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1 Introduction

1.1 Purpose of the Report

This Energy Efficiency and Climate Change Adaptation Design Statement has been prepared in support of the proposed amendments to the permitted Large-scale Residential Development at Tinahask Upper, Money Little and Money Big, Arklow, County Wicklow.

The report outlines the integrated energy efficiency, sustainability, renewable energy and climate change adaptation measures forming part of the proposed development. It demonstrates how the design incorporates measures to minimise operational energy consumption, reduce greenhouse gas emissions, improve resource efficiency and provide resilience against the anticipated effects of climate change.

The strategy reflects the Client's commitment to incorporating sustainable design principles throughout the development, with particular emphasis on the integration of energy-efficient building fabric, low-carbon mechanical and electrical services, renewable energy technologies, sustainable drainage infrastructure and climate-resilient design.

The approach incorporates climate change mitigation and adaptation considerations from the initial design stages, ensuring that sustainability forms an integral component of the overall development rather than a separate consideration.

The strategy is developed through coordination between the Client and the Design Team, including the Architectural, Mechanical and Electrical, Civil and Structural Engineering and Landscape Design disciplines.

The principal objectives are to:

- Minimise primary energy consumption across the development through efficient building design and services installations.
- Reduce operational carbon dioxide emissions through the incorporation of low-carbon heating technologies and renewable energy generation.
- Achieve compliance with the applicable Building Regulations, including the Nearly Zero Energy Building (NZEB) requirements.
- Provide residential accommodation designed to achieve high Building Energy Ratings.
- Reduce reliance on fossil fuels through the incorporation of electrically driven heat pump technologies.
- Incorporate measures to address the potential effects of climate change, including increased rainfall intensity, flooding, elevated external temperatures and extreme weather events.
- Reduce potable water consumption and promote sustainable water management.
- Support sustainable transport through pedestrian connectivity, bicycle parking and electric vehicle charging infrastructure.

- Minimise the environmental impact of construction activities through appropriate material selection, waste management and resource efficiency
- Provide buildings and infrastructure with suitable long-term operational efficiency, durability and resilience.

1.2 **Development Description**

The proposed development comprises amendments to the Large-scale Residential Development permitted under WCC Reg. Ref. 24/325 consisting

352no. residential units proposed in a mix of houses and apartment units comprising 334no. houses (44no. 2-bedroom, 241no. 3-bedroom and 49no. 4-bedroom) ranging from 2 to 3 storeys, 18no. apartments (6no. 1-bedroom and 12no. 2-bedroom) in 1no. 4 storey building, 1no. creche (c. 711 sqm) at ground floor of apartment Block A; and all associated and ancillary site development works including on site attenuation, hard and soft landscaping and boundary treatment works, including public open space; communal open space, public lighting; surface car parking; bicycle parking spaces/stores for houses and apartment units; 4no. ESB substations; bin stores; vehicular access via existing Northwood road and railway overbridge from Knockmore roundabout.

The proposed development also includes road upgrade works to the existing railway overbridge and the western approach to same including the provision of a 2.5m footpath, 6m carriageway, safety barrier improvement works and other ancillary works required to facilitate these elements.

2 Energy Efficiency and Climate Change Policy Framework

2.1 National Climate Policy

The proposed development is designed in accordance with the principles and objectives of Ireland's national climate policy, including the Climate Action Plan 2025.

The Climate Action Plan establishes the national framework for reducing greenhouse gas emissions, improving energy efficiency, increasing renewable energy generation and supporting the transition towards a low-carbon economy

The built environment represents a significant area of focus within national climate policy, particularly in relation to the energy required for space heating, domestic hot water generation, ventilation, lighting and other building services.

The proposed development supports these objectives through the incorporation of high-performance building fabric, electrically driven heat pump systems, renewable electricity generation and energy-efficient mechanical and electrical installations.

The design adopts an integrated approach whereby the building envelope, heating systems, ventilation systems, lighting installations and renewable technologies are considered collectively to achieve an efficient overall building performance.

This approach reduces the energy required to operate the development and supports the continued decarbonisation of the national electricity network.

