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SUSTAINABILITY REPORT

LIBRARY SQUARE RINGSEND

PUBLIC REALM IMPROVEMENT AND LIBRARY REFURBISHMENT AND EXTENSION

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DUBLIN

CLIMATE ACTION AND SUSTAINABILTY STATEMENT

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1. Introduction

The proposal comprises an extension to the existing public Library and redevelopment of the associated public realm and roads at Library Square, Ringsend, Dublin D04 Y970.

Works to the Library include a single storey extension which wraps around two sides and rear of the existing building preserving the front elevation, and which includes the demolition of the lean-to ancillary structure to the rear. The new extension increases the building footprint from 247m2 to 544m2, comprising universal access to a new main entrance foyer to the northern façade which includes a buggy store and public disabled access WC to the north and meeting room, flexible exhibition space, and children's area to southern half of the extension. It is proposed to restore stepped access to the existing Library front door as part of building conservation. This door will be retained as emergency access only. Provision is also made for staff office space, meeting rooms, a canteen, WC and various plant space. At roof level a green/blue roof and solar panels will be introduced in line with the DCC Development Plan 2022 – 2028.

Works to the public realm include re-alignment and reduction of road levels to allow the creation of a new controlled pedestrian crossing from Library Square to St. Patrick's Villas; relocation of Dublin Bus stop No.356; provision of segregated inbound and outbound bicycle lanes; re-paving works to the Library Square plaza and the surrounding public realm generally; the introduction of a suite of new street furniture to include bench seating, bicycle parking, litter bins and wayfinding as required; feature planting with specimen trees and provision of SUDS drainage benefit; feature lighting to enhance the new environment; relocation of 'The Door' sculpture to a central location within the plaza.

Along Fitzwilliam Street works include re-alignment and reduction of the vehicle carriageway to 3.1m; repositioning of the universally accessible parking space adjacent to the medical centre; clear definition of the pedestrian and vehicular spaces by introducing raised kerbs including a 1.2m pedestrian refuge zone along the southern & western facade of the proposed library extension; the introduction of a suite of street furniture to include bench seating and bicycle parking; feature planting with specimen trees and provision of SUDS drainage benefit;. It is proposed to limit the vehicle length allowed to access Fitzwilliam Street to 8m.

The sustainable and energy strategy for the Ringsend Library Square development site will employ an approach that will demonstrate how the library can achieve NZEB compliance based on the Part L 2022(Non-Domestic) Building Regulations. Part L 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 of the EU Energy Performance of Buildings Directive Recast (EPBD Recast) 2010/31/EU of 19 May 2010. 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 strategy to sustainable and energy efficient design for the development at the Ringsend Library Square will use efficient passive and active measures coupled with the appropriate renewable technology to deliver a robust, cost effective, energy efficient and healthy environment within the library site. The Ringsend Library Square provides an opportunity to create an environmentally sound and energy efficient building by using an integrated approach to design, planning and construction. Sustainable development promotes resource conservation of our limited natural resources while catering for climate change impacts.

The design strategies employed will include a whole life cycle approach (See Figure 1) to management and planning, energy efficiency with specific focus on reducing the carbon footprint through a design that meets the requirements of the Near Zero Energy Building (NZEB) standard, material selection, waste management, improved transportation and non-polluting modes of transport and enhancing the ecological value of the site.

There are several increasingly significant drivers for sustainable and energy efficient design which are;

- The rapidly increasing costs required to provide services, such as energy and water.
- Stricter energy and carbon emissions targets set under the Building Regulations through the introduction of the NZEB Standard now and into the future.
- The desire to provide an energy efficient building development to demonstrate energy awareness, low carbon design and efficiency of use.
- Inclusion of building lifecycle considerations.

- Dublin City Council's (DCC) Climate Change Action Plan 2019-2024 to reduce carbon emissions over the life of the Plan.
- DCC Development Plan 2022-2028 objectives regarding Climate Change and Energy Efficiency.
- The Government's plan to continue to decarbonise the built environment through the enactment of the Climate Action and Low Carbon Development Amendment) Act 2021.

