DOUGLAS WALLACE

ENERGY STATEMENT

Proposed Development

at

Cairns Road, Sligo

for

Novot Holdings Limited

TABLE OF CONTENTS:

i INTRODUCTION

This Energy Statement has been prepared for Novot Holdings Limited as part of the planning submission documentation to Sligo County Council for the proposed residential development at Cairns Road, Sligo.

This report aims to set out the overall principles of the energy strategy of the proposed development and how this has been approached in a holistic manner, striving to meet the highest standards of sustainable building design such as passive solar design, high efficiency systems and use of renewable energy technologies.

This report also addresses how the proposed development will comply with Nearly Zero Energy Building (NZEB) requirements of Part L 2021 Dwellings. The principles underpinning Part L compliance are energy demand reduction through passive measures and creased supply from renewable and efficient sources. The proposed design will follow this principle.

All of the houses, duplexes and apartments will be subject to the NZEB requirements of the 2021 Part L Regulations. In terms of energy ratings, all of the units on site will have a BER rating A2/ A3. With the fabric performance of the materials to be used in construction there are no more energy reductions gains to be achieved.

The majority of the thermal energy used within the residential units will be for the generation of HWS for sanitary purposes and a number of solutions are being considered. The benefit of each system is outlined later in this report.

The measure of compliance with Part L of the Regulations are demonstrated using the DEAP software. A revised version of the DEAP 4 software has now been issued by the Sustainable Energy Authority of Ireland (SEAI) and this will formally allow assessors to confirm the NZEB standard has been achieved. Carbon generation and energy consumption figures for all new dwellings have been revised downwards with the net result that these houses, duplexes and apartments will have to use 30% of the energy that the equivalent unit, built to the prevailing 2005 standard would have used. The renewables contribution in each house is now a percentage, 20%, of the overall energy density that the dwelling requires. This is rather than the flat rate of 10 kWh/m2 per year but based on the simulations run to date in the industry this appears to be working out to the same level.

The primary aim of Part L 2021 is to further reduce the energy used in homes. After transport the residential sector is the biggest energy sector in the country. In 1990 domestic units accounted for 31% of the energy demand in the country but by 2016 this had dropped to 23% and over the next 10 years between new builds and deep retrofits this figure could drop by the same again.

ii PROPOSED DEVELOPMENT

This report relates to the proposed development at Cairns Road in the south-eastern part of Sligo Town, Co. Sligo. The overall development will comprise the construction of a scheme comprising 74 No. residential units, comprising 50No. houses and 24No. apartments and duplex units.

The development description for this planning application is:

Novot Holdings Ltd., intend to apply for permission for development on a site which extends to c. 2.1ha on lands located on the Cairns Road, Sligo, Co. Sligo.

The development will consist of:
1) Construction of 74 no. residential units comprising:

- ***5 no. 1-bed own-door apartments,***
- ***19 no. 2-bed own-door apartments,***
- ***8 no. 3-bed terrace houses,***
- ***14 no. 3-bed semi-detached houses,***
- ***2 no. 4-bed terrace houses,***
- ***26 no. 4-bed semi-detached houses.***

2) Provision of all associated surface water and foul drainage services and connections with all associated site works and ancillary services.

3) Pedestrian, cycle, and vehicular access/egress with Cairns Road, and pedestrian and cycle access/egress with the adjoining Ardcairn residential estate.

4) Provision of public open space, communal open space, private open space, site landscaping, public lighting, refuse storage, resident and visitor car parking including electric vehicle charging points, bicycle parking, boundary treatments, and all associated site development works.

5) Demolition of existing bungalow dwellinghouse and outbuildings located to the north-east of the development site.

6) This application is accompanied with a Natura Impact Statement (NIS).

SECTION 1:

LEGISLATIVE/ PLANNING REQUIREMENTS

1.1 Technical Guidance Document Part L 2021 – Conservation of Fuel and Energy – Dwellings

Technical Guidance Document Part L 2021 – Conservation of Fuel and Energy – Dwellings stipulates requirements on minimum fabric and air permeability requirements, maximum primary energy use and carbon dioxide (CO_2) emissions as calculated using the DEAP (Domestic Energy Assessment Procedure) methodology. This is a national standard and compliance is compulsory for all new dwellings.