2.2 Wicklow County Council Climate Action Plan 2024-2029

The Wicklow County Council Climate Action Plan 2024–2029 establishes the local authority's framework for addressing climate change through both mitigation and adaptation measures.

The proposed development supports the relevant objectives of the Climate Action Plan through the incorporation of energy-efficient residential buildings, renewable energy technologies, sustainable transport infrastructure and measures designed to improve resilience against future climate conditions.

Arklow is identified within the County Wicklow Decarbonisation Zone framework. The development supports the principles of the Decarbonisation Zone through the delivery of low-energy residential accommodation and the incorporation of technologies that reduce dependence on fossil fuels.

The proposed design also addresses climate adaptation considerations, including the management of surface water, the reduction of overheating risk, water conservation and the provision of resilient building services infrastructure.

The combination of these measures contributes towards the delivery of a sustainable residential development consistent with the climate objectives established at national and local authority level.

2.3 Building Regulations and Energy Performance Requirements

The residential units are designed to comply with the applicable requirements of Technical Guidance Document Part L – Conservation of Fuel and Energy, Dwellings.

The crèche and any other relevant non-domestic accommodation are designed in accordance with the applicable requirements of Technical Guidance Document Part L – Conservation of Fuel and Energy, Buildings Other Than Dwellings.

The development adopts the principles of the Nearly Zero Energy Building standard, incorporating a high-performance building envelope, efficient mechanical and electrical services and renewable energy technologies.

The design also takes account of the requirements of Technical Guidance Document Part F – Ventilation, ensuring that energy efficiency is achieved without compromising indoor air quality or occupant comfort.

The energy performance of the residential units is assessed through the SEAI Dwelling Energy Assessment Procedure (DEAP), while the non-domestic accommodation is assessed using the relevant Non-Domestic Energy Assessment Procedure (NEAP).

The objective is to achieve A-rated Building Energy Ratings for the residential units, with the final ratings established through the completed energy assessments.

3 Integrated Energy Efficiency Design Strategy

3.1 General Approach

Smart control systems will be employed in each dwelling and residential support services and facilities which will encourage the occupants to be energy conscious and play an important role in the energy reduction across all buildings on the site.

The development incorporates a coordinated energy efficiency design strategy based on reducing energy demand before introducing efficient building services and renewable energy technologies.

This approach recognises that the most effective means of reducing operational energy consumption is to minimise the energy required by the buildings through appropriate architectural design and thermal performance.

The design therefore incorporates a combination of passive and active energy efficiency measures.

Passive measures include building orientation, insulation, airtightness, thermal bridging control, glazing selection, daylight utilisation and solar gain management.

Active measures include high-efficiency heat pumps, ventilation systems, lighting installations, pumps, fans, controls and renewable electricity generation.

The combined application of these measures is intended to minimise the primary energy consumption and associated carbon emissions of the development.

3.2 Building Orientation and Passive Solar Design

The architectural layout and building orientation are considered as part of the overall energy efficiency strategy.

Building orientation influences the availability of natural daylight, winter solar gains, summer overheating potential and the energy required for space heating and lighting.

The design considers these factors in conjunction with the proposed building layouts, glazing arrangements and surrounding development.

Appropriate solar gains during the heating season contribute towards reducing space heating demand, while excessive solar gains during warmer periods are managed through suitable glazing selection, ventilation and architectural design.

The design seeks to balance these considerations to provide comfortable internal environments with reduced reliance on mechanical heating and cooling.

3.3 High-Performance Building Envelope

The building envelope is designed to minimise heat transfer between the internal and external environments.

The principal building elements include external walls, roofs, ground floors, windows and external doors.

These elements are selected to achieve the required thermal performance under Part L and to support the overall energy efficiency objectives of the development.

The thermal design takes account of insulation continuity, construction junctions, glazing performance and the reduction of unwanted air infiltration.

The building fabric is coordinated with the proposed mechanical services installations to ensure that the heating systems are appropriately sized for the anticipated building heat losses.

This integrated approach avoids unnecessary plant capacity and contributes towards improved seasonal heating efficiency.

3.4 Air Tightness and Infiltration Control

The residential buildings incorporate an airtightness strategy designed to reduce uncontrolled air leakage through the building envelope.