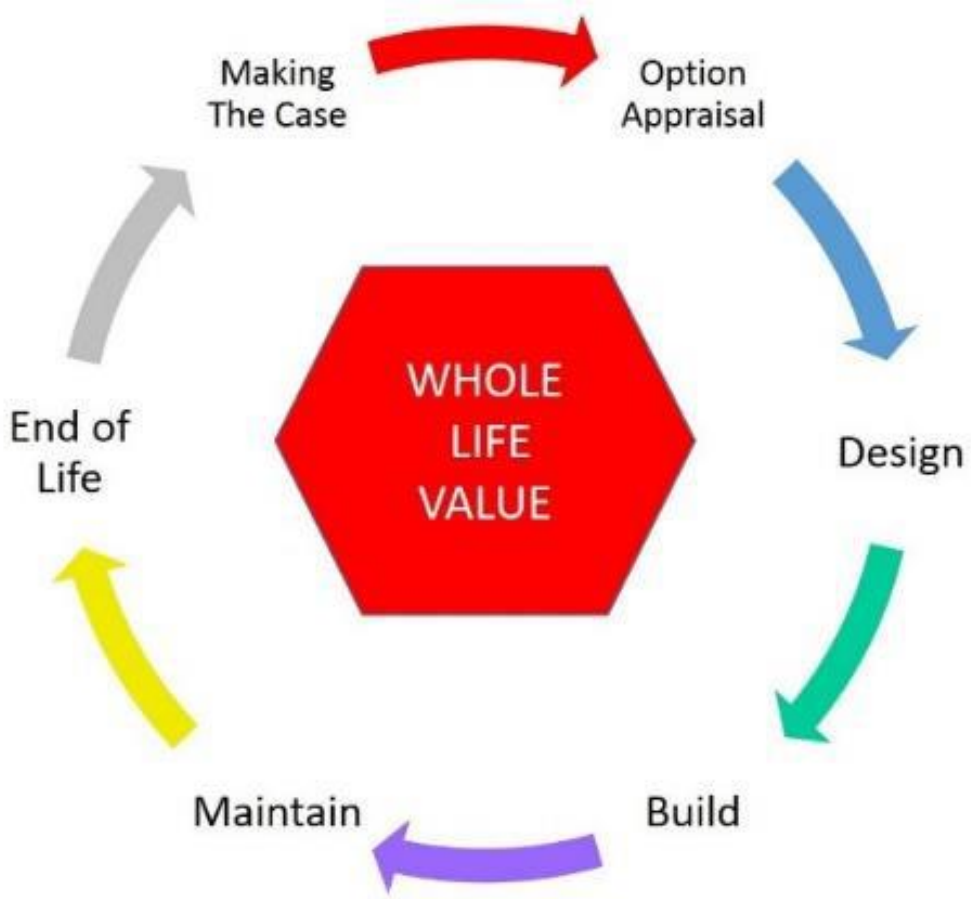

Figure 1 - Whole Life Cycle Design Consideration

2. Sustainability Strategy Approach

In developing the vision for the 'Sustainable and Energy Strategy' for the development at the Ringsend Library Square development, the incorporation of sustainable strategies into the project deliverables will encourage the commitment to sustainable design at a very early stage with the Client and Design Team to ensure a 'best in class' development. This approach will ensure that the development meets the principles of the Government's 'National Climate Change Policy', DCC Development Plan 2022 -2028 objectives regarding Climate Change and Energy Efficiency and that it exceeds the requirements of the Building Regulations Part L 2022 and maximises the reduction in Carbon Dioxide (CO_2) emissions thus demonstrating the Client's commitment to Climate Change.

