement and management

• Preparation of annual service charge budget for the development common areas

• Transfer of documentation in line with Schedule 3 of the MUD Act

• After Hours Services

• Staff Administration

4.1.1 Service Charge Budget

One of the key responsibilities of the Property Management is to establish a service charge budget for the development for agreement with the Owners Management Company (OMC). The service charge budget covers items such as cleaning, landscaping, refuse management, utility bills, insurance, maintenance of mechanical / life safety systems, security, property management fee, etc. to the development's common areas in accordance with the MUD Act.

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 by 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 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 MUD Act.

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.

Note: the detail associated with each element heading, i.e. specification and estimate of the costs to maintain / repair or replace, can only be determined after detailed design and the procurement/ construction of the development and therefore has not been included in this document.

4.2 Measures to Manage and Reduce Costs for the Benefit of Residents

4.2.1 Energy and Carbon Emissions

Section 3 of this report outlines the proposed measures in relation reducing energy in individual dwelling units, which in turn results is low running costs for residents. The following is a summary of the energy measures that are planned for the houses,
duplexes & apartments in reducing both energy and carbon emissions and some additional measures in relation to the overall site which are not included in Section 3 of this report.

Measure	Description	Benefit
Building Energy Rating Certificates	A Building Energy Rating (BER) certificate will be supplied for each unit in the proposed development, which provides detail of the energy performance of the dwellings.	A-Rated Dwellings reduce energy consumption and running costs. Proposed Rating for each dwelling in this project is BER A2.
Fabric Energy Efficiency	As described in Section 3 of this report, the heat loss values (U-Values) for all external elements will meet or exceed the backstop values of TGD Part L, along with minimising thermal bridging and air infiltration.	Lower fabric heat loss will increase the heating system efficiency, thus reducing overall running costs for individual dwelling units.
Energy Labelled White Goods	The white-good package planned for provision in the apartments will be of a high standard and have a high energy efficiency rating. It is expected that the following appliance ratings will be provided: • Oven - A plus • Fridge Freezer - A plus • Dishwasher - AAA • Washer/Dryer - B	Higher Rated Appliances will reduce running costs, but also reduce carbon emissions by using less electricity.
External Lighting	The external lighting will be designed in accordance with the following: ▪ CIBSE Lighting Guide LG – 6 ▪ IS EN 12464-2 ▪ CIE Guide regarding Illumination levels and "Obtrusive Light" to neighbouring properties ▪ HSA Regulations for Electricity ▪ ETCI National Rules for Electrical Installations ET 10101 All lighting proposed will be LED with long unit life	The public lighting design for residential development is to provide adequate illuminance for vehicular and pedestrian access for residents and general public. The design of the public lighting includes low energy LED lighting throughout, which will assist in reducing the developments overall energy consumption.

4.2.2 Building Design

Houses and Duplex Units are designed in accordance with the Building Regulations, in particular Part D 'Materials and Workmanship', which includes all elements of the construction. The Design Specification is applied to both the dwelling units and the common parts of the building and specific measures taken include:

Measure	Benefit
Daylighting to stair cores & common areas. Adequate daylighting to all dwelling units. (Daylight Analysis has been carried out as part of the design process, using IES VE Software).	Avoids the requirement for continuous artificial lighting.
Natural/Passive ventilation system to common circulation areas	Avoids costly mechanical ventilation systems and associated maintenance and future replacement
Secure individual refuse storage areas at ground level	Avoids access lifts and any handling/moving equipment.
External paved and landscaped areas	These will require low / minimal maintenance

4.3 Materials

Measure	Benefit
Consideration is given to the requirements of the Building Regulations and includes reference to BS 7543:2015, 'Guide to Durability of Buildings and Building elements, Products and Components', which provides guidance on the durability, design life and predicted service life of buildings and their parts. All common parts of the proposed Apartment buildings and, the durability and performance of these are designed and specified in accordance with Figure 4; Phases of the Life Cycle of BS7543; 2015. The common parts are designed to incorporate the guidance, best practice principles and mitigations of Annexes of BS 7543: 2015	Ensures that the long-term durability and maintenance of Materials is an integral part of the Design and Specification of the proposed development.
The Design scheme proposes the extensive use of	These traditional materials will require minimal on-

robust materials of Blockwork and render to the building envelope, slate roof covering, uPVC Fascia & soffit, and stainless steel external handrails	going maintenance and have a longer life-cycle expectancy.
The design scheme also considers the use of Low-carbon concrete and low carbon blocks throughout the development.	Substantial reduction in Carbon emissions with the use of low carbon EcoCem cement for the manufacture of Low carbon concrete or Ground Granulated Blastfurnace Slag (GGBS) cement for the manufacture of concrete blocks.
Use of factory finished uPVC materials for windows and doors.	Requires no ongoing maintenance

4.4 Landscape

The Landscape design will include for robust materials in order to minimise maintenance of all landscaped areas within the development, along with tree planting and soft landscaping, which will ensure low running costs for residents.

