CLIMATE CHANGE ADAPTATION & ENERGY EFFICIENCY STATEMENT

BY

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AT

CARTRON, ORANMORE, COUNTY GALWAY.

FOR

MARSHALL YARDS DEVELOPMENT COMPANY LTD.

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1. Introduction

Climate change presents a unique challenge for Ireland economy, environment and society. This document is intended to provide a statement for plan and adaptation for projected climate change and impacts. The overall design was developed based on Adaptation Wizard from Climate Ireland and ensures that the development is equipped for challenges anticipated from a changing climate.

The document outlines Climate Change Adaptation Design for the Development along with detailed energy efficiency design of the Development. The energy efficiency design considers the upcoming revisions in the Part L Building regulations document and is guided by I.S 399 (Energy Efficient Design Management).

The proposed development, by reason of its location on a greenfield site, together with its density and layout, will promote the efficient use of land and of energy, including in relation to transport, and thereby minimise greenhouse gas emissions.

The development shall be constructed to achieve a high level of thermal efficiency with highly insulated building fabric and optimising passive solar gains. Our design will also address ways of influence the behaviour of the occupants which can help to reduce the energy consumption. Our design employs that all houses & apartments will have a very high energy performance & amount of energy required will be covered to a very significant extent by energy from renewable sources.

2. Development Description

Planning permission for the following Large Scale Residential Development (LRD) comprising the demolition of the existing shed and associated structures on site and the construction of 171 no. residential units, 1 no. creche and all associated development works including the provision of pedestrian/cyclist facilities along the R338 public road connecting to Oranmore rail station, 1 no. ESB substation, 1 no. pumping station, the undergrounding of the existing ESB sites traversing the site, footpaths, lighting, parking, drainage, bicycle and bin stores and landscaping/amenity areas at Cartron (townland), Oranmore, Co. Galway. Access will be via a new entrance on the L-71051 to the east.

3. Climate Change Adaptation Statement

Climate Change Adaptation Statement aims to ensure that this project will be better prepared to respond to current and future climate change impacts by reducing our vulnerability to climate change. Adaptation actions aim to reduce the impacts of climate change and also to take advantage of any opportunities presented by climate change.

Local Authority Adaptation Wizard provided by Climate Ireland was used as a baseline to prepare this statement.

This document divides adaptation responses into 3 basic categories:

- Grey Actions - Technological and engineering solutions.
- Green Actions - Ecosystem based approaches that use the multiple services of nature
- Soft Actions - Managerial, legal and policy approaches that alter human behaviour and style of governance.

Climate Change Adaptation Statement provides effective strategies to lower Greenhouse Gases for the development, with respect to:

- Construction stage – waste management & recycling
- Services - lighting, space heating and hot water,
- Climate-dependent envelope changes – high levels of insulation, air-tightness
- Human behaviour - using fewer resources, efficient appliances, efficient transport
- Renewable energy sources - solar photo-voltaics

3.1 Project Location

The location of the proposed development close to public transport routes will ensure good connectivity. Its location is adjacent to the Oranmore Train Station.

3.2 Climate Impact Screening

Building sector has high energy demand which includes the energy used during construction, embodied energy of materials used and in addition there is energy demand of the buildings once occupied.

During the construction process waste is generated and efforts to reduce and recycle waste need to be incorporated.

Changes in climate are being observed and these impacts are expected to continue and intensify into the future. Risk of flooding has been assessed by AKM in their report '23011-FRA-RPT-001-0922_REV02'.

3.3 Assess Climate Risk

Energy Demand & Waste Materials – Construction
Energy demand of the construction process includes production and removal of waste generated on site.

Energy Demand – Occupied Building
Energy demand of the occupied buildings can contribute to the climate change as at present majority of generated energy comes from carbon-based fuels. Carbon footprint of the occupiers can be based on the commuting and consumption patterns.

3.4 Impact Statement - Adaptation Options

Reduce Energy Demand – Grey Actions for the Occupied Building
The development design includes measures to reduce carbon footprint of the building. High level of insulation and high performance glazing will reduce the heating demand on the plant and on site produced renewable energy will further decrease the energy demand. Chapter 3 provides description of Energy Conservation & Renewable Energy which serve as the Grey actions to reduce the energy requirements of the building.

As part of the design process IS 399 was used to review the energy efficient design and to include the energy design. The provision for a connection to the future district heating network will aid the adaptability of building and enable the building to be retrofitted or refurbished to meet higher energy efficiency standards into the future.

Behavioural Measures – Soft Actions for the Occupied Building
The way people use energy in the home, at work and in commuting between the two places, has the potential to save up to 20% of total energy consumption.

Many Irish households are unaware of the large ecological footprint that they have on the environment and how to easily save resources and prevent waste. Soft actions will aim to inform the building occupants on effective strategies to use less resources, efficient appliances, efficient use of their heating/hot water controls and efficient transport/commuting.

Flood Risk
This subject is covered in detail in AKM's 23011-FRA-RPT-001-0922_REV02 report.

3.5 Implement, Evaluate & Review
The adaptation options outlined above should be implemented by the main contractor and after building handover by future management company. The management company will be responsible to develop a final implementation plan, a monitoring routine and a schedule of evaluation and review.

4. Building Regulations

Part L & Nearly Zero-Energy Building
The new Part L - Dwelling (2019) of building regulations was put in place and this document is the new standard for dwelling constructed after October 2019.