Three design aspects demonstrate compliance as follows:

1. The limitation of primary energy use and CO_2 emissions
2. Building fabric
3. The use of renewable energy sources

1.2 Limitation of Primary Energy Use and CO_2 Emissions

In order to demonstrate that an acceptable primary energy consumption rate has been achieved, the calculated Energy Performance Coefficient (EPC) will be no greater than the Maximum Energy Performance Coefficient (MEPC). The MPEPC is 0.30.

To demonstrate that an acceptable CO_2 emission rate has been achieved, the calculated Carbon Performance Coefficient (CPC) of the dwellings being assessed will be no greater than the Maximum Carbon Performance Coefficient (MPCPC). The MPCPC is 0.35.

1.3 Building Fabric

In order to limit the heat loss through the building fabric the thermal insulation for each of the plane elements of a new dwelling must meet or better the area weighted average elemental U-Values (Um) as specified by Part L, listed in Table 1.

Table 1: Fabric U Values Part L 2021

Table 1 Maximum elemental U-value (W/m2K)[1, 2]

Column 1 Fabric Elements	**Column 2 Area-weighted Average Elemental U-value (Um)**	**Column 3 Average Elemental U-value – individual element or section of element**
Roofs	0.16	0.3
Pitched roof	0.16	
- Insulation at ceiling	0.20	
- Insulation on slope		
Flat roof		
Walls	0.18	0.6
Ground floors[3]	0.18	0.6
Other exposed floors	0.18	0.6
External doors, windows and rooflights	1.4[4,5]	3.0

Notes:
1. The U-value includes the effect of unheated voids or other spaces.
2. For alternative method of showing compliance see paragraph 1.3.2.3.
3. For insulation of ground floors and exposed floors incorporating underfloor heating, see paragraph 1.3.2.2.
4. Windows, doors and rooflights should have a maximum U-value of 1.4 W/m2K.
5 The NSAI Window Energy Performance Scheme (WEPS) provides a rating for windows combining heat loss and solar transmittance. The solar transmittance value g perp measures

1.4 Use of Renewable Energy Sources

Since 2008 and the introduction of the European Performance of Building Directive it has been mandated that each dwelling unit must generate a portion of their energy demand. From that time to this the proportion of energy to be delivered has been at a fixed rated of 10 kWh/m2 per year. For the standard of build and resulting energy rating this equated to about 10 to 15% of the DEAP assessed energy demand of the house. In 2022 this fixed deliverable now represents over 20% of the energy needed in a dwelling. With this in mind the new NZEB Regulations issued are calling up a percentage of the primary energy used in a dwelling and this will reward the better built houses.

In reality designers and builders will still need to over supply the renewable energy contribution in order to meet the Energy Performance Criteria of 0.3 as compliance hinges around either the ability to generate hot water (for sanitary purposes) using a heat pump with a related COP of over 230% or providing sufficient photovoltaic capacity to lower the imported energy into the unit.

A summary of the various renewable solutions available is:

- Solar Thermal
- Solar Photovoltaic (PV)
- Wind power
- Biomass
- Combined Heat and Power
- Heat pumps

In order to comply with NZEB, dwellings must conduct a comparative analysis for specified renewable technologies to demonstrate compliance with Regulation L3 (b).

Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy sources to total primary energy as defined and calculated in DEAP. The following represents a very significant level of energy provision from renewable energy technologies in order to satisfy Regulation L3 (b).

Where the MPEPC of 0.3 and MPCPC of 0.35 are achieved, a RER of 0.20 represents a very significant level of energy provision from renewable energy technologies

1.5 Nearly Zero Energy Buildings (NZEB)

The European Energy Performance of Buildings Directive Recast (EPBD) requires all new buildings to be Nearly Zero - Energy Buildings (NZEB) by 31st March 2020. This means that any building completed after these dates must achieve the standard irrespective of when they were started. This is quite different to the transitional arrangements for previous building regulations revisions.

'Nearly Zero - Energy Buildings' means a building that has a very high energy performance, Annex 1 of the Directive and in which "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"

Each member Government has discretion in how the standard is applied nationally. To comply with the NZEB requirement, the Irish Government has published Part L – Dwellings 2021 which includes the following paragraphs at Section 0.7 of the Technical Guidance Document:

'0.7.1 In order to achieve the acceptable primary energy consumption rate for a nearly zero energy dwelling, the calculated energy performance coefficient (EPC) of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC for a nearly zero energy dwelling is 0.30.

