JV TIERNEY & CO
MECHANICAL ELECTRICAL & SUSTAINABLE ENGINEERS

DEVOY BARRACKS DEVELOPMENT
ENERGY STRATEGY & BER REPORT

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ENERGY STRATEGY & BER REPORT

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1. Executive Summary

The energy strategy outlined in this report shows the steps required to deliver low energy and carbon consuming dwellings at the Devoy Barracks development in line with the requirements of the Near Zero Energy Building (NZEB) directive. A preliminary DEAP assessment on a number of sample apartment types was carried out (See Table 1 below) demonstrating that the design intent will be in compliance with Part L of the Building Regulations 2021 and will have indicated Building Energy Ratings (BER) of A2/A3 demonstrating the requirements set out under the NZEB criteria.

Table 1 Summary BER/Part L Results

Apartment type	EPC	CPC	RER	BER	Comment
2 Bed Type X5	0.285	0.276	0.31	A2	Part L Compliant
1 Bed Type X2	0.299	0.29	0.32	A3	Part L Compliant
2 Bed Type K1	0.289	0.28	0.31	A2	Part L Compliant

2. Introduction

This report is prepared by JV Tierney and Co. on behalf of the applicant, the Land Development Agency. The report forms part of the SHD planning application documentation.

The development site is located on John Devoy Road, Naas, Co Kildare, known as Devoy Barracks. The nett site is 3.97 hectares in area, the area of the application is 4.11 hectares. The proposed development is for the construction of 219 no. residential units, comprising of a mix of terraced houses (42 no. in total), and duplex / apartment units (177 no. in total) ranging in height from 2 to 5 storeys, a 59-place childcare facility, public and communal open spaces and all associated site works and infrastructure. Vehicular and pedestrian access is proposed via an existing access point on the John Devoy Road along the southern boundary with additional pedestrian and cycle access provided to the east, and future pedestrian and cycle connection opportunities provided to the north, west and east.

The report sets out the energy strategy for the proposed development and demonstrates how compliance with building regulations Part L and Near Zero Energy Building (NZEB) compliance will be achieved. Part L 2021 – Dwellings, sets out the definition of a **Near Zero Energy Building (NZEB):**

"Nearly Zero Energy Building means a building that has a very high energy performance, as determined in accordance with Annex I to Directive 2010/31/EU of the European Parliament and the Council of 19 May 2010 on the energy performance of buildings (recast)(O.J. No. L 153, 18.6.2010, page 13). 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."

The energy strategy for this development is to use efficient passive and active measures coupled with the appropriate renewable technology to deliver a robust, cost effective, efficient and healthy environment within the development site. The development provides an opportunity to create environmentally sound and energy efficient buildings, both domestic and non-domestic, by using an integrated approach to design, planning, construction and operation.

Sustainable and energy efficient development promotes resource conservation of our limited natural resources. The design strategies employed will include a whole life cycle approach to management and planning of the development, energy efficiency with specific focus on reducing the carbon footprint and delivering the NZEB criteria, improving the environmental quality of the building spaces, material selection and use, waste management, water management and conservation and enhancing the ecological value of the site.

There are many significant drivers for energy and sustainable design; -

- The increasing cost required to provide services such as energy and water.
- Stricter energy targets set under the Building Regulations now and into the future i.e. the NZEB criteria and Ireland's National Energy and Climate Plan 2021 -2030.
- The desire to provide energy efficient and low carbon building development to demonstrate energy awareness and efficiency of use.
- Requirements for building lifecycle considerations for all new residential developments.
- Kildare City Council's (KCC) Climate Change Adaptation Strategy 2019-2024 to minimise the impact on the environment from activities through energy conservation and carbon reduction.
- KCC Development Plan 2017 -2023 objectives regarding Climate Change and Energy Efficiency.

3. Energy Strategy Approach

In developing the energy strategy for the development at Devoy Barracks to meet the NZEB criteria, the incorporation of energy efficient strategies into the project deliverables will encourage the commitment to sustainable design at a very early stage with all concerned to ensure a 'best in class' development for the site. The approach will seek to ensure that the dwellings will meet the principles of the Government's 'National Energy and Climate Plan 2021 -2030', KCC Development Plan 2017 - 2023 objectives with regard to Climate Change and Energy Efficiency, and the NZEB criteria as set out in Part L Regulations 2021 and will maximise the Building Energy Rating of the dwelling (See Figure 1) and reduction in Carbon Dioxide (CO_2) emissions thus demonstrating the commitment to Climate Change.

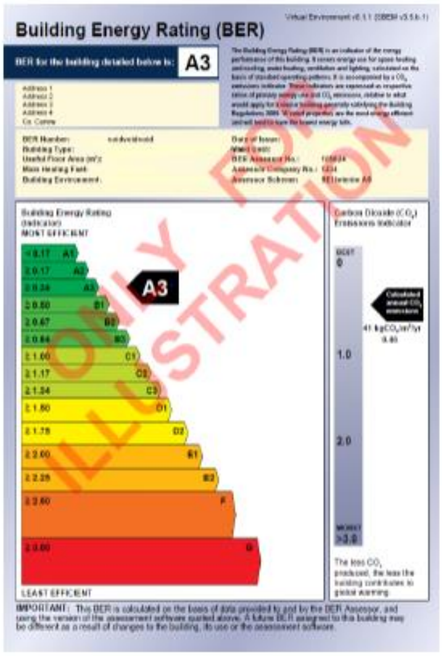


Figure 1 Example BER Certificate

The strategy approach will be to firstly maximise the passive benefits of the buildings fabric, orientation, etc. followed by the inclusion of highly efficient M&E systems to achieve a design that will meet the Renewable Energy Ratio (RER) target of 20% outlined in Part L 2021 Regulations. This 20% RER figure is outlined under the Part L Regulations on the basis that the building has a Maximum Permitted Energy Performance Coefficient (MPEPC) of ≤ 0.3 with a corresponding Maximum Permitted Carbon Performance Coefficient (MPCPC) of ≤ 0.35.