The Part L – Dwelling 2019 set building fabric and energy performance to achieve Nearly Zero-Energy Building. Nearly Zero-Energy Building (NZEB) means a building that has a very high energy performance as determined in accordance with Annex I of the EU Energy Performance of Buildings Directive Recast (EPBD Recast). 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.

EPC & CPC
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.

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.

Renewable Energy Ratio
The Part L 2019 introduces 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. Minimum RER is 0.2 and this index is replacing Part L 2011 Renewable contribution.

5. Energy Conservation & Renewable Energy

The houses will be constructed with high standard of insulation & air tightness which aim to satisfy the requirements of new Part L Building Regulations and NZEB. Energy demand minimization will be achieved by best practise in heat recovery ventilation and energy efficient building design. All windows will come with high performance glazing.

The specification of individual building elements, building services and items linked to energy efficiency was reviewed in detail for the typical apartment types occurring throughout the development to ensure compliance with the building regulations.

Key Sustainable Design Elements:

- High performance glazing in the windows.
- High levels of insulation
- Low energy lighting throughout the development.
- High levels of air-tightness
- Behavioural Measures

Windows and Building Fabric
All windows shall be double glazed windows with a combined thermal transmittance not greater than 1.2W/m2K. All windows shall comply with BS EN ISO 10077-1: 2006 - 'Thermal performance of windows, doors and shutters. Calculation of thermal transmittance'
Building fabric will include insulation levels sufficient to meet the Part L 2019 U-values.

Table 1. Building Elements U-values

Building Fabric	Target U Values	Part L 2019 Target Elemental U-value
Exposed & Ground Floor	0.18 W/m²K	0.18 W/m²K
External Wall	0.18 W/m²K	0.18 W/m²K
Pitched Roof	0.16 W/m²K	0.16 W/m²K
External Windows & Doors	1.2 W/m²K	1.4 W/m²K

Air Permeability
Part L (2019) specify 5 m3/m2/hr @ 50Pa as upper limit for air permeability. To reduce heat loss by infiltration the target air permeability will be 3.0 m3/m2/hr @ 50Pa Air permeability shall be measured by means of pressure testing of a building prior to completion in accordance with BS EN ISO 9972:2015 'Thermal performance of buildings. Determination of air permeability of buildings. Fan pressurization method '

Thermal Bridging Acceptable Construction Details
Building Regulations TGD L Appendix D is defining thermal bridges that occur at junctions between building elements and are included in the calculation of transmission heat losses. The DEAP calculation includes thermal bridging, at junctions between elements and around openings.

For purpose of this statement and preliminary BER results a value of y = 0.08 W/m2K was used. Value 0.08 W/m2K may be used for new dwellings whose details conform with "Limiting Thermal Bridging and Air Infiltration – Acceptable Construction Details" as referenced in Building Regulations 2011 TGD L. This requires that the details described in the above document are adhered to and relevant drawings be signed off by the site engineer or architect.

Demand Controlled Ventilation
Part F of building regulations requires adequate and effective means of ventilation shall be

provided for people in buildings. This shall be achieved by:

(a) limiting the moisture content of the air within the building so that it does not contribute to condensation and mould growth, and
(b) limiting the concentration of harmful pollutants in the air within the building.

It is proposed that Demand controlled ventilation (DCV) system will serve each unit to provide high indoor air quality for the occupants. Max SPF of the fan should not be higher than 0.25 W/l/s and has to be listed on the SAP Appendix Q database.

The design of dwellings shall provide required area of background ventilators via wall vents/trickle vents & undercut doors to wet rooms to provide fresh air in place of extracted air from the wet rooms. Systems should be installed, balanced, and commissioned by competent installers e.g. Quality and Qualifications Ireland accredited or Education Training Board or equivalent. Systems when commissioned and balanced should then be validated to ensure that they achieve the design flow rates by an independent competent person e.g. NSAI certified or equivalent.

Energy Saving Lighting
The new DEAP requires a detailed design of lighting for each dwelling. For this project the calculation of lighting use shall based on the installed fixed lighting, and on the contribution of daylight. The calculation will include low-energy lighting provided by fixed outlets based on lighting design details (e.g. lamp power and efficacy), lamp type, and number of lamps.

Heat Interface Unit
Each apartment will be fitted with a Heat Interface Unit (HIU) which shall be wall mounted and designed to provide indirect space heating and Instantaneous DHW. Each unit contains an ultrasonic heat meter to fitted with MBUS communications which will be linked back to plantroom and provide a record of heat and hot water used by the occupier for purpose of billing.

6. Infrastructure

The proposed site location is very well serviced by all major utilities. Major spine services for Electricity, Water and Communications have local network sufficient to meet the needs of the new development. Based on the number of dwellings it is envisaged that 1 no. ESB substation shall serve the development.

We have explored utilities which are in immediate close proximity to the site & reviewed specific service diversions, service routes and capacities to the site.

7. References

- TGD Part L (2019)
- Galway City Council Local Authority Climate Action Plan (LACAP) 2024-2029
- Galway City Council Climate Change Risk Assessment
- EUROCITIES Declaration on Climate Change
- National Climate Change Adaptation Framework Building Resilience to Climate
- Change, DECLG (2012)
- The EU Strategy on adaptation to climate change