Delap & Waller

Former Teagasc Lands, Kinsealy

Energy & Sustainability Statement

10th February 2025

Revision History

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1.0 Executive Summary

This report prepared by Delap & Waller, outlines the sustainable fabric and services specification strategy for the proposed development at Former Teagasc Lands, Kinsealy' to demonstrate compliance with Part L 2022 and Fingal Development Plan 2023-2029. This report forms part of the planning application.
The proposed development consists of the demolition of existing buildings and structures on a site associated with the former Teagasc Research Centre, and the construction of 193 no. residential dwellings comprising 153 no. two storey houses (consisting of 30 no. two-bed; and 123 no. three-bed terraced houses) and 40 no. duplex units (comprising 20 no. two-bed ground floor apartments with 20 no. three-bed duplexes above) arranged in three storey blocks.

The proposed development includes a single storey childcare facility (approx. 283 sqm gross floor area) with the capacity for approximately 50 children.The proposed development incorporates approximately 1.65 ha of dedicated public open space comprising a series of open spaces and a central east-west green route linear park and parklands along the east boundary. In addition, 2.2 ha of green belt lands are included to the south and south-east of the residential development area to accommodate a playing pitch. Vehicular access to the site will be via a new vehicular entrance at Gandon Lane to the north (providing access to the northern part of the site) and a new vehicular access from the Malahide Road, located to the south of the existing Malahide Portmarnock Educate Together National School (providing access to the southern part of the site).

The proposed development includes 229 no. car parking spaces (comprising 193 no. residential spaces, 4 no. childcare drop off spaces, 3 no. childcare staff spaces, and 29 no. visitor spaces), and 345 no. bicycle parking spaces (201 no. private secure on-curtilage spaces for houses without independent garden access, 100 no. private secure spaces and 20. no. visitor spaces for duplex units, 20 no. childcare drop-off spaces, and 4 no. childcare staff spaces). The proposed development facilitates pedestrian and cycle links to existing and proposed adjoining developments, including the provision of an east-west greenway connecting residential lands to the east of the site at Newpark to the Malahide Road and the provision of a north-south link connecting Beechwood in the north to the green belt lands in the south, with provision for a future link to the St Nicholas of Myra national school.The proposed development has an overall site area of 8.2 ha, and includes bin storage, internal roads, boundary treatments, public lighting, 3 no. ESB unit substations, water supply, surface water drainage and foul water drainage infrastructure, and all associated and ancillary site and development works..

The proposed development will be designed and constructed to meet Approved Document Part L 2022 Conservation of Fuel and Energy – Dwellings and Buildings other than Dwellings. This standard is also referred to as Nearly Zero Energy Building Standard (NZEB), which has become the regulatory standard since October 2022. The Part L regulation requires an overall improved energy performance for the fabric, services, lighting and renewable specification.

For the Creche unit, the standard requires a Carbon Performance Coefficient (CPC) level of <1.00 and an Energy Performance Coefficient (EPC) level of <1.15. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the buildings overall regulated primary energy use. However, where the energy performance and carbon performance is significantly lower than the maximum permissible targets, a renewable energy source providing 10% of the buildings primary energy demand is compliant.

For the residential dwellings, the standard requires an overall improved energy performance for the fabric, services and lighting specification. The standard requires a Carbon Performance Coefficient level of <0.35 and an Energy Performance Coefficient level of <0.30. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the primary energy use. The report will

outline target U-Values of each fabric element, air permeability and options for the space heating, hot water and ventilation for consideration. Please note the specification and efficiencies outlined within this report are based on calculations and design information available at the time of writing.

Figure 1: Kinsealy Site Plan

2.0 Assessment Methodology

2.1 Architectural Design

The energy and carbon calculations have been carried out using floor plans, sections and elevations provided by Conroy Crowe Kelly Architects. The table below summarises the drawings used during this analysis.

Title	Drawing Number	Revision	Date
House Type A	KI-CCK-S1b-XX-DR-A-101	P0	September 2024
House Type B	KI-CCK-S1b-XX-DR-A-102	P0	September 2024
House Type B1	KI-CCK-S1b-XX-DR-A-103	P0	September 2024
House Type C	KI-CCK-S1b-XX-DR-A-104	P0	September 2024
House Type D	KI-CCK-S1b-XX-DR-A-105	P0	September 2024
House Type D1	KI-CCK-S1b-XX-DR-A-106	P0	September 2024
Duplex A1	KI-CCK-S1b-XX-DR-A-200	P0	September 2024
Duplex A2	KI-CCK-S1b-XX-DR-A-201	P0	September 2024
Duplex B1	KI-CCK-S1b-XX-DR-A-202	P0	September 2024
Duplex B2	KI-CCK-S1b-XX-DR-A-203	P0	September 2024
Duplex C1	KI-CCK-S1b-XX-DR-A-204	P0	September 2024
Duplex C2	KI-CCK-S1b-XX-DR-A-205	P0	September 2024
Duplex D1	KI-CCK-S1b-XX-DR-A-206	P0	September 2024
Duplex D2	KI-CCK-S1b-XX-DR-A-207	P0	September 2024
Duplex D3	KI-CCK-S1b-XX-DR-A-208	P0	September 2024
Duplex D4	KI-CCK-S1b-XX-DR-A-209	P0	September 2024

Table 1: Architectural Drawing Schedule

2.2 Software

Energy and carbon calculations have been carried out to demonstrate the performance of the buildings against the NZEB standard. The residential units are assessed using the Dwelling Energy Assessment Procedure (DEAP). DEAP is the Irish official procedure for calculating and assessing the energy required for space heating, space cooling, ventilation, water heating and lighting, less savings from energy generation technologies. DEAP calculates the annual delivered energy consumption, primary energy consumption and carbon dioxide emissions for standardised occupancy.