0.7.2 To demonstrate that an acceptable CO2 emission rate has been achieved for a nearly zero energy dwelling, the calculated carbon performance coefficient (CPC) of the dwelling being assessed should be no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC for a nearly zero energy dwelling is 0.35.'

SECTION 2:

PART L COMPLIANCE

The proposed development will meet or exceed where feasible the requirements of Part L. The proposed Houses and Apartments will be assessed using the Sustainable Energy Authority of Ireland (SEAI) DEAP 4) software which demonstrates Part L compliance.

2.1 Building Fabric

In order to limit the heat loss through the building fabric of the proposed apartments the thermal insulation for each of the plane elements of the development will meet or exceed the area weighted average elemental U-Values (Um) as specified by Part L. Table 1 lists the Part L area weighted average elemental U-Values and the targeted U-Values of the proposed design.

The building fabric elements that will be used in the construction of the houses and apartments will achieve the following performance:

• Walls 0.18W/m^{2}K
• Roof 0.16 W/ m^{2}K
• Windows 1.4 W/m^{2}K
• Floors 0.16 W/m^{2}K

2.2 Thermal Bridging

To avoid excessive heat losses and local condensation problems, consideration will be given to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations.

Acceptable Construction Details will be adopted for all key junctions where appropriate (i.e. typical/standard junctions).

Heat loss associated with thermal bridges is taken into account in the DEAP methodology and can heavily impact the calculated energy use and CO2 emissions. In general this is done by including an allowance for additional heat loss due to thermal bridging, expressed as a multiplier (Ψ, psi) applied to the total exposed surface area or by the calculation of the transmission heat loss coefficient HTB. A default Ψ value of 0.8, based in the use of Acceptable Construction Details, will be applied as per the DEAP value attributed to Acceptable Construction Details.

2.3 Building Envelope Air Permeability

In addition to fabric heat loss/gain, considerable care will be taken during the design and construction to limit the air permeability (Infiltration). High levels of infiltration can contribute to uncontrolled ventilation.

Part L requires an air permeability level no greater than 5m^3/m^2/hr @ 50Pa for a new dwellings; which represents a reasonable upper limit of air tightness. The design intent for the proposed apartments and houses will be to target an air permeability of 3m^3/m^2/hr @ 50Pa. With the proposed ventilation arrangements in each unit the gains in thermal performance become quiet marginal below this level. In a similar vein the Acceptable Construction Details will achieve a minimal thermal bridging factor of 0.08. The net impact of these combined criteria is that the heat losses associated with the house and apartments will likely be below 25% of the total thermal demand.

Air permeability testing will be carried out by a person certified by an independent third party (National Standards Authority of Ireland or equivalent certification body) in accordance with I.S. EN 13829: 2000 “Thermal performance of buildings: determination of air permeability of buildings: fan pressurisation method”. All houses and apartments will be tested in this way.

2.4 Windows & Doors

When assessing the energy efficiency of a window or door the frame has a bigger impact on the U value than the glass, effectively it is the weakest link in the thermal performance of the overall assembly. PVC framing material performs better than aluminium, having improved insulation qualities. At the point of manufacture the embodied energy of uPVC is 80 MJ/kg whereas the equivalent aluminium figure is 170 MJ/kg, a reduction of over 50%.

Both aluminium and u PVC windows have similar U values but on a like for like basis uPVC is better, this is related to the previous point about energy efficiency performance. A typical uPVC window will have a U value of 1.2 W/mK and its aluminium equivalent will be 1.33 W/mK. Another consideration is the impact of the window system on the overall building is sound. uPVC frames have a better noise attenuation property than aluminium. While there is no pronounced local variable at play in this development such as an airport or busy road, the party walls in the dwellings need to comply with acoustic criteria in Part E of the Building Regulations and it makes sense that the windows should contribute to the quiet ambience within. uPVC frames will facilitate less sound transfer into the apartment than the equivalent aluminium frame.

The lifespan of both aluminium and PVC is similar at circa 35 years. Aluminium frames depend on their paint cover, minimum of 70 microns, for protection whereas the PVC frame material is designed to be exposed and does not require an outer protective layer.

There is an initial cost differential between aluminium and PVC windows. The aluminium units are more costly but this is compounded over the lifetime of the units. It is important, especially this close to the coast, that the paint on the aluminium frames is kept intact and the colour as initially selected. Realistically the frames will have to be painted every 10 years. This maintenance cost is not associated with the PVC frames. PVC is genuinely maintenance free and the colour of the frames is ingrained through the material.