Uncontrolled infiltration increases space heating demand and can adversely affect occupant comfort.

The design therefore addresses airtightness at construction junctions, service penetrations, window and door interfaces and other potential leakage locations.

The airtightness strategy is coordinated with the ventilation design to ensure that adequate fresh air is provided through the intended ventilation arrangements.

Airtightness testing forms part of the compliance verification process, with the results incorporated into the final energy assessments.

3.5 Thermal Bridging

Thermal bridging is addressed through the architectural and construction detailing of the buildings.

Particular consideration is given to junctions between external walls and floors, roof connections, window openings, balconies and other locations where heat loss may occur through structural or construction elements.

Appropriate thermal bridging details contribute towards reducing heat loss, improving internal surface temperatures and minimising the risk of surface condensation.

The final thermal bridging values are incorporated into the energy performance calculations in accordance with the applicable assessment methodology.

4 Residential Energy Performance Strategy

4.1 DEAP Energy Assessments

The energy performance of the houses and apartments is assessed using the SEAI Dwelling Energy Assessment Procedure.

The DEAP methodology evaluates the energy performance of each dwelling through consideration of the building fabric, ventilation arrangements, heating and hot water systems, lighting and renewable energy contribution.

The assessments take account of the different dwelling types, building geometry, glazing arrangements and other relevant design characteristics.

The preliminary and detailed energy assessments provide a means of evaluating the proposed design and identifying opportunities to improve energy efficiency.

The final DEAP assessments establish the Building Energy Ratings and verify compliance with the applicable Part L requirements.

4.2 Space Heating Demand

The residential units are designed to achieve reduced space heating demand through the combined performance of the building fabric and heating systems.

High levels of insulation, airtightness and thermal bridging control reduce the rate of heat loss from the buildings.

The heating installations are designed to operate efficiently under these reduced heat load conditions.

The approach also incorporates appropriate zoning and temperature control, allowing occupants to manage internal temperatures in accordance with their requirements.

4.3 Domestic Hot Water Energy Consumption

Domestic hot water represents a significant proportion of energy consumption in highly insulated residential buildings.

The proposed design incorporates efficient domestic hot water generation using heat pump technology.

Hot water storage and distribution arrangements are designed to minimise standing losses and unnecessary heat losses from associated pipework.

Appropriate controls are incorporated to manage hot water generation and storage efficiently.

The design also considers water-efficient sanitary fittings to reduce unnecessary hot water consumption.

5 Mechanical Services Energy Efficiency Strategy

5.1 Air-to-Water Heat Pump Systems

The development incorporates air-to-water heat pump technology as the principal low-carbon heating solution.

Heat pumps transfer energy from the external environment into the building heating and domestic hot water systems, providing a more energy-efficient alternative to conventional direct electric heating and fossil-fuel-based systems.

The systems are selected with consideration of the building heating requirements, operating temperatures, domestic hot water demand and anticipated seasonal performance.

The heating distribution systems are designed to operate at suitable temperatures to maximise heat pump efficiency.

The incorporation of high-performance building fabric reduces the heating demand and supports the efficient operation of the heat pump installations.

5.2 Heating Controls

The heating installations incorporate appropriate temperature control and operating schedules to minimise unnecessary energy consumption.

The control strategy allows heating operation to respond to occupant requirements and prevailing internal conditions.

Where appropriate, the controls incorporate weather compensation, time scheduling and temperature setback functions.

These measures support efficient system operation and reduce the potential for unnecessary heating energy consumption.

5.3 Ventilation and Indoor Air Quality

The ventilation systems are designed to provide suitable indoor air quality in accordance with Technical Guidance Document Part F.

The ventilation strategy considers the requirements of the different building types, including houses, apartments and the crèche.

The design seeks to minimise ventilation-related energy consumption while maintaining appropriate fresh air provision.

Where mechanical ventilation systems are incorporated, high-efficiency fans and suitable controls are selected to minimise electrical consumption.

Mechanical ventilation with heat recovery is considered where appropriate to reduce ventilation heat losses.

The ventilation strategy also takes account of the need to manage internal moisture levels, condensation risk and occupant comfort.