The commercial units are assessed using the Non-Domestic Energy Assessment Procedure (NEAP) using IES VE software. NEAP is the official procedure for the calculation of energy performance of non-domestic buildings in Ireland for the purposes of producing Building Energy Ratings (BER). It considers space heating, cooling, ventilation, water heating, and lighting in a building. The Sustainable Energy Authority of Ireland (SEAI) publishes NEAP software, the associated guidance and procedural documents.

3.0 Assessment Criteria

3.1 Technical Guidance Document L 2022

Technical Guidance Document Part L Conservation of Fuel and Energy – Buildings other than Dwellings 2022, has been issued by the Department of Housing, Planning and Local Government. This document becomes the regulatory standard for all new buildings other than dwellings from October 2022, to achieve Nearly Zero Energy Building standard (NZEB).

A Nearly Zero-Energy Building 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. 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 the commercial units - Creche, the sections 1.1.2 and 1.2 of Part L requires a Carbon Performance Coefficient (CPC) level of <1.00 and an Energy Performance Coefficient (EPC) level of <1.15. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the buildings overall regulated primary energy use. However, where the energy performance and carbon performance are significantly lower than the maximum permissible targets, a renewable energy source providing 10% of the buildings primary energy demand is compliant.

For the residential dwellings, the standard requires an overall improved energy performance for the fabric, services and lighting specification. Sections 1.1.2, 1.1.3 and 1.2.3 of Part L requires a Carbon Performance Coefficient level of <0.35 and an Energy Performance Coefficient level of <0.30. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the primary energy use.

Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy technologies to total primary energy, as defined and calculated in NEAP/DEAP respectively. Renewable energy technologies means technology, products or equipment that supply energy derived from renewable energy sources, e.g. solar thermal systems, solar photovoltaic systems, biomass systems, systems using biofuels, heat pumps, aerogenerators and other small scale renewable systems. NEAP and DEAP analyses have been completed for the proposed Creche and sample dwellings to demonstrate compliance with Part L 2022 Building Regulations.

Part L outlines the requirement for new developments to include provision for electric vehicle charging, this report will outline how the proposed Kinsealy development complies with TGD Part L in this regard.

As of 2006 all domestic and non-dwellings buildings that were newly built and existing buildings that are for sale or rent require a BER (Building Energy Rating) certificate. The BER is based on the primary energy used for one year and is classified on a scale of A1 to G with A1 being the most energy efficient. It also gives the anticipated carbon emissions for a year's occupation based on the type of fuel that the systems use. In order to identify Primary energy consumption of the building, the BER assesses energy consumed based on, building type, orientation, thermal envelope, air permeability, heating system, ventilation system and efficiency, domestic hot water generation, lighting systems and renewable energy.

3.2 Fingal Development Plan 2023-2029

The Fingal Development Plan provides a positive vision which will enable the county to continue to make a significant contribution to the national economic recovery by promoting sustainable development. The energy and sustainability strategy for the proposed development at Kinsealy, will consider and adhere to the following relevant policies as outlined within Chapter 5 of the development plan.

3.2.1 Climate Action & Energy

Chapter 5: Climate Action

Fingal County Council have aimed to improve 50% County Council's energy efficiency by 2020 and 40% reduction in GHG emission by 2030. The Fingal County Council Climate Action Plan 2024 to 2029. is based on the national Climate Action Plan 2023 (CAP23), which is committed to achieving a net zero carbon energy system for Irish society and create a resilient and sustainable country. The Council is focused on two approaches required to tackle climate change. The first, mitigation, consists of actions that will reduce current and future greenhouse gas emissions, e.g. reductions in energy use and switching to renewable energy sources. The second approach, adaptation, consists of actions that will reduce the impacts that are already happening now from our changing climate and those that are projected to happen in the future. Energy and Building, Transport are the two key features of five features explained in Fingal County Council Climate Action Plan 2024 to 2029.

Building Energy Rating: As part of the Energy Performance of Buildings Directive (2002/91/EC) Directive, a Building Energy Rating (BER) certificate is required once a building is offered for rental or sale. The BER measures the energy performance of a building and provides homeowners with the information required in order to improve the thermal efficiency of their dwelling.

Part L of the Building Regulations: Part L of the Building Regulations deals with the conservation of fuel and energy in buildings. The Regulations state that a building shall be designed and constructed so as to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the building and the amount of carbon dioxide (CO2) emissions associated with this energy use insofar as is reasonably practicable. This can be achieved using a combination of measures including the use of renewable energy sources, limiting heat loss and availing of heat gain through the fabric of the dwelling and using energy efficient space and water heating systems.