I. Maximise the passive elements of the design:

- Specifying building fabric insulation u-values better than the Part L/ NZEB specification (See Table 2)
- Using dynamic thermal modelling to optimise the façade using differing glazing u-values, light transmittance and solar gain (‘g’ values).
- Targeting natural daylight factors that meet CIBSE and BRE Guidelines. Good natural daylight creates a positive living environment and contributes to the well-being of the occupants. (Please refer to the sunlight and daylight report as prepared by Arc Consulting which sets out the modelled daylight provision in the development). The provision on the elevations of high-performance glazing for the dwellings that meet with the NZEB and BER requirements, will maximise the use of natural daylight and will enhance the visual comfort for the occupants. The high-performance glazing will also ensure that the thermal performance of the buildings is not compromised, while allowing the building occupants to enjoy the benefit of the glazed views.
- Using Façade studies in conjunction with the Design Team using computer modelling techniques to maximise the daylight factors, ventilation and solar benefits specific to the Devoy Barracks site. The efficient use of natural light will help to offset the use of artificial light.
- Ensuring particular detailing of linear thermal bridging by using ACD thermal bridging values (0.08 W/m^2K).

Table 2 Proposed Outline Specification

Item	Part L 2021 Reference Values	Proposed Outline Specification (Range)
Flat Roof	0.20 W/m^2K	≤ 0.14 W/m^2K
Pitched Roof	0.20 W/m^2K	≤ 0.14 W/m^2K
Walls	0.18 W/m^2K	≤ 0.18 W/m^2K
Floor	0.18 W/m^2K	≤ 0.12 W/m^2K
Windows	1.4 W/m^2K	≤ 1.3 W/m^2K
Air Permeability	≤3m^3/m^2.h @50Pa	≤ 3m^3/m^2.h @50Pa

II. Maximising the Active elements of the design:

- Heat Source – Please refer to Table 3 below. The heating source will be based on providing an Exhaust/Air Heat Pump solution for the Apartments, Houses and Duplex units.
- Specifying the use of high efficiency light fittings, LED lights, etc. for use in dimming, presence/ absence detection, occupancy and daylight controls
- Specifying lighting designs that deliver > 90 lumen/ circuit watt
- Specifying high efficiency Heating systems
- Minimise the specific fan power where applicable.
- Use of M&E systems and plant that are high efficiency and registered on the SEAI Triple E register of products

III. The renewable technology employed will again be based on the type of building being served, the most optimum technology from an operational and maintenance viewpoint and the ability of the technology to meet the RER target projected (See Table 3) including the optimum billing solution for the buildings. The approach will be to address the electrical energy usage in the first instance as this has the highest primary energy factor and technologies such as Solar PV, Exhaust/Air Heat Pumps will be considered to meet the renewable source produced on-site or nearby as per the NZEB definition.

Table 3 Heat Source and Renewable Energy Solution

Item	Type	Energy Source	Source
1	Apartments/Houses/Duplex Units	Individual	Exhaust/ Air Source Heat Pump

IV. Additional items for consideration in supporting the delivery of the energy and sustainable strategy.

- Development of a flexible design to enhance each building's longevity and expandability.
- Computer analysis of the natural ventilation strategy will be carried out for the impact of climate change using approved CIBSE 2050 weather files. This will ensure that there will be no

need to alter the ventilation strategy of the buildings where a natural ventilation strategy is employed.

- During design and construction phases, environmental assessment methodology will be used to ensure that the buildings are developed holistically.
- An integrated Water Management and Conservation approach that incorporates the use of low water consumption equipment to ensure the minimal use of potable water, efficient sanitary appliances (low water WC cisterns, push spray taps). The proposed Devoy Barracks scheme will incorporate the following SUD's systems with the aim of reducing water usage and conserving energy through reduced pump power:
  - low water usage sanitary appliances,
  - permeable paving,
  - local infiltration trenches.
- Extend the sustainable approach from the Building to the Site throughout the construction and handover process.
- Reduce Reuse and Recycle throughout the design, construction and operational phases of the development.
- Own door billing options.
- Provision of electric car charging facilities as required under Part L Regulations.
- All public and amenity lighting will use low energy LED light fittings and be installed in line with Kildare City Council specifications.
- Whole life cycle approach to the selection of materials and equipment used in the buildings with specific regard to the impact on the carbon footprint.
- During the design and construction stages of the project environmental assessment methodologies will be used to assist in the development of a life cycle approach, in which approach the principles of IS0 15686 – Building and Constructed Assets – Service Life Planning – Life Cycle Costing (LCC) will be used (see Figure 2). The life cycle analysis will assess the long-term operation of the development of a 60year timeframe and will consider all aspects of the development from maintenance costs to running costs to replacement costs and noting that certain M&E elements especially those with moving parts will have a typical life cycle of 10 - 15 years and this will be accounted for in the LCC analysis.

