

# Energy & Sustainability Report

Barrington Tower Residential Development

Project No. C975

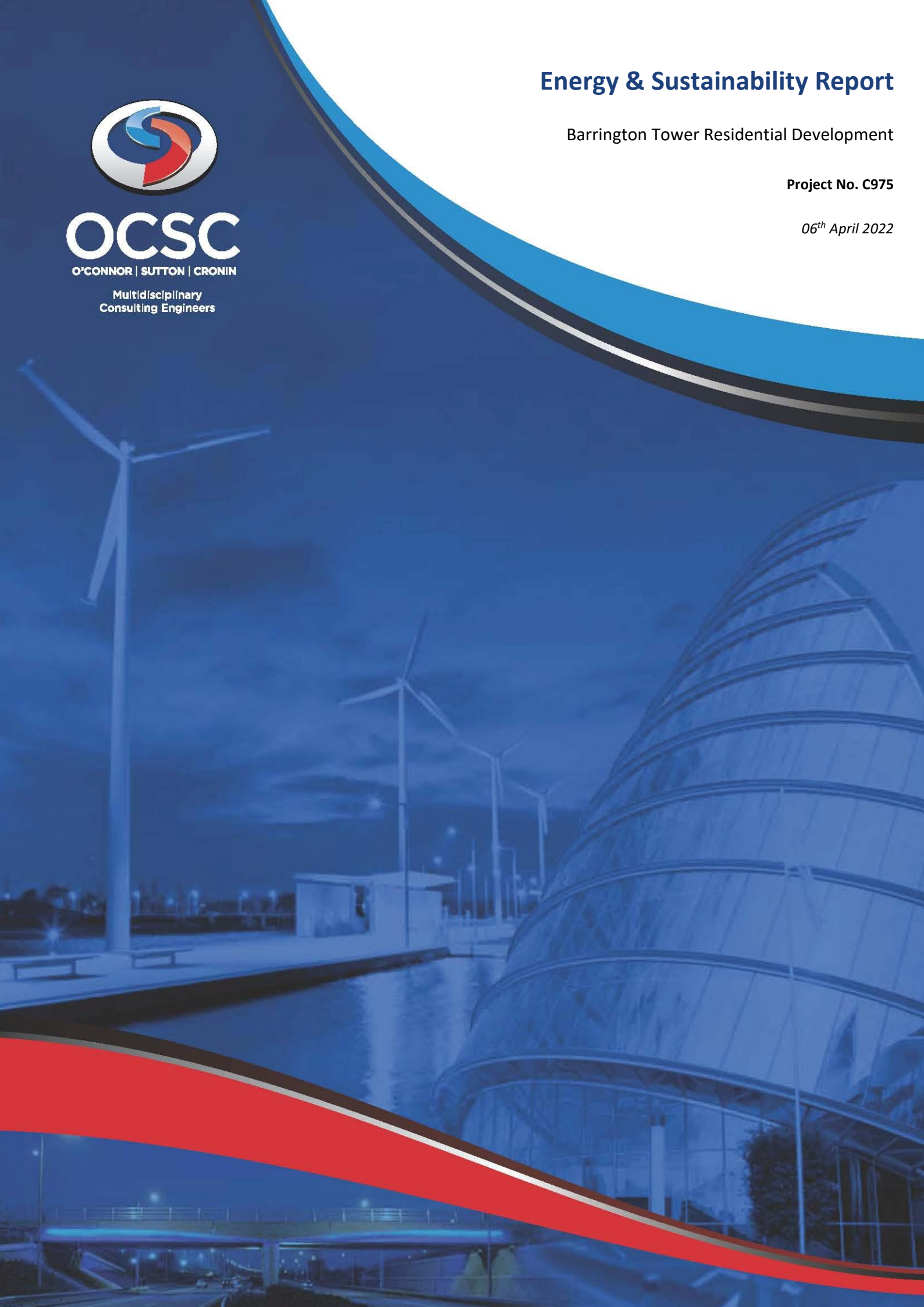
06<sup>th</sup> April 2022



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# Energy & Sustainability Report



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## DOCUMENT CONTROL & HISTORY

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## EXECUTIVE SUMMARY

This document provides an overview of how the project intends to integrate sustainability as a key strategy into the development's design. The report focuses on the performance targets required by the Building Regulations Part L – Conservation of Fuel and Energy and what energy measures are needed to ensure compliance. Furthermore, a Building Energy Rating (BER) of A2/A3 has been targeted throughout.