2.5 Passive Solar

The scheme at Cairns Road has good exposure to daylight and this feeds in to the setting out and extent of the windows to be provided. There are a number of confliction aspects to daylight that needs to be balanced by the architect. Adequate daylight needs to penetrate the apartments and hosues to support the wellness of the environment and this needs to be balanced against the U values impact of the openings. At the same time there is a growing awareness of the level of solar gain that windows allow into the space and while solar gain is welcome in reducing the energy needed for space heating, during the summer can lead to prolong period of overheating internally. The quality and performance of the glass will be looked at the optimise its performance against these different variables.

2.6 Building Services

2.6.1 Heating Appliance Efficiency

Regulation L3 (d) requires that space heating and water heating systems in dwellings are energy efficient, with efficient heat sources and effective controls. More specifically, Regulation L3 (e) provides that oil and gas fired boilers must achieve a minimum seasonal efficiency of 90%.

The proposed design for the houses and apartments are to generate heat for space heating and domestic hot water (DHW) by using a heat pump technology for each unit/ The design for houses and apartments intends to generate heat for space heating and domestic hot water (DHW) by using a central heating system.

In relation to apartments and houses, heating will be provided to the space by appropriately sized radiators or low temperature radiators which operate at lower flow and return temperature.

2.6.2 Space Heating and Hot Water Supply System Control

Demand associated with space heating is now a minor aspect of energy demand, especially in apartments. In order to effectively and accurately manage these losses while still maintaining comfort conditions it is necessary to have accurate and fast acting heating controls. The controls will be at a level to get the highest DEAP rating (time and temperature control) and we expect with the systems to be used on site that this will be achieved on a room by room basis.

Space and water heating systems should be effectively controlled so as to ensure the efficient use of energy by limiting the provision of heat to that required to satisfy the user requirements.

The design intent is to provide the following minimum level of control:

▪ Automatic control of space heating on the basis of room temperature
▪ Automatic control of heat input to stored hot water on the basis of stored water temperature
▪ Separate and independent automatic time control of space heating and hot water
▪ Shut down of boiler or other heat source when there is no demand for either space or water heating from that source

It is proposed to use a control system with full time and temperature control in each occupied room

2.6.3 Insulation of Hot Water Storage Vessels, Pipes and Ducts

All hot water storage vessels, pipes and ducts (where applicable) will be insulated to prevent heat loss. Adequate insulation of hot water storage vessels will be achieved by the use of a storage vessel with factory applied insulation tested to BS 1566, part 1:2002 Appendix B. Water pipes and storage vessels in unheated areas will be insulated for the purpose of protecting against freezing. Technical Guidance Document G and Risk report BR 262, Thermal insulation avoiding risks, published by the BRE is to be followed.

2.6.4 Low Flow Sanitary Ware

Low flow sanitary ware installation are to be utilised including water efficient showers, taps, wash hand basins and baths. The installation of flow restrictors is recommended.

Good practice would include:

▪ Shower – 6 litres/min

▪ Bath Volumes – Can vary but 175-130 L would be usual. 150L would be a recommended design target.

2.6.5 Lighting Design

A focus on lighting design is an important aspect of the DEAP4 software with a preference for appropriate LED lighting design for the dwellings. This is one of the more accessible routes to gaining NZEB compliance. An LED light source will last at least twice as long as a low energy bulb and use about half of the energy. Another advantage of the LED bulbs is that their low energy demand correlates with less heat rejected to the space and adding to the potential of overheating.

2.6.6 User Information

After the completion of the proposed Development the end user(s) will be provided with sufficient information about the building, its installed services and their maintenance requirements so that the Apartments can be operated in line with their optimum operation for energy efficiency.