5.4 Pumps and Ancillary Equipment

The development incorporates air-to-water heat pump technology as the principal low-carbon heating solution.

The mechanical services design incorporates high-efficiency pumps and associated equipment.

Where appropriate, variable-speed control is incorporated to allow equipment operation to respond to system demand.

The use of variable-speed technology reduces unnecessary electrical consumption during periods of reduced system load.

The distribution systems are also designed to minimise excessive pressure losses and associated pumping energy requirements.

6 Non-Domestic Energy Efficiency Strategy – Crèche

6.1 General Design Approach

The proposed crèche comprises approximately 711 m² of non-domestic accommodation at ground-floor level within Apartment Block A.

The energy efficiency strategy for the crèche considers the specific operational requirements associated with childcare accommodation, including occupancy patterns, ventilation requirements, heating demand, lighting and domestic hot water consumption.

The design incorporates efficient building services installations and appropriate control arrangements to minimise energy consumption while maintaining suitable internal

6.2 Thermal and Energy Modelling

The crèche energy performance is assessed using the applicable non-domestic energy assessment methodology.

Integrated Environmental Solutions (IES) software is identified as the thermal modelling platform for evaluating the energy performance of the non-domestic accommodation.

The model considers the building geometry, fabric performance, occupancy patterns, internal heat gains, lighting, ventilation and mechanical services installations.

The modelling approach allows the interaction between these factors to be assessed and supports the selection of an appropriate energy-efficient design solution.

Dynamic thermal modelling also provides an opportunity to examine the potential for summer overheating and assess the effectiveness of proposed mitigation measures.

6.3 Energy Efficient Lighting

The crèche incorporates high-efficiency LED lighting throughout.

The lighting design takes account of the operational requirements of childcare accommodation, including appropriate illumination levels, visual comfort and energy efficiency.

Lighting controls incorporate occupancy or absence detection and daylight-linked operation where appropriate.

The combination of efficient lighting equipment and suitable controls reduces unnecessary operating hours and associated electrical consumption.

6.4 Building Energy Controls and Monitoring

The crèche incorporates an appropriate energy management and controls strategy to support efficient operation.

The design considers the principles of I.S. 399:2021 Energy Efficient Design Management, including the identification of significant energy users and opportunities for energy monitoring.

The controls strategy provides for appropriate scheduling and temperature control of the mechanical services installations.

Energy metering arrangements are considered in accordance with the scale and operational requirements of the accommodation, with reference to CIBSE TM39 Building Energy Metering.

The objective is to provide the building operator with suitable information to understand energy consumption and identify opportunities for operational improvements.

7 Renewable Energy Strategy

7.1 General

Renewable energy generation forms an integral component of the development's energy efficiency strategy.

The principal renewable technologies incorporated into the proposed design are air-to-water heat pumps and solar photovoltaic systems.

The combination of these technologies contributes towards reducing reliance on conventional fossil fuels and minimising the primary energy consumption of the buildings.

7.2 Solar Photovoltaic Installations

Solar photovoltaic systems are incorporated into the energy strategy to provide on-site renewable electricity generation.

The photovoltaic installations convert solar energy into electricity, contributing towards the electrical demand associated with the buildings.

The design considers roof orientation, available roof areas, shading, electrical integration and the renewable energy contribution required to satisfy the applicable energy performance requirements.

The photovoltaic systems are coordinated with the architectural and electrical design to ensure suitable integration with the buildings.

The final installed capacities are established through the detailed energy assessments and electrical design.

7.3 Heat Pumps as Renewable Energy Technology

The heat pump installations utilise energy extracted from the external environment.

This contributes towards the renewable energy performance of the buildings and reduces the direct use of fossil fuels for heating and domestic hot water generation.

The efficiency of the installations is influenced by the operating temperatures, system controls and thermal performance of the buildings.

Accordingly, the heat pump strategy is developed in conjunction with the building fabric and heating distribution design.

7.4 Future Energy Performance

The incorporation of electrically driven heating systems and on-site renewable electricity generation supports the continued decarbonisation of building operations as the national electricity supply becomes less carbon intensive.