The sustainable strategy will seek to incorporate appropriate and effective economic and environmental measures. In this respect, consideration will be given to the following:

- Development of a flexible design to enhance the buildings longevity.
- Maximising the use of passive design measures such as the building façade to take advantage of the site constraints/orientation, use of enhanced fabric u-values in excess of Part L 2022 with the delivery of an excellent air permeability rate.
- Improving the thermal performance of the existing library building envelope.
- Targeting natural daylight levels that meet European, CIBSE and BRE Guidelines. Good natural daylight creates a positive working environment and contributes to the well-being of the occupants and the provision of high-performance glazing on the elevations that maximises the use of natural daylight that will enhance the visual comfort for the occupants.
- Carrying out Façade studies in conjunction with the Architect using computer modelling techniques to maximise the daylight factors, ventilation and solar benefits specific to the Ringsend Library Square site.
- 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.
- Use of Dynamic Thermal and Energy Simulation techniques to confirm a low energy and carbon footprint design for the development. The design will incorporate areas that will operate under natural ventilation principles and these areas will be checked for compliance with Part L of the Building Regulations for the impact of overheating. Additionally, the spaces will also be checked for the impact of Climate Change using the 2020/2050 CIBSE accredited weather files and the spaces will be confirmed to meet the compliance criteria.
- Energy efficient M&E systems and plant including HVAC, Lighting (LED efficiency), Triple E registered products, etc. that minimises the consumption of energy and maximises the air quality within the buildings using the following measures:
    - Efficient use of natural light to offset the use of artificial light.
    - Elimination of the existing fossil fuel heating systems and then specifying high efficiency heating systems with a low carbon footprint.
    - Use of High efficiency light fittings, LED lights, etc. for dimming, presence detection, daylighting.
    - Lighting Management Plan that uses daylight control in the library and automatic presence detection in areas which are intermittently occupied e.g. Common areas.
    - Use of renewable technologies to off-set Primary Energy consumption and carbon emissions where economically and technically feasible. For example, the introduction of heat pump technology and a PV Panel Array at roof level will assist in increasing the developments impact on the carbon footprint.
- Incorporation of the above design measures to maximise the Building Energy Rating (BER) for the building and set a target of an 'A Rated' building. This will demonstrate that the building has been designed to ensure energy efficiency and provide the users with a degree of certainty over their energy and carbon footprint.