Measure	Description	Benefit
Site Layout & Design	Significant tree planting and soft landscaping within courtyards and public spaces.Generous and high-quality landscape with ecological corridors designed within the proposed development. Pedestrians prioritized over cars. SUDs drainage system and landscape maintenance preferable Existing Hedgerows along boundaries to be retained	Provides for high levels of water absorption and natural attenuation on site to slow water discharge and minimise any risk of localised water pooling
Materials	Sustainable, robust materials, with high slip resistance to be used for paving and high quality decking matierals to be used. Durable and hardwearing equipment (e.g. benches, play equipment etc.) to be used throughout.	Robust materials and elements reduce the frequency of required repair and maintenance.
Planting	The use of native and strategically located non-native plants will provide optimum biodiversity and aesthetic values. This varied profile is designed to provide a diversity of landscape. . Planting proposals intended to complement the local setting	Correctly installed planting will develop into well established and robust soft landscape reducing future maintenance. Low-cost, availability, ease of establishment are some of the other benefits.

4.5 Waste Management

The following are measures that outline the intentions for waste management.

Measure	Description	Benefit
Storage of Non-Recyclable Waste and Recyclable Household Waste	Domestic waste management strategy: 1) Grey, Brown and Green bin distinction 2) Competitive tender for waste management collection	Helps reduce potential waste charges
Composting	Organic waste bins to be provided throughout	Helps reduce potential waste charges

4.6 Health & Wellbeing

The following are illustrations of how the health and well-being of future residents are considered.

Measure	Description	Benefit
Natural/Daylight	The design, separation distances and layout of the Duplex / Apartment blocks have been designed to optimise the ingress of natural daylight/sunlight to the proposed dwellings to provide good levels of natural light. Please also refer to the Daylight analysis Report submitted with this application which was carried out by Integrated Environmental Solutions Limited, which shows the design in respect to Daylight to all Duplex and Apartments are in compliance with BRE Guidelines.	Reduces reliance on artificial lighting thus reducing costs.
Accessibility	All units will comply with the requirements of Part M/K.	Reduces the level of adaptation, and associated costs, potentially necessitated by residents' future circumstances
Security	The scheme is designed to incorporate passive surveillance of all areas of the site	Help to reduce potential security/management costs
Fire Safety	The Operator will be responsible for the preparation of a	Ensures ongoing compliance with Part B

	comprehensive fire risk assessment and the maintenance and servicing of the fire alarm panel and communal sprinkler system in the development including plant in individual apartments.	
Natural Amenity	Large public areas of open space are evenly distributed throughout the site where they can be overlooked by surrounding residential units.	Proximity and use of parks promotes a healthy lifestyle

4.7 Transport

The following are illustrations of how the health and well-being of future residents are considered.

Measure	Description	Benefit
Access to Public Transport (Bus Services)	The site is approximately 1km from the nearest Bus Stop on Dunlo Street Ballinasloe – 10-15 minutes walking distance, with the Portiuncula Hospital bus stop, 1.5km from the proposed site and a 15-20minute walk, providing transportation to Galway City and Dublin.	The proximity, frequency and range of destinations served by these local bus services enhance the accessibility levels of the proposed residential development in addition to providing a viable and practical sustainable alternative to journeys undertaken by the private motor car.
Permeable Connections	Provision and subsequent maintenance of dedicated pedestrian and cycle infrastructure on-site and their connectivity with adjoining third party lands and the off-site networks.	Ensure the long-term attractiveness of walking and cycling to a local educational facility (proposed creche) and high quality public open spaces.
Bicycle Storage	The provision of high quality secure bicycle parking facilities, for both short term and long-term parking requirements.	Accommodates the uptake of cycling and reduces the reliance on the private motor vehicle.
E-car Facilities	Ducting will be provided from a local landlord distribution board to designated E-car charging car park spaces.	To accommodate the growing demand for Ecar which assist in decarbonising society and reducing oil dependency.

5.0 Conclusion

This report concludes that the proposed development will comply with Part l 2021 (NZEB) if all aspects of the design highlighted in the report are implemented.