2.7 Proposed Renewable Energy Systems under consideration

TECHNOLOGY/ SYSTEM	FEASIBILITY ASSESSMENT (HIGH/ MEDIUM/ LOW)	ASSESSMENT COMMENTS:
Micro Wind	Low	**<u>Technology Description:</u>** Micro wind turbines can be fitted to the roof of a building but would contribute a negligible amount of energy to the development. **<u>Applicability to this Development:</u>** Due to the suburban nature of the development site, this renewable has not been deemed viable. Vertical axis wind turbines may be more suited to these buildings, but there would still be the obvious aesthetic and potential noise issues.
Wind Power	Low	**<u>Technology Description:</u>** Mast-mounted wind turbines can be located in an open area away from obstructions such as buildings and tall trees. **<u>Applicability to this Development:</u>** Due to the suburban location of the site and its location close to other residential buildings it is deemed that a large wind turbine installation is not feasible.
Solar Photovoltaic (roof-mounted)	Medium	**<u>Technology Description:</u>** Photovoltaic (PV) Cell technology involves the conversion of the sun's energy into electricity. PV panels can be discrete roof-mounted units or embedded in conventional windows, skylights, atrium glazing, façade cladding etc. **<u>Applicability to this Development:</u>** Residential developments can be suitable locations for the installation of PV depending on orientation roof pitch and over-shading while also being virtually maintenance free. PV could be included for this development and assessed further at detailed design.
Solar hot water systems	Low	**<u>Technology Description</u>:** Active solar hot water technology uses the sun's thermal radiation energy to heat fluid through a collector in an active process. **<u>Applicability to this Development:</u>** Due to the maintenance factor surrounding solar panels a solar hot water system is not considered feasible at this site.
Biomass Heating	Low	**<u>Technology Description:</u>** Biomass boilers work on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water loads. **<u>Applicability to this Development:</u>** This technology requires substantial space allowance in a boiler room, access for delivery trucks, a thermal accumulator tank and considerable space for fuel storage of wood chips or pellets. The system also requires regular maintenance to remove ash etc. The use of biomass calls for a continuous local supply of suitable fuel to be truly sustainable. Concerns exist over the level of NOx and particulate emissions from biomass boiler installations, particularly in urban areas.
Ground source heat pump (GSHP)	Low	**<u>Technology Description:</u>** GSHP technologies exploit seasonal temperature differences between ground and air temperatures to provide heating in the winter and cooling in the summer. GSHP systems use some electricity to run the heat pump, but as most of the energy is taken

		from the ground, they produce less greenhouse gas than conventional heating systems. Ground source heat systems deliver low temperature heat and high temperature cooling, suitable for underfloor heating or chilled beams. **Applicability to this Development:** Site restrictions would require the use of vertical boreholes as opposed to horizontal ground loops. GSHP technology would need further investigation during detailed design and will depend on a favourable ground Thermal Response Test. Additionally capital costs are high and ideally, there should be a good balance between heating and cooling loads to allow for high COPs and reasonable capital payback. While a well-designed GSHP system operating under favourable conditions can achieve good efficiencies, the capital cost difference may still outweigh potential energy savings. As there is no cooling load, this investment is not deemed viable
Air source heat pump (ASHP)	High	**Technology Description:** ASHP technologies exploit seasonal temperature differences between external air and refrigerant temperatures to provide heating in the winter and cooling in the summer. ASHP systems use more electricity to run the heat pump when compared to GSHP, but as most of the energy is taken from the air, they produce less greenhouse gas than conventional heating systems over the heating season. Their COP can reduce to below 2.0 when outside air temperatures are ≤0℃ and they can require additional energy for a de frost cycle. **Applicability to this Development:** Heat pumps are generally safer than the combustible based heating systems and have a relatively low carbon footprint. Heat pumps can deliver heat at low outside temperatures which can be considered suited to the Irish climate. For this reason ASHP has been deemed suitable for the proposed development for the provision of space heating and/or DHW demand. ASHPs are under active consideration for the development, particularly for the dwelling house units.
Exhaust Air source heat pump (EAHP)	High	**Technology Description:** The exhaust air heat pump uses otherwise wasted heat in the warm air areas of your home (bathrooms, kitchen, utility.) and transfers that heat to hot water using the same principles as air source and ground source heat pumps. An Exhaust Air Heat Pump (EAHP) extracts heat from the exhaust air and transfers the heat to domestic hot water and/or hydronic heating system (underfloor heating, radiators).This type of heat pump requires a certain air exchange rate to maintain its output power. Since the inside air is approximately 20-22 degrees Celsius all year round, the maximum output power of the heat pump is not varying with the seasons and outdoor temperature **Applicability to this Development:** Exhaust Air Heat Pumps are best suited to apartments which will have low fabric heat losses. The latest units with inverter controlled compressor also have a ducted outside air supply which means the unit can draw on outside air when extract rates are low but without the need for an external condenser unit. EAHPs are under active consideration for the development, particularly for the apartment and duplex units