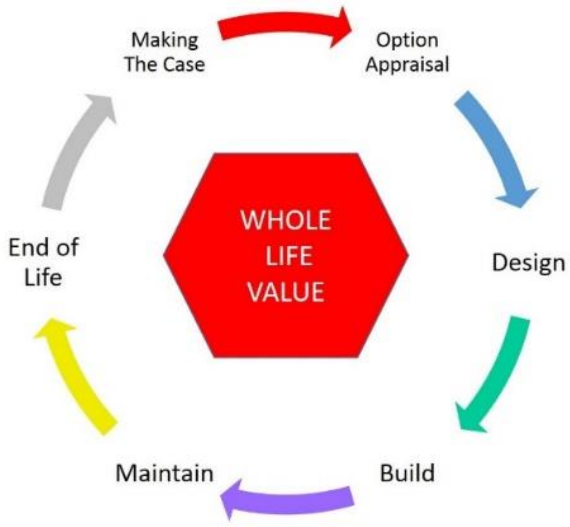


Figure 2 Whole Life Cycle Approach

The additional investment required to deliver a sustainable and energy efficient design in line with the Kildare City Council Development Plan will add long term value for the building's owners and users. These benefits will require less energy, less services and therefore less resources to operate than is required for existing developments and will make the buildings more energy and environmentally efficient and will ensure that they are more sustainable buildings into the future.

Appendix 1

a. Report on Preliminary Design BER/ NZEB Building Compliance

Introduction

This report outlines a design stage NZEB building compliance assessment for the social and affordable houses/apartments in the Devoy Barracks development project. The buildings are designed to exceed the proposed provisions of the Building Regulations Part L 2021 and will offer a sustainable and adaptable design to meet future provisions to these standards.

The strategy approach to the design of the facilities is firstly to maximise the passive measures of the buildings (insulation, solar gains, daylight, etc.) and then apply the most efficient active measures (Heating Plant, lighting controls and power density, etc.) and only then apply renewable technologies that are environmentally and economically viable.

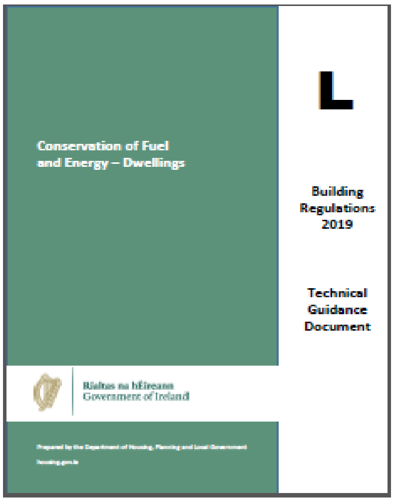


Figure 1: Building Design Standards

The following key elements will be included in the design parameters:

V. Maximise the passive elements of the design in the first instance by:
   - Specifying building fabric insulation u-values equal to or better than the Part L 2021 Regulations.
   - Targeting the air permeability to be ≤ $3m^3/m^2/hr$ @ 50Pa
   - Using the DEAP Software to optimise the façade using differing glazing u-values, light transmittance and solar gain ('g' values).
   - Ensuring particular detailing of linear thermal bridging.

Maximising the Active elements of the design by:

- Specifying lighting designs that deliver > 90 lumen/ circuit watt
- Specifying lighting systems with occupancy and daylight controls in Landlord areas.
- Specifying high efficiency Heating systems
- Minimise the specific fan power where applicable.

By addressing the passive and active elements of the building design as outlined above, the strategy will achieve a design that exceeds the Renewable Energy Ratio target of 20% as outlined in the Part L Regulations 2021 on the basis that the building has a Maximum Permitted Energy Performance Coefficient ≤ 0.3 with a corresponding Maximum Permitted Carbon Performance Coefficient ≤ 0.35.

The renewable technology employed will target the highest primary energy factor and technologies such as Solar PV, Exhaust/Air Source Heat Pumps will be utilised to meet the renewable source produced on-site or nearby as per the NZEB definition.

Renewable Options Considered

The following renewable energy sources have been considered as outlined in the Energy Performance Directive for alternate energy systems for the development. The most feasible technologies currently that will achieve the criteria for NZEB is the use of PV Solar Panels, Exhaust/Air Source Heat Pumps on their own or in combination with other technologies based on the final developed design:

	Feasibility			
Technology	High	Med	Low	Comments
Ground Source Heat Pumps (GSHP) Closed Loop 	√			GSHP technology uses seasonal differences between ground and air temperatures to provide heating in winter and cooling in summer. GSHP provide low temperature heating and high temperature cooling suitable for underfloor heating or chilled beams. Site restrictions would be a consideration with vertical boreholes been most practical but also more capital intensive. Impact on the Primary Energy factor can be significant with Heat Pumps but additional capital and area required is a constraint.

Table 1: GSHP Feasibility

	Feasibility			
Technology	High	Med	Low	Comments
Air Source Heat Pump (ASHP) 	√			ASHP technology uses seasonal differences between external air temperatures and refrigerant temperatures to provide heating in winter and cooling in summer. As most of the energy is taken from the air they produce less greenhouse gas than a conventional heating system over the heating season. Most efficient when used as a pre-heat mechanism as the COP remains high and therefore has a major impact on the RER % and NZEB criteria.