The following document sets out the energy design approach that requires the design to initially focus on an energy demand reduction. This will primarily be through passive strategies such as an energy efficient envelope which in turn reduces the demands relating to items such as HVAC and renewable energy systems. This initial approach in reducing the energy demand significantly aids the project in obtaining the desired energy goals while reducing running costs. Performance criteria relating to the development's building envelope are set out within this document.

The energy systems design must also focus on specifying energy efficient equipment to ensure the day to day running of the energy systems are optimised to further enhance energy savings and related energy cost. Specifications relating to efficient heating, cooling, lighting and auxiliary equipment are also set out in this document.

This report confirms that if the energy and sustainability strategy is successfully implemented, the proposed Barrington Tower development will achieve all energy and sustainability targets.

## ENERGY & SUSTAINABILITY REPORT

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## 1. INTRODUCTION

The purpose of this report is to identify the energy efficiency measures associated with the design, construction, ongoing management and maintenance of the proposed Project Barrington development located in Barrington Tower, Brennanstown Road, Dublin 18.

The proposed development will comply with Part L 2021 (Dwellings) for residential areas and Part L 2021 (Buildings Other Than Dwellings) for non-residential areas. As part of the development's efforts to further reduce energy consumption, the project is targeting an A2/A3 BER (Building Energy Rating).

Extensive work has been carried out to develop a balanced design approach to achieve these onerous targets with a number of sustainable features being incorporated into the design from the early stages.

Energy Performance Targets		
Standard / Rating	Mandatory	Target
<b>Part L Residential</b>	Yes	2021 (Dwellings)
<b>Part L Non-residential</b>	Yes	2021 (Buildings Other Than Dwellings)
<b>BER Residential</b>	Yes	A2/A3
<b>BER Non-residential</b>	Yes	A3

Table 1: Energy Performance Targets

The following sections identify a range of energy efficient measures that have been considered for the proposed Barrington Tower development.



## 2. PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.



Figure 1: Proposed Site Plan

### 3. DUN LAOGHAIRE/RATHDOWN DEVELOPMENT PLAN 2022-2028

The Dun Laoghaire / Rathdown County Development Plan 2022-2028 sets out the impact of climate change and how to deal with the problem in the future. The proposed Barrington Tower residential development will comply with the new standards set out within the policy.

A number of important policies related to energy efficient design are outlined within the plan which are addressed as follows:

#### 3.1. POLICY CA5: ENERGY PERFORMANCE IN NEW BUILDINGS

*“It is a Policy Objective to support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing and new buildings, including retro fitting of energy efficiency measures in the existing building stock.”*

- DLR’s social housing stock promotes high quality energy efficiency in new build and has a programme of energy upgrade supported by other stakeholders.
- The Development Plan can play a role in supporting and encouraging energy efficiency in the built environment.
- According to the ‘Dún Laoghaire-Rathdown Baseline Emissions Report’ it was estimated that buildings equated to 63.7% of the total carbon emissions within DLR.

The Planning Authority will support the actions of the DLR Climate Change Action Plan and overall energy conservation and energy efficiency in new and existing buildings. Design of both new and existing buildings should consider orientation, energy conservation and energy efficiency so as to promote the transition to net zero carbon.



### 3.2. POLICY CA7: CONSTRUCTION MATERIALS

“It is a Policy Objective to support the use of structural materials in the construction industry that have low to zero embodied energy and CO2 emissions. (Consistent with the RPO 7.41 of the RSES)”

The proposed project Barrington will refer to Action 118 of the National Climate Action Plan 2019 which is to “work with industry stakeholders to increase the use of low carbon materials, taking into account international best practice”.

### 3.3. POLICY CA8: SUSTAINABILITY IN ADAPTABLE DESIGN

*“It is a Policy Objective to promote sustainable approaches to the improvement of standards for habitable accommodation, by allowing dwellings to be flexible, accessible and adaptable in their spatial layout and design.”*

- It is important that the design of the proposed project Barrington’s individual buildings facilitate a good quality of life for residents and secures long-term sustainability of the overall development.
- The design of new residential developments should consider not just the immediate needs of the prospective occupants, but also their possible changing needs over the life of the building.
- The Planning Authority will also support developments that manage the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure

### 3.4. POLICY CA10: RENEWABLE ENERGY

*“It is a Policy Objective to support County, Regional, National and International initiatives and pilot schemes to encourage the development and use of renewable energy sources, including the SEAI Sustainable Energy Community initiatives, as a means of transitioning to a low carbon climate resilient County in line with national renewable energy targets.”*

Renewable energies will play an increasing role in the future in the drive to reduce GHG emission and transition to a low carbon society. DLR offers a range of opportunities for renewable energy. DLR supports the increase in use of renewable energy resources, namely solar photovoltaic, geothermal, heat pumps, district heating, solar thermal, hydro, tidal power, offshore and small-scale onshore wind.