Nearly Zero Energy Buildings: Arising from the Recast of the European Performance of Buildings Directive 2010/30/EU, from 1 January 2019, every new public building and from 1 January 2021 all other new buildings will have to be designed to nearly zero energy building (NZEB) standards. The Council will have regard to the DoEHLG publication Towards Nearly Zero Energy Buildings in Ireland Planning for 2020 and beyond and the EU Energy Performance of Buildings Directive (2010/31/EU) which promote the increase in nearly Zero Energy Buildings (nZEB).

Climate Action Plan (CAP) & Building Policies	
Policy CAP4	Ensure that the County's need for sustainable environmental infrastructure is addressed in a way which contributes to wider climate action goals and targets.
Policy CAP5	Ensure the built environment is equipped for the impacts of climate change by supporting climate change mitigation and adaptation measures as part of new and existing developments.

Policy CAP8	Support the retrofitting and reuse of existing buildings rather than their demolition and reconstruction where possible.
Policy CAP9	Support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing buildings, including retrofitting of appropriate energy efficiency measures in the existing building stock.
Policy CAP10	Promote low carbon development within the County which will seek to reduce carbon dioxide emissions, and which will meet the highest feasible environmental standards during construction and occupation, New Development should provide: 1. Building layout and design which maximises daylight, natural ventilation, active transport and public transport use. 2. Sustainable building/services/site design to maximise energy efficiency. 3. Sensitive energy efficiency improvements to existing buildings. 4. Energy efficiency, energy conservation, and the increased use of renewable energy in existing and new developments. 5. On-site renewable energy infrastructure and renewable energy. 6. Minimising the generation of site and construction waste and maximising reuse or recycling. 7. The use of construction materials that have low to zero embodied energy and CO2 emissions.

Table 2: Fingal County Council – Climate Action Plan and building policies

3.2.2 Transport

Section 5.5.5.1 Decarbonising Transport and Electric Vehicles (EVs)

The National Climate Action plan supports the growth of EV cars and Vans so that Ireland reaches 100% of all new cars and vans being EVs by 2030. Approximately one third of all vehicles sold during the decade will be Battery Electric Vehicles (BEV) or Plug-in Hybrid Electric Vehicles (PHEV). It will be necessary to ensure that sufficient charging points and rapid charging infrastructure are provided to appropriate design and siting considerations and having regard to the Planning and Development Regulations 2001 as amended, which have been updated to include EV vehicle charging point installation.

Electrical Vehicle Policy	
Policy CAP27	Ensure that sufficient charging points and rapid charging infrastructure are provided on existing streets where such infrastructure does not impede persons with mobility issues and in new developments subject to appropriate design, siting and built heritage considerations and having regard to the Planning and Development Regulations 2001 as amended, which have been updated to include EV vehicle charging point installation, so that EV Street Charging Points be provided to every community of the County.

Table 3: Fingal development plan electric vehicle policies

Section 14.17.10 Electric Vehicle Parking (Fingal Development Plan)

Development shall provide following minimum standards for EV charging points:

1. All multi-unit residential developments shall incorporate EV charging points at 20% of the proposed parking spaces and appropriate infrastructure (e.g. ducting) to allow for future fit out of a charging point at all parking spaces.
2. Non-residential development shall be required to provide functioning EV charging points at a minimum of 10% of all spaces and all other spaces shall incorporate appropriate infrastructure (ducting) to allow for future fit out of a charging point at all spaces.
3. Publicly accessible EV parking spaces should be clearly marked and be capable of communicating usage data with the National Charge Point Management System. EV parking spaces for accessible spaces should also be included in the development where these exist.
4. All other parking spaces, including in residential developments, should be constructed to be capable of accommodating future charging points as required.

Drawing 23039-XXX-DR-DLW-E-600 sets out the proposed location of the EV charging points, serving 9 number off curtilage car parking spaces. Ducting and infrastructure will be provided to all dwellings to allow for the future fit out of a charging point. As such, the proposed development at Former Teagasc Lands, Kinsealy meets the policy CAP27 requirements within The Fingal County Council Climate Action Plan 2024 to 2029.

The next sections of the report will outline the how the proposed development comply with each of the policies set out above.

4.0 Energy Strategy

4.1 Energy Hierarchy

The design of the proposed Teagasc Kinsealy development will incorporate the principles of the energy hierarchy. The energy hierarchy consists of three key principles:

1. Be Lean
2. Be Clean
3. Be Green

The Be Lean stage encourages a passive strategy whereby space heating, cooling and lighting energy demand is minimised through a fabric first approach. A carefully designed fabric first approach will ensure a robust, efficient and sustainable design throughout the lifetime of the building, which is affordable. Furthermore, it reduces the reliance on technologies, which overtime will require maintenance or replacing.

The Be Clean stage encourages that energy supplied to the development, such as heating or domestic hot water is delivered efficiently through communal or highly efficient systems.

The Be Green stage ties in with the Renewable Energy Ratio requirement of Part L 2022, whereby any remaining requirements are addressed through on-site renewable energy.

4.2 Be Lean

4.2.1 Passive Design Measures

The table below outlines the target thermal performance for the heat loss elements within the dwelling and Creche required to achieve compliance with Part L 2022 (nZEB). The values are compared with the Part L 2022 limiting values for new build developments.