Table 2: ASHP Feasibility

	Feasibility			
Technology	High	Med	Low	Comments
Exhaust Air Heat Pump (EAHP) 	√			Hot water for space and hot water heating is generated via. an exhaust air heat pump. Part L compliance is met through generating space heating and hot water from heat recovered from hot air within the apartment. Ventilation is provided by exhaust air working on differential pressure. Very efficient when the COP of the unit is high and therefore has a major impact on the RER % and NZEB criteria

Table 3: EAHP Feasibility

	Feasibility			
Technology	High	Med	Low	Comments
Combined Heat & Power (CHP) 	√			Combined heat and power (CHP) refers to the local simultaneous generation of electricity and heat. CHP works best in areas that have a constant “round the clock” demands for heat. CHP systems typically run on oil or gas with biomass also used. Key to a CHP installation is to ensure that the demand load for heating and electricity usage are utilized, i.e. to size the unit correctly on a base load basis. Can assist in meeting the RER requirement under NZEB but energy load dependent.
	Feasibility			
Technology	High	Med	Low	Comments

Wind Power 			√	Micro wind turbines can be fitted to roofs but do not supply much energy. Full scale turbines need open space and are capital intensive but deliver large energy savings. There is considerable health and safety issues associated with wind turbines. Good impact from a Primary Energy perspective.

Table 4: CHP & Wind Power Feasibility

	Feasibility			
Technology	High	Med	Low	Comments
Solar Photovoltaic 	√			Solar PV collectors absorb the sun's energy and converts it into electricity. PV Panels can be discrete roof-mounted units or embedded in conventional facades, etc. The ideal location for locating the PV system is facing a southerly direction. Good impact from a Primary Energy perspective and RER% under NZEB.

Table 5: Solar PV Feasibility

	Feasibility			
Technology	High	Med	Low	Comments
Solar Thermal 			√	Solar collectors absorb the sun's energy and provide energy for space heating and hot water generation. The ideal location for locating the solar system is southerly direction. Solar systems are usually designed to meet only a portion of the heating load. Available roof area is better utilised with PV Panels as has higher Primary Energy impact.
	Feasibility			
Technology	High	Med	Low	Comments
Biomass Heating 			√	Biomass boilers combust wood chips or pellets and is considered carbon neutral. The technology requires significant plant space and ongoing maintenance.

Table 6: Solar Thermal & Biomass Heating Feasibility

b. NZEB Details for House and Apartments at Devoy Barracks

We have carried out an NZEB analysis on a sample number of apartment types for the proposed development at Devoy Barracks to demonstrate that the NZEB strategy approach outlined by the Design Team will deliver compliant buildings in line with the provisions of the Building Regulations Part L 2021. This report provides a preliminary design stage energy assessment, using the DEAP 4.2 Software tool as issued by the Sustainable Authority of Ireland (SEAI). The Dwelling Energy Assessment Procedure (DEAP) is a software tool and manual which calculates energy consumption and carbon dioxide emissions. It considers space heating, ventilation, water heating, and lighting in a dwelling.

The Dwelling Energy Assessment Procedure (DEAP) is the methodology for demonstrating compliance with specific aspects of Part L of the Building Regulations. DEAP is also used to generate the Building Energy Rating (BER) and advisory report for new and existing domestic buildings. DEAP calculates the energy consumption and CO_2 emissions associated with a standardised use of a building. The energy consumption is expressed in terms of kilowatt hours per square meter floor area per year ($kWh/m^2/yr$) and the CO_2 emissions expressed in terms of kilograms of CO_2 per square meter floor per year ($kg\ CO_2/m^2/yr$).