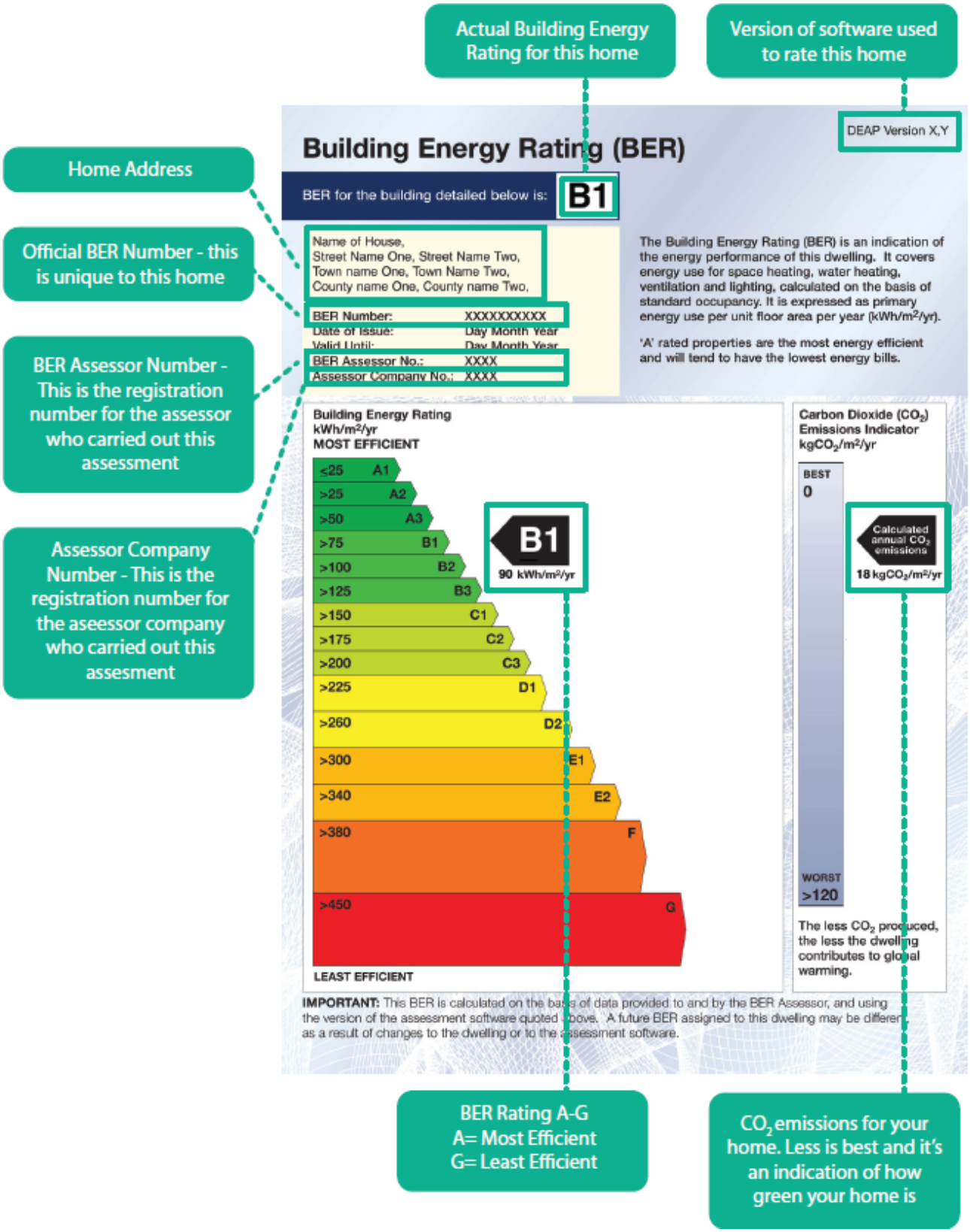

Figure 2 - Example BER Cert

- An integrated Water Management and Conservation approach that incorporates the use of low water consumption equipment in the library to ensure the minimal use of potable water, efficient sanitary appliances (low water WC cisterns, automatic flushing controls, push spray taps), water consumption and leak detection linked to a Building Management System (BMS).
- Encouraging the use of public transport by using the principles of environmental assessment methodologies to reduce the reliance on cars and encourage a shift to more carbon lowering modes of transport.
- Whole life cycle approach to the selection of materials/ plant used in the building with specific regard to the impact on the carbon footprint. Designing out of MEP where possible to reduce Embodied Carbon of plant and services. Avoidance of plant with a high weight and selection of materials based on their environmental merit. Mitigation of refrigerant impact through low refrigerant GWP and leakage rates.

Figure 3 - Material Selection Lifecycle

The additional investment required to deliver a sustainable design in line with the Dublin City Council Development Plan 2022 – 2028 will add long term value for the building occupiers. These benefits will require less energy due to the achievement of the Part L 2022 standards, less services and therefore less resources to operate than is required for existing developments and will make the library building more energy and environmentally efficient and will ensure that it is a more sustainable development into the future.

APPENDIX 1: Energy Approach

1.0 Introduction

This report outlines a preliminary design stage assessment for the Ringsend Library Square. The development consists of the delivery of a refurbished library building assessed under Part L 2022. A sustainable energy approach to the building offers an opportunity to create an environmentally sound and energy efficient building by using an integrated approach to design, planning and construction. Sustainable development promotes resource conservation of our limited natural resources, which includes energy efficiency, renewable energy, water conservation, waste minimisation and also considers the environmental impact of the operation of a building for its entire “life-cycle”.

The process to maximise the environmental performance of the Ringsend Library Square development project is driven by a holistic and fully coordinated approach in order to achieve sustainable and flexible facilities. The buildings are designed to exceed the provisions of the Building Regulations Part L 2022 (See Figure 4) and will offer sustainable and adaptable designs to meet future provisions to these standards.

The proposed Ringsend Library Square development will be designed to surpass current ‘Best Practice for low energy design as outlined in CIBSE TM46:2008 - Energy Benchmarks, which is the Government benchmark for Display Energy Certification applicable to buildings. The building will accommodate a mix of uses and varied quantities of users and the building services systems will be quick responding and flexible to adapt to these needs.