## 4. PART L CONSERVATION OF FUEL & ENERGY - DWELLINGS

### 4.1. PART L 2021 (DWELLINGS)

Part L 2021 (Dwellings) of the Technical Guidance Document has been issued by the Minister for Housing, Planning and Local Government. This document is the new standard for dwellings constructed from 27<sup>th</sup> July 2021.

The Part L 2021 (Dwellings) regulations set energy performance requirements to achieve Nearly Zero Energy Buildings performance as required by Article 4 (1) of the Directive for new buildings.

The definition of Nearly Zero Energy Buildings is defined as:

*“Nearly zero-energy building’ means a building that has a very high energy performance, as defined in Annex 1. 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 Part L 2021 (Dwellings) requirements, a Renewable Energy Ratio (RER) has replaced the Part L 2011 renewable requirements. A RER of 20% (ratio of total primary energy generated from renewable energy resources to total primary energy consumption) is required to achieve compliance.

In line with the requirements detailed within the Technical Guidance Document, renewable energy technologies are defined as technologies that derive their energy directly from a renewable energy source, such as:

- Solar Photo-Voltaic Systems;
- Solar Thermal System;
- CHP Units (Combined Heat & Power);
- Heat Pumps (Minimum COP of 2.5).

## 5. PART L CONSERVATION OF FUEL & ENERGY - BUILDINGS OTHER THAN DWELLINGS

### 5.1. LOCATION OF NON-RESIDENTIAL DEVELOPMENT

The non-residential aspects of the development will consist of residential amenity spaces in Blocks E and I, and there is a creche and retail unit in Blocks C and D.

### 5.2. PART L 2021 (BUILDINGS OTHER THAN DWELLINGS)

The Part L 2021 (Buildings Other Than Dwellings) building regulations is the new standard for all buildings other than dwellings constructed after 27<sup>th</sup> July 2021. The Part L 2021 (Buildings Other Than Dwellings) regulations set energy performance requirements to achieve Nearly Zero Energy Buildings performance as required by Article 4 (1) of the Directive for new buildings.

The definition of Nearly Zero Energy Buildings is defined as:

*“Nearly zero-energy building’ means a building that has a very high energy performance, as defined in Annex 1. The nearly zero or very low amount of energy required should be covered to a significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby”.*

For new buildings other than dwellings, the Part L 2021 (Buildings Other Than Dwellings) ‘L1’ requirements shall be met by:

- a) providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related Carbon Dioxide (CO<sub>2</sub>) emissions to a Nearly Zero Energy Building level insofar as is reasonably practicable, when both energy consumption and Carbon Dioxide emissions are calculated using the Non-domestic Energy Assessment Procedure (NEAP) published by Sustainable Energy Authority of Ireland (1.0 for EPC and 1.15 for CPC);
- b) providing that, the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources produced on-site or nearby;
- c) limiting the heat loss and, where appropriate, availing of the heat gains through the fabric of the building;
- d) providing and commissioning energy efficient space heating and cooling systems, heating and cooling equipment, water heating systems, and ventilation systems, with effective controls;

- e) ensuring that the building is appropriately designed to limit need for cooling and, where air-conditioning or mechanical ventilation is installed, that installed systems are energy efficient, appropriately sized and adequately controlled;
- f) limiting the heat loss from pipes, ducts and vessels used for the transport or storage of heated water or air;
- g) limiting the heat gains by chilled water and refrigerant vessels, and by pipes and ducts that serve air conditioning systems;
- h) providing energy efficient artificial lighting systems and adequate control of these systems;
- i) providing to the building owner or occupants sufficient information about the building, the fixed building services, controls and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.

However, Part L (2021) – Buildings Other Than Dwellings now has additional requirements relating to self-regulating devices and electric vehicle charging.