Buildings assessed

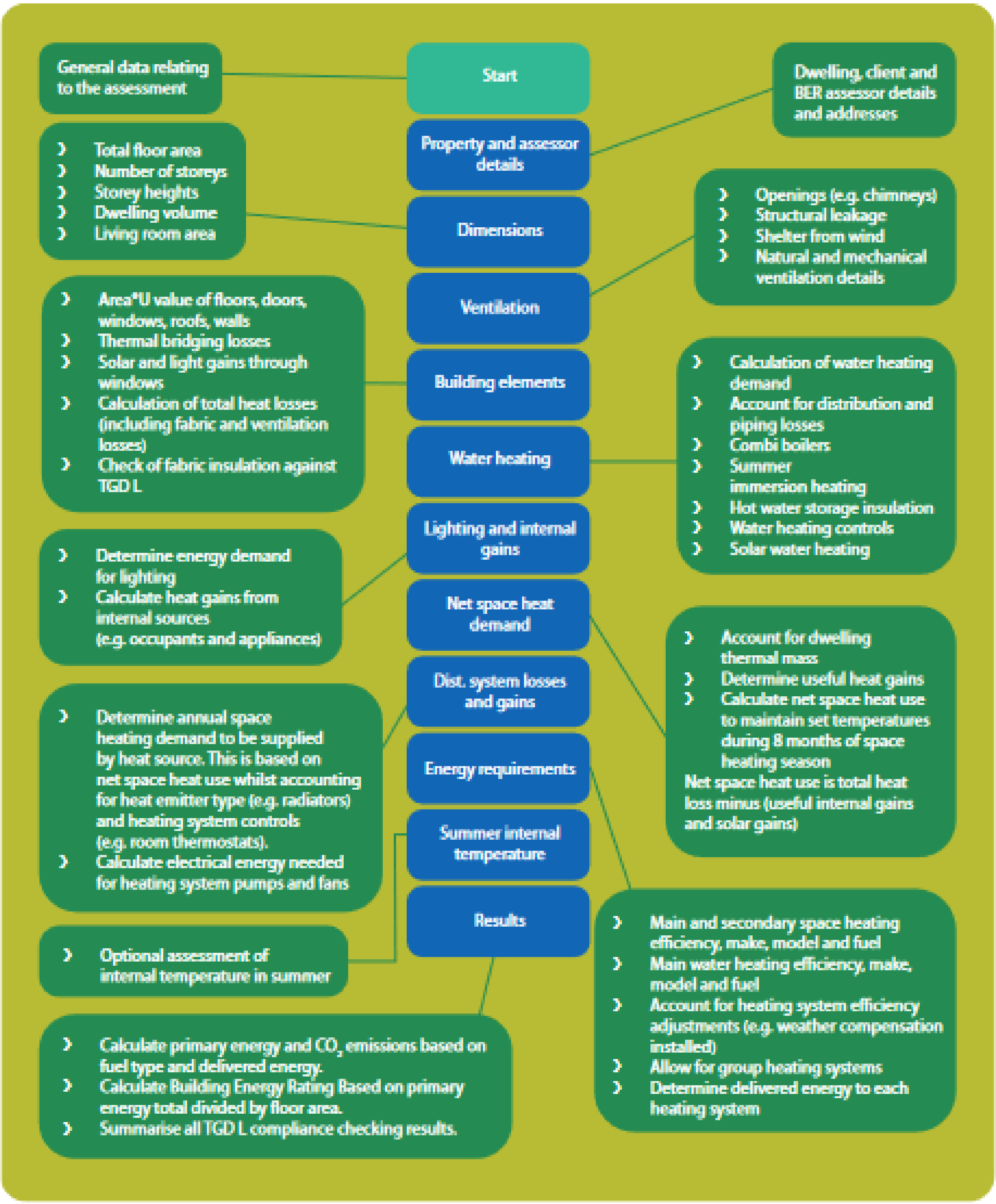
The Preliminary DEAP assessment was carried out on the following building type:

A) Typical 1 Bed Type X2
B) Typical 2 Bed Type X5

C) Typical 2 Bed Type K1

DEAP Procedure (source: www.seai.ie).

The following outlines the DEAP Procedure.



Tab	Main user entry actions	Visible calculated outcome and other comments
Start	Administrative details of the dwelling and BER assessment including electricity Meter Point Reference Number (MPRN), new/existing dwelling, TGD L version, construction date and dwelling type.	As entered
Property and assessor details	Details of property, client and Assessor	As entered
Dimensions	Area and height of each storey, area of living room, number of storeys.	› Total floor area, dwelling volume and living area fraction. › Total energy usage is divided by the dwelling floor area to determine the Building Energy Rating. › All dimensions in DEAP are internal – this is a standard convention in UK and other EU member states. Irish Building Regulations Part L work to internal dimensions.
Ventilation	Openings (e.g. chimneys), structural leakage and mechanical ventilation systems.	› Ventilation heat loss (components and total), electricity for fans, heat gain from fans. Air permeability compliance check with Building Regulations 2008 and 2011 TGD L requirements. › Number of openings (such as chimneys, permanently open wall/window vents) is likely to have a significant bearing on the BER. If using mechanical ventilation, it is best to use test data from SAP Appendix Q rather than default data.
Building elements: › Floors › Walls › Roofs › Doors	Heat loss building element dimensions and U-values. Default U-values may be used for existing dwellings.	› Total Area*U-value for each element type. U-value is the rate of heat loss per m^2 surface area per degree. E.g. a U-value of 1, with a temperature inside of 21 and outside of 11 on a $1m^2$ wall area has a rate of heat loss of 10W. › Best to use actual calculated U-values instead of defaults, but supporting evidence must be acquired from survey or dwelling specifications (such as insulation type, thickness, area, certified test data). Certified data from Agrement certs or accredited data gives insulation thermal conductivity. The DEAP Manual details the applicable European U-value calculation standards (such as EN6946 for walls and roofs). › Adding insulation to a poorly insulated building element will have a significant bearing on the BER.
Building elements: Windows	Window and glazed door dimensions, orientations, U-values and shading characteristics. Defaults may be used for new or existing dwellings.	› Glazed area, heat loss, effective area for solar gain, glazing ratio for daylight gain, summer heat gain. › Window orientation is important. Actual U-values and solar transmittance should be used where available from certified data (to relevant European standards such as EN10077-1;2).