Element	Proposed Fabric Design Dwellings	Part L 2022 Limiting Values
Ground Floor / Exposed Floor	0.15 W/m^{2}K	0.18 W/m^{2}K
External Walls	0.18 W/m^{2}K	0.18 W/m^{2}K
Pitched Roof	0.15 W/m^{2}K	0.16 W/m^{2}K
Flat Roof	0.15 W/m^{2}K	0.20 W/m^{2}K
Windows / Glazed Doors	1.4 W/m^{2}K	1.40 W/m^{2}K
	G-Value 0.50	N/A

Entrance Doors	1.40 W/m²K	1.40 W/m²K
Air Permeability	3.00 m³(m²/hr) at 50 Pa	5.00 m³(m²/hr) at 50 Pa
Thermal Bridging Factor	Y-Factor 0.08	Default y-value of 0.15

Table 4: Dwellings proposed fabric specification

Element	Proposed Fabric Design Non-Dwellings	Part L 2022 Limiting Values
Ground Floor	0.18 W/m²K	0.21 W/m²K
External Walls	0.21 W/m²K	0.21 W/m²K
Pitched Roof	0.16 W/m²K	0.16 W/m²K
Flat Roof	0.20 W/m²K	0.20 W/m²K
Windows / Glazed Doors	1.40 W/m²K	1.60 W/m²K
	G-Value 0.40	N/A
Entrance Doors	1.40 W/m²K	1.60 W/m²K
Air Permeability	3.00 m³(m²/hr) at 50 Pa	5.00 m³(m²/hr) at 50 Pa
Thermal Bridging Factor	Y-Factor 0.05 – 0.08	Default y-value of 0.15

Table 5: Creche proposed fabric specification

To ensure energy use is minimised from the outset, where feasible the proposed development has been designed with regard to the principles of passive design including; orientation, location of openings, local shading to maximise the potential for solar gain and limit overheating.

The fabric specification has been optimised in order to strike a balance between maximising natural daylight benefits to reduce the use of artificial lighting, the provision of solar gains to reduce space heating demands during the winter months, whilst limiting summertime solar gains to reduce space cooling demands. This can be exhibited in the design window U-Value of 1.40 W/m²K and a solar transmission value of 0.50.

4.2.2 Thermal Bridging

Heat loss via thermal bridging is a critical aspect of the energy performance, for the purposes of the Provisional Part L analysis, an indicative Y-Factor 0.08 has been used. At detail design stage, where architectural details are bespoke, a specific thermal modelling calculation will be carried out to ensure

the Psi Value (φ) is within acceptable parameters. Refer to figure 2 below for examples of bespoke calculations for an intermediate floor and roof detail

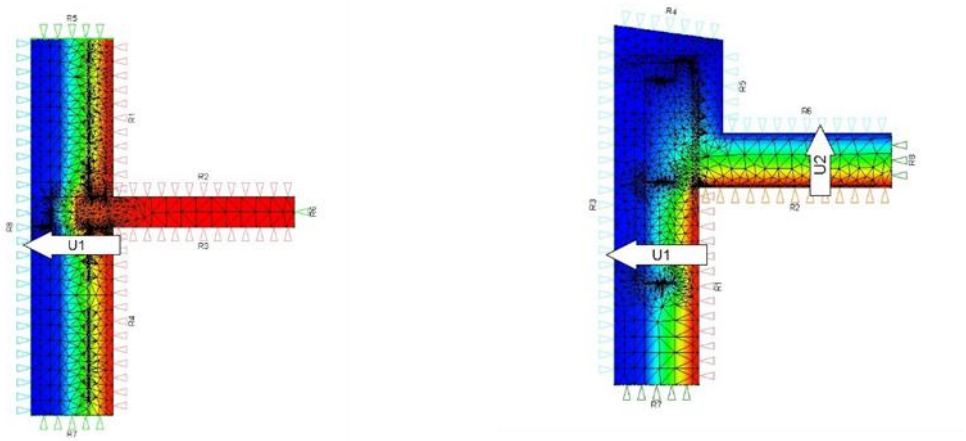


Figure 2: Typical linear thermal bridging heat flows

4.2.3 Air Permeability

Convective losses through drafts and junctions are another main source of heat loss within a dwelling. This is referred to Air Permeability or Infiltration. Part L 2022 outlines that an air permeability level of 5.00 m^3 (m^2/ hr) @ 50 Pa represents a reasonable upper limit for air permeability. Therefore, the dwellings and Creche at the proposed Kinsealy development has been designed to achieve an air permeability of 3.00 m^3 (m^2/ hr) @ 50 Pa.

4.2.4 Thermal Comfort

Incremental changes to construction regulations and methodologies have introduced, greater thermal standards, high proportions of glazing, lightweight construction and inadequate ventilation strategies. This has led to an increasing number of occupants experiencing overheating in new build developments. Kinsealy has been designed to achieve thermal comfort in accordance with the industry standard CIBSE Technical Memorandum 59 (2017). Compliance has been achieved through; reduced glazing solar transmission to control excessive solar gains, high thermal mass capacity of the floors, openable windows for purge ventilation and mechanical ventilation to provide continuous background ventilation.

CIBSE TM59 sets out differing criteria for thermal comfort compliance depending on whether the rooms are predominately naturally ventilated or mechanically ventilated. The standard required that for bedrooms, to guarantee comfort during the sleeping hours, the operative temperature from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26°C will be recorded as a fail).The Creche has been assessed for thermal comfort against CIBSE Technical Memorandum 52, which is the most appropriate assessment for this use type.