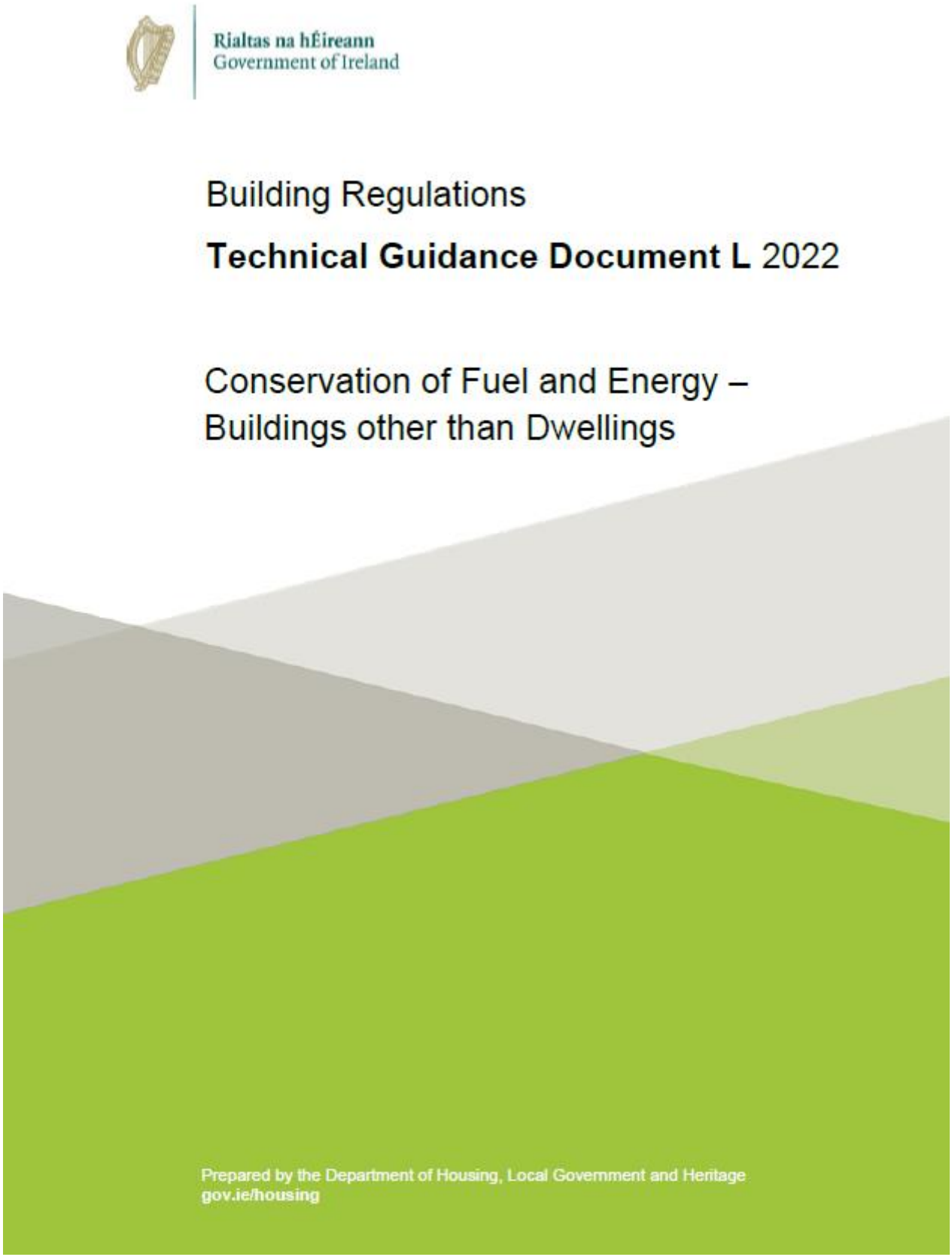

Figure 4 - Building Design Standards Part L 2022

The strategy approach to the design of the facilities is firstly to maximise the passive measures of the library building (improved insulation, solar gains, daylight, etc) and then apply the most efficient active measures (Heat Pumps, LED lighting & controls and power density, etc) and only then apply renewable technologies that are deemed environmentally and economically viable.