Tab	Main user entry actions	Visible calculated outcome and other comments
Building elements: Heat loss results	Thermal bridging factor	› Tab calculates fabric heat loss, total heat loss coefficient and heat loss parameter for the dwelling. Compliance check with Building Regulations fabric insulation requirements (for Building Regulations 2005 - 2011 TGD L as appropriate for the dwelling) is also carried out. › Obtain more beneficial thermal bridging factor from certified calculations or use of Acceptable Construction Details for new dwellings as published by DECLG. › Dimensions are internal as per TGD L. Thermal bridging heat losses are added to the fabric plane elements heat losses. › A supporting spreadsheet to calculate actual Thermal Bridging heat loss as per TGD L 2011 is available on www.seai.ie
Water heating	Water heating system characteristics, including supplementary electric water heating in summer and solar water heating	› Tab calculates the hot water heating demand, solar hot water output, solar hot water pump consumption, primary circuit loss, internal heat gains from hot water, distribution losses. › Hot water storage insulation and improved hot water storage controls (time and thermostatic) are commonly used to improve the BER.
Lighting and internal gains	Proportion of fixed lighting outlets which are low energy	› Annual energy use for lighting, internal seasonal heat gains from lighting and other internal heat gains. › Installation of low energy light bulbs (CFLs, LEDs and fluorescent tubes) is a cost effective way to improve the BER.
Net space heat demand	Thermal mass category	› Mean internal temperature, annual 'useful' space heat demand from monthly calculations allowing for intermittency, solar gains and internal heat gain utilisation.
Distribution system losses and gains	Heating system control category, responsiveness category, heat emission characteristics, pumps and fans	› Annual space heat demand allowing for control, responsiveness, heat emission and equipment heat gain characteristics. › Electrical power consumed by pumps (e.g. central heating pumps) calculated. › Use of thermostats, zoning, TRVs and programmers along with other control improvements can have a significant bearing on the BER. Central heating pumps with high efficiency labels will also decrease energy consumption in DEAP.

Tab	Main user entry actions	Visible calculated outcome and other comments
Energy requirements: Individual heating system	Individual heating systems: Space and water heating appliance efficiency and fuel characteristics. Combined heat and power plant characteristics. Secondary heating (e.g. fireplace) is also considered.	› Annual delivered fuel consumption for space and water heating, CO_2 emissions. › Improved heat source efficiency is critical to obtaining a better BER. Data is preferably taken from www.seai.ie/HARP. The Home-heating Appliance Register of Performance (HARP) lists efficiencies based on accredited test data to the standards and calculation methods specified in DEAP. › Replacing an open fire with a stove and flue will reduce ventilation losses and improve the secondary heating system efficiency. Heating system efficiencies are based on Gross Calorific Values and generally are a seasonal value as calculated in the DEAP Appendices. The test data are derived from European standards (e.g. EN14511 for heat pumps).
Energy requirements: Group heating	Community/ group heating schemes: Space and water heating appliance efficiency and fuel characteristics. Combined heat and power plant characteristics.	› Annual fuel consumption for space and water heating, CO_2 emissions. › Heating system efficiency, controls and pipework should all be considered to reduce energy consumption for all dwellings heated by the group system.
Summer internal temperature	Effective air change rate of dwelling	› Optional tab › Calculates threshold internal temperature and provides approximate indication of overheating risk

Results	None	› Annual delivered energy
		› Annual primary energy and CO_2 emissions. DEAP derives these values by multiplying the delivered energy for each fuel by the associated primary energy and CO_2 factors for those fuels.
		› The BER grade ranging between A1 and G.
		› Building Regulations Compliance checking for new dwellings:
		  › Energy and CO_2 emissions compared to TGD L reference dwelling.
		  › Renewables conformance requirements checking as per TGD L
		  › Fabric insulation levels as per TGD L
		  › Air tightness checking against TGD L performance levels

Architects Drawings

The DEAP assessment is based on the architect's drawings, façade details and M&E outline specifications issued to date.

Building Performance

The construction details assumed in the assessment were as modelled as follows:

External wall area weighted average U-value – ≤ 0.18 W/m^2.K

Ground floor area weighted average U-value – ≤ 0.12 W/m^2.K

External flat/pitched roof area weighted average U-value – ≤ 0.14 W/m^2.K

Window area average U-value (incl. frame) – ≤ 1.3 W/m2.K

Door area average U-value – 1.6 W/m^2.K

Vertical glazing total solar transmittance (g-value) – 0.6 (Typical value assumed)

Glazing light transmittance – 71% (Typical value assumed – to be confirmed by architect and window manufacturer)

Air permeability/Tightness – ≤3 (m^3/ (m^2.hr)) at 50 Pa.

Thermal bridging Factor – 0.08 W/m^2.K

Mechanical & Electrical Services

Mechanical Systems

- System Type:
  - UFH/Radiators
  - DHW System
    - 150 litre DHW storage built into Exhaust Heat Pump
- Fuel Type – Electricity

Electrical Systems

- Power factor correction ≥0.95

Lighting Systems

- Energy metering for lights

Renewable Technologies

Exhaust Heat Pumps:

- Fuel Type – Electricity
- Heat Pump Heating Efficiency – sCOP >3.5
- Fraction of Heating Supplied by Heat Pump – 100%
- Fraction of DHW Supplied by Heat Pump – 85%

A) 1 Bed Apartment -Type X2

Project details	
Dwelling type	Top-floor apartment
Address	DEVOY_1BED_4thFLOOR_TYPE_X2
Eircode	
MPRN Number	
Date of assessment	13/06/2021
Type of Rating	New-provisional
Purpose of Rating	New dwelling for owner occupation
Is there an Extension?	No
Year of Construction	2022
Building Regulations	2019

Developer/owner details	
Name	JVTE
Address	53 - 56 Cork Street
Phone	01 421 4900
Email	