The strategies that will be adopted include:

- Proposed U-Values for Flat Ceilings, flat roofs and Ground Floors will exceed Part L backstop values
- Proposed U-Values for Windows will exceed Part L backstop values
- Air permeability target of 3.0 $m^3/h.m^2$ or less
- Considerable consideration to reducing thermal bridging and advanced thermal modelling
- High performance heat pump systems, contributing to high RER figures
- Efficient space heating and hot water controls
- Hot water storage vessels and pipework highly insulated
- Hot water conservation in the form of flow restrictors
- Low energy demand controlled Mechanical ventilation system
- Low Energy Lighting
- Provision for Electric vehicle car charging

The Building Lifecycle section of the report also concludes that the proposed design will also satisfy requirements in relation to property management and consideration has been made in relation to the reduction of running costs of the development, which includes low energy building design and services, high quality materials, effective waste management, strategic landscaping and accessibility to public transport, including the promotion of cycling and use of electric vehicles.

Appendix A – Proposed BER Specification

Proposed BER Specification: Terrace/ Semi Detached & Duplex Dwellings

Element	Proposed Dunlo SHD Design Target values
Ground Floor/ Exposed Floor	0.15
External Walls	0.18
Pitched Roofs- Flat Ceilings	0.13
External Windows	1.2
External Doors	1.4
Air Permeability test result	3.0 $m^3/hr.m^2$ or less
Thermal Bridging Y-Factor	0.08 or less
Proposed Space heating system	Air to water Samsung Gen 6 AE050RXYDEG EU Heat Pump
Space heating controls	Full Time & Temperature Zone control
Weather compensation	Yes
Heat emitter	Underfloor heating/ Radiators
Max Design Flow temperature	42.5 ^{o}C for underfloor + Radiators (24hr daily operation)
Central Heating Pump	Wilo Central Heating Pumps: EEI 0.2 or less
Secondary heating system	None
Chimneys/ Flues	None
Hot Water Storage	Kodiak 189L Pre-plumbed cylinder
Domestic Hot Water controls	Separate time and temperature control of DHW
Standing heat loss of hot water storage	1.87 Kwh/day
DHW system losses	All Primary pipework from heat pump to hot water storage to be fully insulated
Hot Water conservation	Flow restrictors on all Showers (6L/ min)
Ventilation	MEV Vent Axia Sentinel Multivent H 445655B (SFP as per PCDB Database)
Ventilation ducting	100% of all ducting to be Lindab LFPE 63/75 as per PCDB Database
Specific Fan Power	0.16-0.17 W/l/s
Lighting	100% low energy lighting

Proposed BER Specification: Apartments Block A & B

Element	Proposed Dunlo SHD Design Target values
Ground Floor/ Exposed Floor	0.15
External Walls	0.18
Pitched Roofs- Flat Ceilings	0.13
Flat Roofs	0.16
External Windows	1.2
External Doors	1.4
Air Permeability test result	3.0 $m^3/hr.m^2$ or less
Thermal Bridging Y-Factor	0.08 or less
Proposed Space heating system	Exhaust Air to water Samsung Victorum 62010200 Heat Pump
Space heating controls	Full Time & Temperature Zone control
Weather compensation	Yes
Heat emitter	Underfloor heating only
Max Design Flow temperature	35 ^{o}C for underfloor only (24hr daily operation)
Central Heating Pump	Wilo Central Heating Pumps: EEI 0.2 or less
Secondary heating system	None
Chimneys/ Flues	None
Hot Water Storage	Samsung Victorum 62010200 integrated Hot Water Storage
Domestic Hot Water controls	Separate time and temperature control of DHW
Standing heat loss of hot water storage	2.06 Kwh/day
Hot Water conservation	Flow restrictors on all Showers (6L/ min)
Ventilation	Samsung Victorum 62010200 Exhaust Air MEV
Exhaust Flow Rate	155 m3/hr
Specific Fan Power	0.26 W/l/s
Lighting	100% low energy lighting

Appendix B – Provisional BER Ratings Summary

Unit Type	Proposed BER Rating	Compliant with Part L MPEPC	Compliant with Part L MPCPC	Compliant with Part L min. RER
Block A Duplex	A2	YES	YES	YES
Block A Apartments	A2	YES	YES	YES
Block B Duplex	A2	YES	YES	YES
Block B Apartments	A2	YES	YES	YES
House Type C	A2	YES	YES	YES
House Type E	A2	YES	YES	YES

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