4.3 Be Clean

4.3.1 Space Heating and Cooling

A feasibility study was carried out to determine the most appropriate energy strategy for the development, the study took into consideration, energy demand, special requirements, end user requirements, maintenance, operational energy costs. HPI Performance and planning implications. The following options were assessed:

- District Heating
- Air Source Heat Pump
- Ground Source Heat Pump
- Electric Panels with Air Source Heat Pump
- Air to Air Heat Pump

With the passive measures above incorporated into the design of Kinsealy the space heating demand within the dwellings is notably low. Therefore, following an assessment of available space heating generation options, an air to water heat pump and low surface temperature radiator was deemed the most feasible solution for Houses and Creche. For Duplexes, the exhaust air heat pump is suitable.

The table below summarises the heating and cooling strategy and efficiencies in each of the use types at Kinsealy.

Use Class	Heating Strategy	System Seasonal Efficiency	
		Heating	Cooling
Houses	Air to Water Heat Pump	485.49	-
Duplexes	Exhaust Air Heat Pump	479.20	-
Creche	Air to Water Heat Pump	457.00	-

Table 6: System heating and cooling efficiencies

4.3.2 Heating and Cooling Controls

The dwellings will have separate time and temperature controls for the living area and sleeping areas, to reduce heating demand.

The Creche will have local zone controls to ensure that heating and cooling is only active when required and to the pre-determined temperature in line with CIBSE design standards.

4.3.3 Ventilation

In accordance with Section 1.2.2 of TGD Part F, due to the airtight construction, the houses will have continuous mechanical extract ventilation. This system extracts stale air from kitchens, bathroom and utility areas, fresh air is then drawn into habitable rooms through passive wall ventilation. Duplexes will have exhaust air ventilation, this system uses fans to expel air from rooms, bathrooms, kitchen and creates negative pressure that draws in fresh air from passive wall vents.

Creche will use mechanical ventilation with heat recovery (MVHR). This system extracts stale air from wet areas, the temperature from the extracted air is passed through a heat exchanger to temper the incoming supply air to the habitable rooms within the creche. This ensures a consistent supply of fresh, tempered air that reduces the space heating demand and negates the need for passive wall vents. The duty and specification will be sized based on the determined occupancy levels of these spaces in accordance with TGD Part F. For the purposes of the NEAP and DEAP assessment at this stage, indicative efficiencies have been used, based on manufacturer.

Use Class	Heating Strategy	Specific Fan Power (W/l/s)	Heat Recovery Efficiency (%)
Houses	Whole House Extract	0.19-0.29	-
Duplexes	Exhaust	0.26	-
Creche	MVHR	1.50	80.00%

Table 7: System ventilation efficiencies

4.3.4 Lighting

The design intent is to achieve good levels of natural daylighting within each of the habitable spaces of Kinsealy, in order to minimise artificial lighting requirements. High Energy efficient LED fittings are proposed for both type of dwellings and the Creche at Kinsealy. The lighting design will be designed with the most appropriate level of control based on the room's activity. See below table:

Use Class	Lighting Efficiency (Lm/W)	Lighting Control
Houses/Duplexes	90.00	Manual
Creche	120.00	Manual – Time Switch

Table 8: System ventilation efficiencies

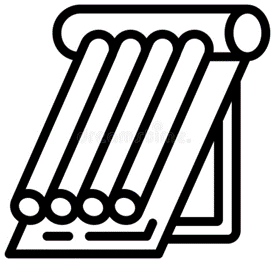
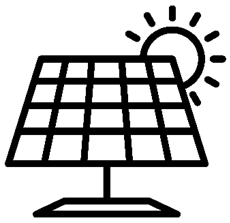
4.3.5 Domestic Hot Water

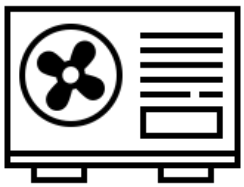
Hot water generations accounts for 48.47% of the overall regulated energy demand within the dwellings, therefore the design team have selected a highly efficient and low carbon strategy to address this demand, in accordance with Part L and Fingal Development Plan. Air Source Heat Pumps (ASHP) provide an efficient, low carbon and future proofed means of space heating and domestic hot water heating. The heat pumps absorb heat from the atmosphere by directing a flow of air across the primary (evaporator) side of the heat pump. The heat pump, through the normal refrigerant cycle elevates the temperature of the rejection (condenser) side circuit water to upwards of 65°C. Exhaust air Heat Pump (EAHP) operates in a similar manner to air source heat pump.

To help reduce domestic hot water consumption, the dwellings will be provided with efficient water fittings to sanitaryware such as flow restrictors to showers and taps. This will allow the dwellings to achieve an estimated water consumption of ≤125 litres/person/day. Within the Creche, the domestic hot water generation will be provided via the Air Source Heat Pump.

4.4 Be Green

A feasibility study has been carried out to determine the most appropriate low zero carbon or renewable energy systems for Former Teagasc Lands, Kinsealy. Each system was assessed based on cost, planning implications,carbon emissions reduction, maintenance and , Home Performance Index (HPI) scoring. The HPI strategy is summarised in Section 5 of this report.