B) Typical 2 Bed Type X5

Project details	
Dwelling type	Top-floor apartment
Address	DEVOY_2BED_4thFLOOR_TYPE_X5
Eircode	
MPRN Number	
Date of assessment	13/06/2021
Type of Rating	New-provisional
Purpose of Rating	New dwelling for owner occupation
Is there an Extension?	No
Year of Construction	2022
Building Regulations	2019

Developer/owner details	
Name	JVTE
Address	53 - 56 Cork Street
Phone	01 421 4900
Email	

C) Typical 2 Bed Type K1

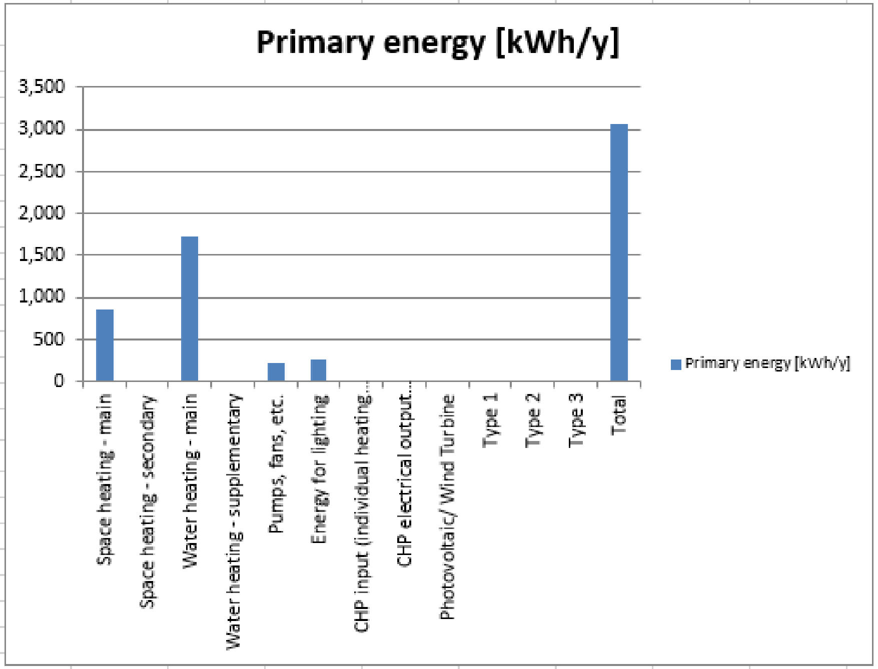
Project details	
Dwelling type	Top-floor apartment
Address	DEVOY_2BED_TOP_FLOOR_TYPE_K1
Eircode	
MPRN Number	
Date of assessment	13/06/2021
Type of Rating	New-provisional
Purpose of Rating	New dwelling for owner occupation
Is there an Extension?	No
Year of Construction	2022
Building Regulations	2019

Developer/owner details	
Name	JVTE
Address	53 - 56 Cork Street
Phone	01 421 4900
Email	

RESULTS:

A) Typical 1 Bed X2:

		Delivered energy [kWh/y]	Primary energy [kWh/y]	CO_2 emissio [kg/y]
Space heating - main		411	855	168
Space heating - secondary		0	0	0
Water heating - main		834	1,734	341
Water heating - supplementary		0	0	0
Pumps, fans, etc.		101	211	41
Energy for lighting		128	266	52
CHP input (individual heating systems o		0	0	0
CHP electrical output (individual heating		0	0	0
Photovoltaic/ Wind Turbine		0	0	0
Type 1		0	0	0
Type 2	-	0	0	0
Type 3	-	0	0	0
Total		1,474	3,065	603
per m^2 floor area		30.9	64.32	12.65
			[kWh/m^2 y]	
Building Energy Rating			64	A3



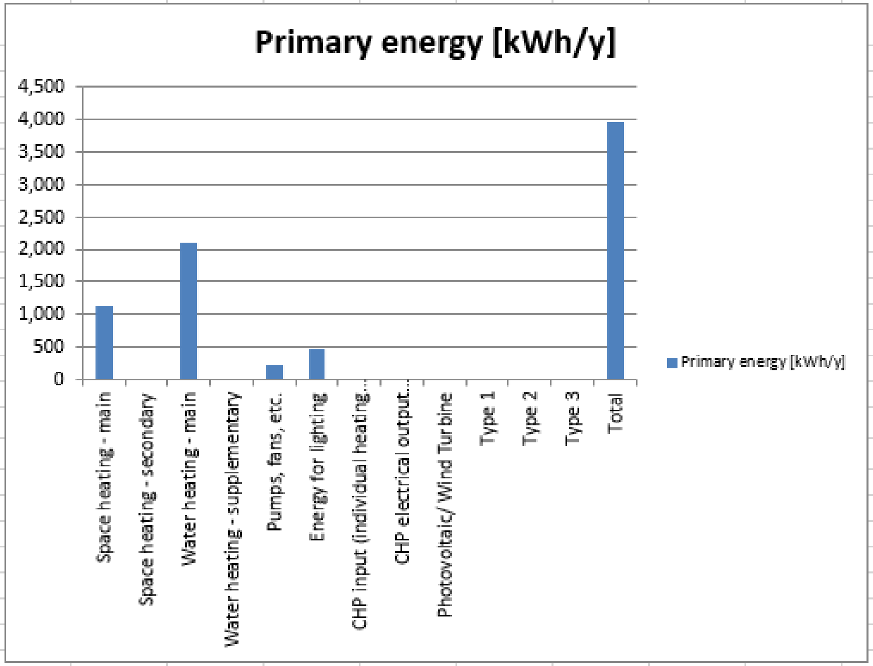
Check conformity with MPEPC, MPCPC and RER requirements in TGD L

Relevant for new-build.