The design therefore provides a long-term approach to reducing operational carbon emissions over the anticipated life of the development

8 Climate Change Adaption Strategy

8.1 General

The climate change adaptation strategy addresses the potential impacts of changing climatic conditions on the proposed buildings, occupants and associated infrastructure.

The principal considerations include increased rainfall intensity, surface water flooding, elevated summer temperatures, extreme weather events, changing water availability and potential disruption to essential infrastructure.

The design incorporates measures intended to reduce vulnerability to these conditions and improve the long-term resilience of the development.

8.2 Increased Rainfall Intensity

The surface water drainage strategy incorporates on-site attenuation to manage rainfall runoff from the development.

The drainage design considers the applicable rainfall events and climate change allowances in accordance with the relevant drainage design criteria.

The attenuation infrastructure provides controlled management of surface water runoff and contributes towards reducing the risk of downstream drainage impacts.

The design also considers the arrangement of external ground levels and drainage routes to reduce the potential for localised surface water accumulation.

8.3 Sustainable Drainage Systems

Sustainable Drainage Systems are considered as part of the overall surface water management approach.

These systems provide opportunities to manage rainfall closer to its source, reduce peak runoff rates and improve the environmental performance of the development.

Potential measures include permeable surfaces, landscaped drainage features, infiltration arrangements where ground conditions permit and other suitable attenuation or runoff management solutions.

The final selection and configuration of these measures are determined through the Civil Engineering design, taking account of site conditions, drainage requirements and maintenance considerations.

8.4 Flood Resilience

Flood resilience is addressed through the coordination of the site layout, external levels, drainage infrastructure and building design.

The design considers the potential for surface water accumulation during significant rainfall events and the importance of providing appropriate drainage and overland flow routes.

The location and protection of essential electrical and mechanical infrastructure are also considered in relation to potential water ingress.

The detailed flood risk assessment and drainage design provide the basis for confirming the adequacy of the proposed flood resilience measures.

8.5 Summer Overheating

The potential for increased external temperatures is considered within the architectural and building services design.

The residential buildings incorporate measures intended to limit excessive internal temperatures during warmer periods.

These measures include appropriate glazing design, insulation, ventilation arrangements and management of solar gains.

Particular consideration is given to rooms with significant solar exposure and accommodation where natural ventilation opportunities may be restricted.

The design seeks to minimise overheating through passive measures, thereby reducing the potential need for energy-intensive mechanical cooling.

8.6 Extreme Weather Events

The design considers the resilience of the building envelope and external infrastructure during extreme weather conditions.

Roofing systems, external plant installations, photovoltaic panels and other exposed equipment are designed and secured in accordance with the applicable structural and environmental requirements.

External mechanical and electrical equipment are selected with appropriate environmental protection and consideration of its installation location.

The design also considers access for inspection and maintenance of essential infrastructure.

8.7 Water Conservation and Drought Resilience

The development incorporates water-efficient sanitary fittings and associated water services design measures to reduce potable water consumption.

These include appropriate flow control, efficient WC flushing arrangements and measures to minimise unnecessary water usage.

Water-efficient landscaping principles are considered in the selection of planting and external maintenance requirements.

The overall approach supports the responsible use of water resources and contributes towards resilience during periods of reduced water availability.

9 Sustainable Transport and Electrical Infrastructure

9.1 General

The development incorporates infrastructure intended to support sustainable transport and reduce reliance on conventional fossil-fuel-powered vehicles.

The overall strategy includes pedestrian access, bicycle parking facilities and consideration of electric vehicle charging requirements.

9.2 Electric Vehicle Charging

The electrical infrastructure strategy addresses the applicable requirements for electric vehicle charging facilities.

The design considers electrical supply capacity, distribution arrangements and opportunities for appropriate load management.

The provision of charging infrastructure supports the transition towards electrically powered transport and contributes towards reducing transport-related carbon emissions.

9.3 Bicycle Parking and Pedestrian Infrastructure

Bicycle parking and storage facilities are incorporated into the proposed development.

These facilities support active travel and provide residents with alternatives to private vehicle use.