Technology	Comment	Feasibility
	Ground mounted wind turbines can be located in an open area away from obstructions such as buildings Due to the location of Kinsealy it is deemed that a ground mounted wind turbine installation is not feasible	Low
	The term 'solar thermal' (ST) is used to describe a system where the energy from the sun is harvested to be used for its heat. Solar thermal systems differ from solar photovoltaics which convert sunlight directly into electricity. The use of the term 'solar thermal' is also associated with the integration of 'passive' heating and cooling technologies in buildings. The main application for solar thermal systems in Ireland is domestic hot water heating although there are also 'combisystems' that use non-potable thermal stores directly linked with low temperature space heating Solar thermal systems typically have a payback greater than 10 years and also require regular maintenance. Given the proposed energy strategy is an all-electric solution, solar photovoltaic panels would provide a greater energy and carbon saving compared to solar thermal. For this reason, solar thermal has been discounted for Kinsealy	Medium
	Photovoltaic (PV) panels offer a “passive” method for generation of electricity. Photovoltaic systems use solar cells to convert sunlight into electricity. The PV cell consists of one or two layers of a semi-conducting material, usually silicon. When photovoltaic modules are exposed to the sun rays, they generate a direct current (DC). The DC power is typically converted into AC power dependant on the application, which is then utilised	High

	by the systems on site and/or exported to the electrical grid and sold. In summary the greater the solar intensity, the greater the flow of electricity. With upcoming changes to feed in tariffs, PV panels have a payback period of approximately 6 years.	
	This system utilises a series of air source heat pumps (ASHP) designed to cater for the heating, cooling, and hot water loading of a building. The heat pumps absorb heat from the atmosphere, by directing a flow of air across the primary (evaporator) side of the heat pump. The heat pump, through the normal refrigerant cycle elevates the temperature of the rejection (condenser) side circuit water to typically 50degC. The 50°C water produced by the ASHPs would typically be stored within buffer vessels. This heated water would be the primary source for heating the domestic hot water cylinder for hot water generation. The systems efficiency Coefficient of Performance (COP) varies depending on the external temperature and the temperature to which the water is heated but can range between 2.50 – 3.80. As ASHP extract heat from external air at a high efficiency, they are classified as a renewable energy source and contribute towards the renewable energy ratio (RER) under TGD Part L 2022. This technology is deemed as feasible for the Houses, and Creche at Kinsealy.	High
	Ground source heat pumps (GSHP) are a proven and efficient method of heating and cooling both domestic and non-domestic developments. Heat pumps use refrigerant gases and an electrical compressor to take heat from a source and deliver it to an output. Chillers and refrigerators are examples of systems that remove heat, but other types of system use the heat removed from a source to heat a building. Traditional heat pumps use the air as the source of heat. However, the ideal source for maximum efficiency would be one having a stable temperature, and the ground provides such a resource. The ground itself acts as a solar collector and thermal store. The surface is warmed by the sun and the adjacent air during daytime and in the summer. Similarly, it is cooled during the night-time. Fluctuations in ground temperature reduce with depth and stabilise at the annual mean for the location by about 12m below the surface. This temperature ranges between 9°C -12°C in Ireland	Low

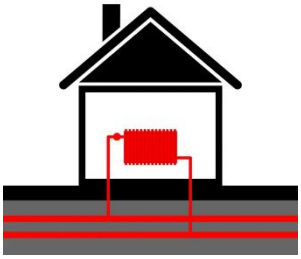
	District Heating is a method of delivering thermal energy in the form of hot water through a network of highly insulated pipelines. In this way, heat rather than fuel is delivered to buildings. This works in much the same way as the electricity system; energy is produced at large plants and transported over a network, and usage is metered at each building. Like the electricity grid, large systems have transmission and distribution networks, and energy feeds into the network from a variety of sources and technologies. This means there is no actual fuel delivered to buildings and no heating plant is required in each building, therefore no gas, oil or coal deliveries or connections, and no open fires, gas or oil boilers and flues are required. A heat exchanger at each building transfers the heat energy from the DH network to the building's own water based heating system, and heat is supplied for both space heating (SH) and domestic hot water (DHW). A desktop feasibility study determines that there are no existing or currently proposed district heating networks within the vicinity of the proposed Kinsealy development. The closest future proposed network being within SDRA 10 NEIC located 9.74km from the proposed development Therefore district heating is not a feasible solution for Kinsealy	Low
	Exhaust air heat pump (EAHP) operate in a similar manner to air source heat pumps. However, as opposed to extracting heat from the external air which varies between -5°C to 26°C, EAHP's extract air from the building's wet rooms for hot water generation. EAHPs have a high COP of 3.9 due to the high extract air temperature of around 20°C which is constant all year, guaranteeing high seasonal efficiency. EAHP's are optimal for small apartments or terraced dwellings with a low heat loss parameter. This technology is deemed as feasible for the Duplexes at Kinsealy.	High

Table 9: Review of renewable energy technologies

Following the feasibility assessment for Kinsealy, the most feasible renewable energy strategy is to incorporate highly efficient air source heat pumps to provide space heating and hot water for the Houses and exhaust air heat pumps to provide space and water heating for Duplexes. For the Creche, ASHPs will be used to provide the space heating and cooling requirement where necessary.