	Primary energy [kWh/y]	CO2 emissions [kg/y]	Renewable Energy Ratio
Totals for reference dwelling	10,262	2,081	
	EPC	CPC	RER
Performance coefficients	0.299	0.290	0.32
Maximum permitted	0.300	0.350	0.20
	Complies	Complies	Complies

B) Typical 2 Bed Type X5

	Delivered energy [kWh/y]	Primary energy [kWh/y]	CO_2 emissio [kg/y]
Space heating - main	546	1,135	223
Space heating - secondary	0	0	0
Water heating - main	1,014	2,110	415
Water heating - supplementary	0	0	0
Pumps, fans, etc.	114	238	47
Energy for lighting	230	478	94
CHP input (individual heating systems or	0	0	0
CHP electrical output (individual heating	0	0	0
Photovoltaic/ Wind Turbine	0	0	0
Type 1	0	0	0
Type 2 -	0	0	0
Type 3 -	0	0	0
Total	1,904	3,961	779
per m² floor area	22.1	45.95	9.04
		[kWh/m² y]	
Building Energy Rating		46	A2



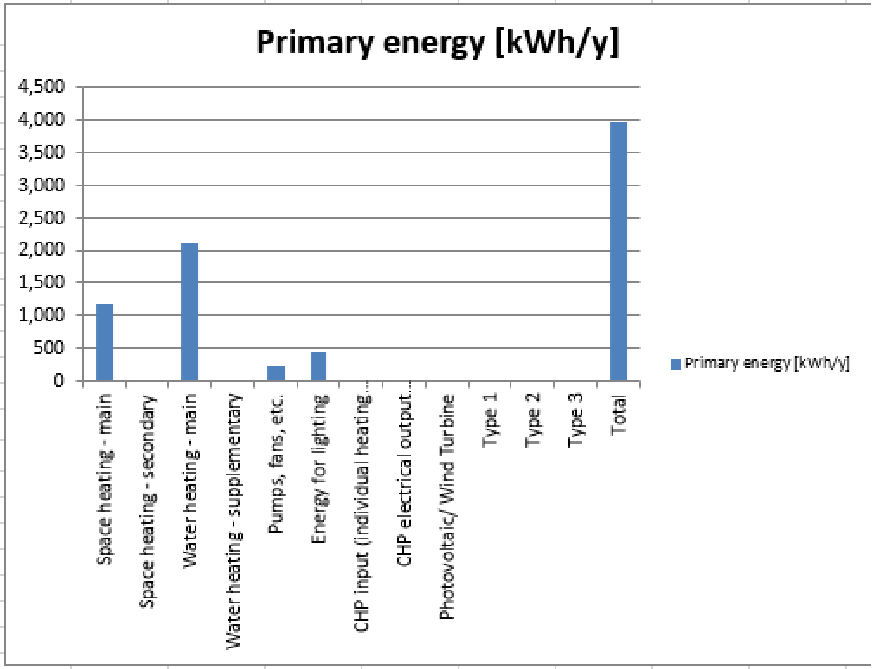
Check conformity with MPEPC, MPCPC and RER requirements in TGD L

Relevant for new-build.

	Primary energy [kWh/y]	CO2 emissions [kg/y]	Renewable Energy Ratio
Totals for reference dwelling	13,878	2,826	
	EPC	CPC	RER
Performance coefficients	0.285	0.276	0.31
Maximum permitted	0.300	0.350	0.20
	Complies	Complies	Complies

C) Typical 2 Bed Type K1

	Delivered energy [kWh/y]	Primary energy [kWh/y]	CO_2 emissio [kg/y]
Space heating - main	568	1,181	232
Space heating - secondary	0	0	0
Water heating - main	1,014	2,110	415
Water heating - supplementary	0	0	0
Pumps, fans, etc.	114	238	47
Energy for lighting	212	441	87
CHP input (individual heating systems oi	0	0	0
CHP electrical output (individual heating	0	0	0
Photovoltaic/ Wind Turbine	0	0	0
Type 1	0	0	0
Type 2 -	0	0	0
Type 3 -	0	0	0
Total	1,908	3,969	781
per m^2 floor area	22.1	46.05	9.05
		[kWh/m^2 y]	
Building Energy Rating		46	A2



Check conformity with MPEPC, MPCPC and RER requirements in TGD L

Relevant for new-build.

	Primary energy [kWh/y]	CO2 emissions [kg/y]	Renewable Energy Ratio
Totals for reference dwelling	13,717	2,791	
	EPC	CPC	RER
Performance coefficients	0.289	0.280	0.31
Maximum permitted	0.300	0.350	0.20
	Complies	Complies	Complies

The preliminary DEAP assessment shows indicative EPC and CPC compliant apartment buildings in accordance with Part L of the Building Regulations 2021.

Signed:

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Rory Burke, Chartered Engineer
Director
J.V. Tierney & Co.

Date: 28-02-2022