The proposed improvement works to the railway overbridge include the provision of a 2.5 m footpath, contributing towards improved pedestrian connectivity.

The integration of pedestrian infrastructure and bicycle facilities supports the development of a more sustainable residential environment.

10 Water Efficiency and Resource Conservation

10.1 Water Services Design

The water services installations are designed to provide reliable operation while minimising unnecessary water consumption.

Water-efficient fittings are incorporated into the design, with consideration of flow rates, water pressure and operational requirements.

The water services design also seeks to minimise leakage and unnecessary wastage through appropriate installation practices and isolation arrangements.

10.2 Domestic Hot Water Consumption

Reducing domestic hot water consumption also reduces the energy required for water heating.

The incorporation of efficient sanitary fittings contributes towards both water and energy conservation.

The hot water generation and distribution systems are designed to minimise unnecessary standing and distribution losses.

10.3 Landscape Water Management

The landscaping strategy considers the selection of planting appropriate to the local environment.

Planting arrangements that minimise excessive irrigation requirements contribute towards reducing water consumption.

The integration of landscaped areas with surface water management also provides opportunities to improve the environmental performance of the development.

11 Non-Domestic Energy Efficiency Strategy – Crèche

11.1 Whole-Life Carbon Consideration

The sustainability strategy considers the environmental impact of materials and construction activities in addition to operational energy consumption.

Embodied carbon arises from the extraction, manufacture, transportation, installation, maintenance and eventual disposal or replacement of construction materials.

The design adopts a whole-life approach, considering material durability, maintenance requirements and environmental performance.

11.2 Material Selection

The selection of construction materials takes account of their suitability, durability and environmental impact.

Where practicable, locally sourced materials and products incorporating recycled content are considered.

Materials with suitable environmental product declarations provide opportunities for more informed assessment of environmental performance.

The design also seeks to avoid unnecessary material consumption through efficient structural and architectural coordination.

11.3 Durability and Maintenance

The use of durable construction materials contributes towards reducing the frequency of replacement and associated environmental impacts.

The design considers the anticipated service life of major building components and the need for appropriate access to maintain mechanical and electrical equipment.

This approach supports the long-term performance and sustainability of the development.

12 Construction Environmental Management

12.1 Construction Energy Consumption

The construction phase incorporates measures to monitor and manage energy consumption.

Temporary electrical supplies are metered where practicable, and fuel consumption associated with construction equipment is recorded.

The use of efficient equipment and appropriate construction methodologies contributes towards reducing unnecessary energy consumption.

12.2 Construction Water Consumption

Water usage during construction is monitored through appropriate metering arrangements.

The construction management approach seeks to minimise unnecessary water consumption and prevent wastage.

12.3 Waste Management

Construction waste is managed through appropriate segregation, recovery and recycling arrangements.

The approach prioritises the prevention of unnecessary waste and the recovery of suitable materials.

Where practicable, materials are selected and ordered to minimise offcuts, surplus quantities and unnecessary disposal.

The waste management strategy also considers the appropriate handling and disposal of materials that cannot be reused or recycled.

12.4 Construction Transport and Deliveries

Construction logistics are considered as part of the environmental management approach.

The coordination of material deliveries, site access and construction activities provides opportunities to reduce unnecessary vehicle movements and associated emissions.

13 Commissioning, Testing and Verification

13.1 General

Commissioning and verification form an essential component of the energy efficiency strategy.

The mechanical and electrical installations are subject to appropriate testing and commissioning to confirm that the installed systems operate in accordance with the approved design.

The commissioning process addresses the principal energy-consuming systems, including heating, ventilation, domestic hot water, lighting and renewable energy installations.

13.2 Mechanical Services Commissioning

The mechanical services commissioning process includes verification of the operation and control of the heating and hot water systems.

The process also addresses ventilation performance, system balancing and the operation of relevant control devices.

The objective is to ensure that the installations operate efficiently and provide the intended internal environmental conditions.

13.3 Electrical Services Commissioning

Electrical commissioning includes verification of the operation of lighting controls, photovoltaic installations and associated electrical systems.

The commissioning process confirms that the relevant equipment and controls operate in accordance with the design requirements.