4.5 Electric Vehicle Charging

Electric vehicle charging provision shall be provided in accordance with the requirements set out in TGD Part L, European Union (Energy Performance of Buildings) Regulations 2021 and Fingal County Council Climate Action Plan 2024 to 2029. The requirements vary across buildings other than dwellings, and dwellings

4.5.1 Buildings other than dwellings

The EU (Energy Performance of Buildings) requires that New buildings or buildings undergoing major renovations (other than a dwelling) shall install at least one recharging point and ducting infrastructure for at least one in every 5 car parking spaces to enable the subsequent installation of recharging points for electric vehicles.

Building Regulations Technical Guidance Document L 2022 Conservation of Fuel and Energy – Buildings other than Dwellings, section 1.4.7.1 Electric Vehicle Recharging Infrastructure states that; for new buildings, where there are more than 10 car parking spaces and where the car park is located inside the building, e.g. a basement car park; or the car park is physically adjacent to the building, i.e the car park is within the curtilage of the site, the following minimum electric vehicle recharging installation should be provided:

(a) at least 1 recharging point within the meaning of Directive 2014/94/EU of the European Parliament and of the Council of the European Union;
(b) ducting infrastructure, consisting of conduits for electric cables, for at least 1 in every 5 car parking spaces, or part thereof, to enable the subsequent installation of recharging points for electric vehicles;
(c) at least 1 accessible recharging point;or 5% of the total recharging point provision, whichever is the greater, in accordance with similar provision for accessible car parking spaces as outlined in TGD M 2010 Sub-section 1.1.5. Where only 1 recharging point is provided this should be located so that it can be used either from a standard car parking bay or from an accessible car parking bay, and where his is not possible then 2 recharging points should be provided.

The creche, within the proposed development, is the only non-dwelling building. The creche has been allocated with 7 car parking spaces, 1 of which will be provided with a recharging point and ducting infrastructure shall be provided to 1 additional space.

4.5.2 Dwellings

Building Regulations Technical Guidance Document L 2022 Conservation of Fuel and Energy – Dwellings, section 1.4.6.1 dwelling house electric vehicle recharging infrastructure states that; For a new building (containing one, or more than one, dwelling), ducting infrastructure, consisting of conduits for electric cables, should be provided for every parking space, to enable the subsequent installation of recharging points for electric vehicles where:

- The car park is located inside the building, e.g. a basement car park; or
- The car park is physically adjacent to the building i.e. the car park is within the curtilage of the site.

The infrastructure should be installed in accordance with I.S. 10101:2020. Appropriate electric vehicle recharging infrastructure will provide a safe, unobstructed route, e.g. ducting infrastructure, from a metered electrical supply point to a future recharging point location, to enable the installation of an electric vehicle recharging point without the need for builder's work.

For the proposed development all residential dwellings with on-curtilage parking will have appropriate electric vehicle recharging infrastructure, to allow for future installation of an electric vehicle recharging point.

Functional electric vehicle charging points will be provided to a serve 9 off curtilage car parking spaces within the Former Teagasc Lands, Kinsealy development. Please refer to the site services drawing “23039-XXX-DR-DLW-E-600” for the proposed locations of EVC charging points.

5.0 Home Performance Index

The HPI Certification is Ireland's national certification for new homes. Similar to certification for commercial development like LEED and BREEAM, except that it's specifically designed for residential development and aligns to Irish building regulations. The certification is based on over 30 verifiable indicators across five categories; Environment, Health & Wellbeing, Economic, Quality Assurance and Sustainable Location.

This section will summarise the HPI assessment for the proposed development at Former Teagasc Lands, Kinsealy. The HPI assessment is assessed throughout the design and construction process, therefore some indicators and percentages are subject to change as the design progresses.

The scoring across the five categories are summarised in the table below:

Category	Total Standard Available	Total Awarded
Environment	38.00%	22.00%
Health & Wellbeing	17.00%	9.00%
Economic	13.00%	5.00%
Quality Assurance	17.00%	11.00%
Sustainable Location	15.00%	5.25%
Total	100.00%	52.25%
Achieved Standard		Certified

Table 14: Kinsealy HPI Scoring Summary

When targeting the mandatory credits for HPI, in conjunction with the proposed base design information, the results show that the expected level achieved at this stage for Kinsealy HPI Certified. The blocks achieve a total of 52.25%, where a minimum of 45.00% is required for certification.

6.0 Conclusion

This report prepared by Delap & Waller, outlines the sustainable fabric and services specification strategy for the proposed development at Former Teagasc Lands, Kinsealy to demonstrate compliance with Part L 2022 and Fingal Development Plan 2024-2029. This report forms part of the planning application. The proposed development consists of 193 dwellings, along with a creche and public open spaces. The mix of dwelling typologies include of a mix of 2 and 3 bed houses, apartments and duplexes. The proposed development will be designed and constructed to meet Approved Document Part L 2022 Conservation of Fuel and Energy – Dwellings and Buildings other than Dwellings. This standard is also referred to as Nearly Zero Energy Building Standard (NZEB), which has become the regulatory standard since October 2022. The Part L regulation requires an overall improved energy performance for the fabric, services, lighting and renewable specification.