Combined Heat and Power (CHP)	Low	**<u>Technology Description:</u>** Combined heat and power (CHP), also known as co-generation, is the simultaneous generation of both useable heat and electrical power from the same source. A CHP unit comprises of an engine (referred to as the prime mover) in which fuel is combusted. The mechanical power produced by the engine is used to generate electricity using an integral electrical generator. The heat emitted from the engine (waste heat) is used to provide space heating and domestic hot water **<u>Applicability to this Development:</u>** CHP systems can be used in applications where there is a significant year-round demand for heating in addition to the electricity generated. CHP has been not been deemed suitable for this suburban development containing a number of separate house and apartment/ duplex blocks

SECTION 3:

PASSIVE DESIGN

A focus for this project is to operate the dwellings with low energy consumption. The building will be designed to minimise/ avoid the requirements for mechanical ventilation and/or air conditioning. This will be done with the use of passive systems to control the internal environment, where possible.

This will be further developed with the client and design team as the scheme develops. The passive systems will aim to reduce external noise and pollution, reduce heat loss (in winter), reduce solar gains (in summer), and maximum daylight while maintaining comfort conditions.

3.1 Natural Ventilation

Natural ventilation will be incorporated wherever possible via either single sided or cross ventilation. Where natural ventilation cannot provide the comfort and air quality needs of the occupants or the space and mechanical ventilation cannot be avoided, these systems will incorporate energy efficient solutions to maximise the efficiency of the systems through the use of heat recovery and the efficient controls. This will be fully assessed during detailed design in accordance with procedures in CIBSE TM59 – 'Design methodology for the assessment of overheating risk in homes'.

For dwellings that incorporate mechanical solutions as in Section 4.2 below, it should be noted that these systems will not be sufficient to prevent summertime overheating alone. CIBSE TM59 states that 'homes that are predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method'.

3.2 Humidity controlled background ventilation inlets

The proposed system under consideration for the apartment and houses is humidity-controlled ventilation inlets that generally supply fresh air from the external environment to internal rooms when required while preventing excess air leakage when humidity is at an acceptable level.

This technology will provide background building ventilation and prevent excessive humidity to maintain a good air quality. For WCs and kitchens rapid mechanical ventilation is proposed to be utilised to removed odours to maintain indoor air quality.

3.3 Passive Solar

Daylight in buildings creates a positive environment by providing connectivity with the outside world and assisting in the wellbeing of the building inhabitants. Daylight also represents an energy source; it reduces the need for artificial lighting, particularly in dwellings where natural light alone is often sufficient throughout the day. The design intent is to maximise the use of natural daylight to enhance visual comfort and not compromise thermal performance. The proposed development will have glazing specified that will minimise thermal conduction (u-value) while allowing for sufficient daylight levels and the maximisation of solar gain. Maximising solar gain within the limitations of thermal comfort will allow for a portion of the space heating load to be met passively during the day.

3.4 Water Conservation

During the detailed design stage for the proposed development the consumption of potable water in sanitary applications will be strongly considered and where possible low water use fittings and dual flush WCs will be specified.

A rainwater harvesting system will also be considered for this project and during the detailed design stage; calculations will be carried out to evaluate the suitability of this type of system. Reclaimed rainwater can be used for a range of applications such as toilet flushing, washing machines and irrigation. There are three main types of rainwater recovery systems: indirectly pumped, directly pumped, and gravity fed. The benefits of rain water harvesting is twofold as not only does it help to reduce the use of treated mains water for non-potable use, it can also help reduce water run –off and risk of flooding.

SECTION 4

CONCLUSIONS

4.1 Conclusions Summary

This Energy Statement report sets out the approaches being considered at this stage for achieving compliance with Part L 2021 regulations (NZEB). The report highlights that Part L compliance can be achieved for this development.

The proposed strategies for the developments are outlined here:

- U-values for floor, walls and roof will meet or exceed the building regulation backstops
- Using Glazing U-Value targets in line with Part L
- Better performance air permeability than the backstop, adding to building air tightness and ventilation effectiveness
- Consideration of use of Humidity controlled ventilation inlets
- High performance thermal bridging (use of Acceptable Construction Details)
- Consideration of use of Air source heat pump (ASHP) to provide space Heating (via radiators) and domestic hot water for the dwelling house units
- Consideration of use of Exhaust Air heat pump (EAHP) to provide space heating (via radiators) and domestic hot water for the apartment units