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

- Maximise the passive elements of the design in the first instance by:
  - Specifying building fabric insulation u-values better than the Part L 2022 standards applicable to refurbished buildings.
  - Improving the thermal performance of the existing library building envelope.
  - Targeting the air permeability to be < $3m^3/(hr.m^2)$ @ 50Pa.
  - Using dynamic thermal modelling to optimise the façade using differing glazing u-values, light transmittance and solar gain ('g' values).
  - Ensuring particular detailing of linear thermal bridging.
  - Ensuring the maximum number of spaces are naturally ventilated.
- 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 for the library and common areas.
  - Replace exiting fossil fuel heating system with a high efficiency system for the existing and new building extension.
  - Minimise the specific fan power where applicable.
- Where renewable technology is employed, it will target the highest primary energy factor and technologies such as Solar PV, Heat pumps, etc.

1.1 Renewable Options to be Considered

The following renewable energy sources will be considered for the development during the detailed design stages to assist in reducing the carbon footprint if deemed economically and technically feasible.

Table 1 - GSHP Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
Ground Source Heat Pumps (GSHP) Closed 		✓		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 2 - ASHP Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
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 energy efficiency criteria.

Table 3 - CHP Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
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.

Table 4 - Solar PV Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
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.

Table 5 - Solar Thermal Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
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.

Table 6 - Biomass Heating Feasibility

Technology	Feasibility			Comments
	Low	Medium	High	
Biomass Heating 	✓			Biomass boilers combust wood chips or pellets and is considered carbon neutral. The technology requires significant plant space and ongoing maintenance. The impact on the Primary Energy factor is not significant.

1.2 Part L Energy Building Procedure

The performance of buildings to achieve Part L compliance will be checked during the design stage using the current NEAP methodology. To assess whether a building achieves the Part L performance, it is necessary to first calculate the performance of the building being designed in SBEM v5.5h using the parameters from TGD Part L 2022 for non-domestic buildings and then compare the performance to that of the same building modelled using its actual performance specification. The actual building performance should be equal to or better than that of the building modelled with the Part L 2022 Performance Specification. The building is being designed to incorporate the necessary specification details to achieve compliance with the NZEB Standard.

1.3 Non-Domestic Energy Assessment Procedure (NEAP)

The Non-Domestic Energy Assessment Procedure (NEAP) is the methodology for demonstrating compliance with specific aspects of Part L of the Building Regulations. NEAP is also used to generate the Building Energy Rating (BER) and advisory report for new and existing non-domestic buildings.

NEAP 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/m²/yr) and the CO2 emissions expressed in terms of kilograms of CO2 per square meter floor per year (kg CO2/m²/yr).

NEAP allows the calculation to be carried out by approved software packages or by the default calculation tool, Simplified Building Energy Model (SBEM), which is based on CEN standards and has been developed by BRE on behalf of the UK Department of Communities and Local Government.

SBEM, accompanied by a basic user interface, iSBEM, calculated monthly energy use and CO2 emissions based on building geometry, construction, use and HVAC and lighting equipment. The purpose of SBEM and its interface iSBEM is to produce consistent and reliable evaluations of energy use in non-domestic buildings for

Building Regulations compliance and Building Energy Rating purposes. Although SBEM may assist in the design process, it is not primarily a design tool.

(source: www.seai.ie).

1.4 Conclusion

The building will be designed to comply with all relevant environmental and sustainable regulations. Building design and analysis will be conducted in conjunction with all relevant design team disciplines to ascertain the most suitable pathway taking consideration of building fabric, lighting, HVAC, material selection and building operation & design.

Signed: 

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Rory Burke, Chartered Engineer

Joint Managing Director

J.V. Tierney & Co.

Date: 24/01/2023