13.4 Building Energy Ratings

The completed residential units are subject to final DEAP assessments to establish their Building Energy Ratings.

The crèche is subject to the relevant non-domestic energy assessment and certification requirements.

The final assessments provide verification of the energy performance of the completed buildings.

13.5 Occupant Information

Building occupants are provided with suitable information regarding the efficient operation of the heating, hot water and ventilation systems.

The information supports appropriate use of the installations and assists occupants in managing energy consumption.

For the crèche, the building operator is provided with suitable operating and maintenance information to support efficient ongoing operation.

14 Climate Change Mitigation and Adaptation Measures

Design consideration	Energy efficiency / adaptation measure	Environmental benefit
Building fabric	High-performance insulation and glazing	Reduced heat loss and heating energy
Airtightness	Continuous airtightness strategy	Reduced uncontrolled infiltration
Thermal bridging	Appropriate construction junction detailing	Reduced heat loss and condensation risk
Space heating	Air-to-water heat pumps	Reduced reliance on fossil fuels
Domestic hot water	Efficient heat pump generation and insulated storage	Reduced water heating energy
Ventilation	Efficient ventilation equipment and controls	Reduced fan energy and improved air quality
Lighting	High-efficiency LED lighting	Reduced electrical consumption
Lighting controls	Occupancy and daylight-linked control where appropriate	Reduced unnecessary lighting operation
Renewable energy	Solar photovoltaic systems	On-site renewable electricity generation
Building controls	Heating and hot water controls	Improved operational energy efficiency
Surface water	On-site attenuation	Improved rainfall runoff management
Flood resilience	Drainage coordination and appropriate site levels	Reduced potential for water ingress
Overheating	Solar gain management and ventilation	Improved summer thermal comfort
Water conservation	Efficient sanitary fittings	Reduced potable water consumption
Extreme weather	Resilient building envelope and protected equipment	Improved infrastructure durability
Sustainable transport	Bicycle parking and pedestrian infrastructure	Support for active travel
Electric vehicles	EV charging infrastructure strategy	Support for lower-emission transport
Materials	Durable and lower-impact material selection	Reduced whole-life environmental impact
Construction	Energy, water and waste management	Reduced construction environmental impact
Commissioning	Testing and performance verification	Improved installed system efficiency
Energy certification	DEAP and NEAP assessments	Verification of regulatory energy performance

15 Conclusion

The proposed development at Tinahask Upper, Money Little and Money Big, Arklow, County Wicklow, incorporates an integrated Energy Efficiency and Climate Change Adaptation Strategy designed to minimise environmental impact and provide sustainable residential accommodation.

The strategy supports the objectives of Ireland's Climate Action Plan 2025 and Wicklow County Council Climate Action Plan 2024–2029 through the incorporation of high-performance building fabric, energy-efficient mechanical and electrical services, low-carbon heating technologies and renewable energy generation.

The residential buildings are designed to comply with the applicable Nearly Zero Energy Building requirements, with A-rated Building Energy Ratings identified as the energy performance objective. The crèche incorporates an energy efficiency strategy appropriate to its non-domestic use, including efficient heating, ventilation, lighting and controls, together with energy assessment and monitoring principles.

Climate change adaptation measures are addressed through the surface water management strategy, consideration of flood resilience, overheating mitigation, water conservation and the protection of buildings and infrastructure against extreme weather conditions.

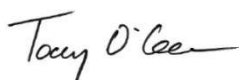
The development also supports sustainable transport through pedestrian infrastructure, bicycle parking and the provision of appropriate electric vehicle charging infrastructure.

The incorporation of sustainable construction principles, resource efficiency, waste management and whole-life environmental considerations further contributes towards reducing the overall environmental impact of the development.

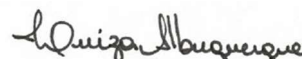
The combined application of these measures provides a coordinated approach to climate change mitigation and adaptation, supporting the delivery of an energy-efficient, low-carbon and climate-resilient residential development.

The strategy demonstrates the Client's commitment to sustainability and establishes a framework for the delivery of buildings and associated infrastructure that respond to both current energy performance requirements and anticipated future climatic conditions.

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