For the Creche unit, the standard requires a Carbon Performance Coefficient (CPC) level of <1.00 and an Energy Performance Coefficient (EPC) level of <1.15. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the buildings overall regulated primary energy use. However, where the energy performance and carbon performance is significantly lower than the maximum permissible targets, a renewable energy source providing 10% of the buildings primary energy demand is compliant.

For the residential dwellings, the standard requires an overall improved energy performance for the fabric, services and lighting specification. The standard requires a Carbon Performance Coefficient level of <0.35 and an Energy Performance Coefficient level of <0.30. The nZEB also introduces a mandatory requirement for renewable energy sources, providing 20% of the primary energy use.

Be Lean, Be Clean, Be Green principles of the energy hierarchy have been incorporated throughout the design whereby space heating, cooling and lighting energy demand is minimized through a passive fabric first approach. This is exemplified through improved u-values, good thermal detailing, air tightness, high levels of natural daylight and a passive thermal comfort strategy. A feasibility study was carried out to determine the most feasible and effective low zero carbon and renewable energy technologies for the development. The analysis and proposed strategy use highly efficient Air Source Heat Pump (ASHP) and Exhaust Air Heat Pump (EAHP) to deliver space heating and domestic hot water.

Using proposed fabric, energy and renewable strategy, all buildings within the proposed development achieve compliance with TGD Part L 2022 and consequently the Fingal Development plan policies. Compliance has been demonstrated through DEAP and NEAP calculations. Tables 10 and 11 below summarises the energy, carbon and renewable energy performance of the proposed dwellings. Table 12, details how the proposed development complies with each of the relevant policies within the Fingal County Council Climate Action Plan 2024 to 2029.

House/Duplex Type	Energy Performance Coefficient	Carbon Performance Coefficient	Renewable Energy Ratio	BER Rating
House -Type A	0.264	0.173	0.515	A2
House -Type B1	0.255	0.165	0.537	A2
House -Type C	0.257	0.166	0.542	A2

House -Type D1	0.250	0.161	0.544	A2
Duplex – Type A1 - GF	0.265	0.171	0.249	A2
Duplex – Type B1 - GF	0.273	0.177	0.257	A3
Duplex – Type A1 - FF	0.256	0.166	0.238	A2
Duplex – Type B1 - FF	0.260	0.169	0.243	A2

Note: Shower flow rate 6 litre/min has been used in all house-types.

Table 10: Part L energy, carbon and renewable performance – Dwellings

Unit Type	Energy Performance Coefficient	Carbon Performance Coefficient	Renewable Energy Ratio	BER Rating
Creche	0.83	0.67	0.23	A2

Table 11: Part L energy, carbon and renewable performance – Creche

Policy Reference	Policy	How the proposed development complies
Policy CAP4	Ensure that the County's need for sustainable environmental infrastructure is addressed in a way which contributes to wider climate action goals and targets.	All electric energy strategy is supported through upgrades to the electrical infrastructure including ESB substations.
Policy CAP5	Ensure the built environment is equipped for the impacts of climate change by supporting climate change mitigation and adaptation measures as part of new and existing developments.	Overheating risk analysis is carried out to dwellings and creche, to ensure that passive measures incorporated during construction, will be suitable to mitigate future climate scenarios.
Policy CAP8	Support the retrofitting and reuse of existing buildings rather than their demolition and reconstruction where possible.	N/A no existing buildings on site.
Policy CAP9	Support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing buildings, including retrofitting of appropriate energy efficiency measures in the existing building stock.	Low Zero Carbon Technologies are proposed for all dwellings through Air Source or Exhaust Air Heat Pumps.
Policy CAP10	Promote low carbon development within the County which will seek to reduce carbon dioxide emissions, and which will meet the highest feasible environmental standards during construction and occupation, New Development should provide:	1. Daylighting assessment demonstrates high level of natural daylight achieved. Natural purge ventilation via openable windows and cross ventilation. This provides free cooling during warmer months. Sustainable

	1. Building layout and design which maximises daylight, natural ventilation, active transport and public transport use. 2. Sustainable building/services/site design to maximise energy efficiency. 3. Sensitive energy efficiency improvements to existing buildings. 4. Energy efficiency, energy conservation, and the increased use of renewable energy in existing and new developments. 5. On-site renewable energy infrastructure and renewable energy. 6. Minimising the generation of site and construction waste and maximising reuse or recycling. 7. The use of construction materials that have low to zero embodied energy and CO2 emissions.	transport assessment carried out through HPI, identifying sustainable transport options. 2. Fabric first approach applied to building fabric to minimise energy demand. Highly efficient and decarbonised energy strategy using ASHPs. 3. N/A no existing buildings on site. 4. Fabric first approach, highly efficient and all electric energy strategy, water conservation measures through low water use fittings. 5. Air Source Heat Pumps providing Renewable Energy Ratio, required for Part L. 6. Commitment through HPI, that resource waste management plan will be developed. Additionally, at least 70% of the non-hazardous construction and demolition waste is prepared for re-use, recycling and material recovery. 7. Embodied Carbon analysis shall be carried out in accordance with HPI. Preferred construction methodology is to use timber frame for external walls, which has a lower CO_{2e} compared with traditional masonry or hybrid steel frame.

Table 12: Demonstrating compliance with relevant policies