For new and existing buildings other than dwellings, the Part L 2021 (Buildings Other Than Dwellings) 'Regulation 5' requirements shall be met by:

- a) a new building shall, where technically and economically feasible, be equipped with self-regulating devices for the separate regulation of the temperature in each room or, where justified, in a designated heated zone of the building unit;
- b) Where a heat generator is being replaced in an existing building, where technically and economically feasible, self-regulating devices shall also be installed;
- e) A building which has more than 10 car parking spaces, that is:
  - i. New, or
  - ii. Subject to subparagraph (g), undergoing major renovation, shall have installed at least one recharging point and ducting infrastructure (consisting of conduits for electric cables) for at least one in every 5 car parking spaces to enable the subsequent installation of recharging points for electric vehicles.
- g) The requirements of subparagraph (e) shall apply to a building undergoing major renovation where:
  - i. In a case where the car park is located inside the building, the renovation concerned include the car park or the electrical infrastructure of the building; or
  - ii. In a case where the car park is physically adjacent to the building, the renovations concerned include the car park or the electrical infrastructure of the car park.

### **Renewable Energy Ratio (RER):**

This is the most significant change introduced as part of the Part L 2021 (Buildings Other Than Dwellings) regulations for non-residential buildings. Some of the main performance requirements are as follows:

- The new regulations will require a significant level of energy provision be provided onsite or nearby by renewable energy technologies, e.g. solar energy (thermal and photovoltaic), air and exhaust air source heat pumps, combined heat and power, biomass boiler, etc.;
- The current NZEB definition does not allow the renewable requirement to be met through the purchase of off-site green electricity;
- There are two routes in achieving compliance with the renewable target:
  - Route 1 = If the Part L compliance is achieved with no tolerance (0% margin), 20% of the building's energy use must be provided by onsite / near site renewable technologies;
  - Route 2 = If the Part L compliance is achieved with a minimum of 10% margin, then 10% of the building's energy use must be provided by onsite / near site renewable technologies. To achieve the 10% margin, the building envelope, lighting and M&E specification will likely have to be improved above minimum requirements.

## 6. PART F VENTILATION

This report is primarily focused around achieving compliance with Part L of the building regulations, but in doing so, the ventilation systems proposed must also comply with Part F (Ventilation) of the Technical Guidance Documents (TGD).

The TGD Part F 2021 document revolves around two requirements as outlined below:

Means of ventilation.

- *F1 – Adequate and effective means of ventilation shall be provided for people in buildings. This shall be achieved by:*
  - a) *Limiting the moisture content of the air within the building so that it does not contribute to condensation and mould growth, and*
  - b) *Limiting the concentration of harmful pollutants in the air within the building.*

Condensation in roofs.

- *F2 - Adequate provision shall be made to prevent excessive condensation in the floor or in a roof void above an insulated ceiling.*

The proposed development will be designed to achieve compliance with Part F of the building regulations.

## 7. BUILDING ENERGY RATING (BER)

As of 1<sup>st</sup> July 2009, all newly built domestic and non-domestic buildings and existing buildings that are for sale or rent require a BER (Building Energy Rating) certificate.

The actual building energy rating 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 provides the anticipated carbon emissions for a year of occupation based on the type of fuel that the building systems use. The following determines the extent of primary energy consumption within the building:

- Building type (residential, office, retail, etc.);
- Building orientation;
- Thermal envelope (insulation levels of the façade, roofs, ground floor etc);
- Air permeability (how much air infiltrates into the building through the façade);
- Heating systems (what type of plant is used and how efficient it is);
- Cooling systems (what type of plant is used and how efficient it is);
- Ventilation (what form of ventilation is used - natural ventilation, mixed mode mechanical ventilation);
- Fan and pump efficiency (how efficient are the pumps and fans);
- Domestic hot water generation (what type of plant is used and how efficient it is); and
- Lighting systems (how efficient is the lighting).

The areas identified above will be described within this report and categorised under three main headings through “The Energy Hierarchy Plan”. i.e. Be Mean, Be Lean, Be Green.



## 8. THE ENERGY HIERARCHY PLAN

Through the specification of an energy efficient façade and HVAC systems, the energy consumption of a building will be reduced compared to a set baseline. This ensures the environmental and economic impact of the operation of the building is reduced.

The key steps in the Energy Hierarchy Plan are outlined as follows:

1. The key philosophy of this plan is to first reduce energy demand by improving the building's thermal envelope, increasing air tightness, improving thermal transmittance and applying passive design techniques.
2. The second step is to utilise energy in the most efficient way through the selection and installation of energy efficient plant and equipment.
3. The final step is to introduce energy from renewable sources to reduce the burden on fossil fuels.

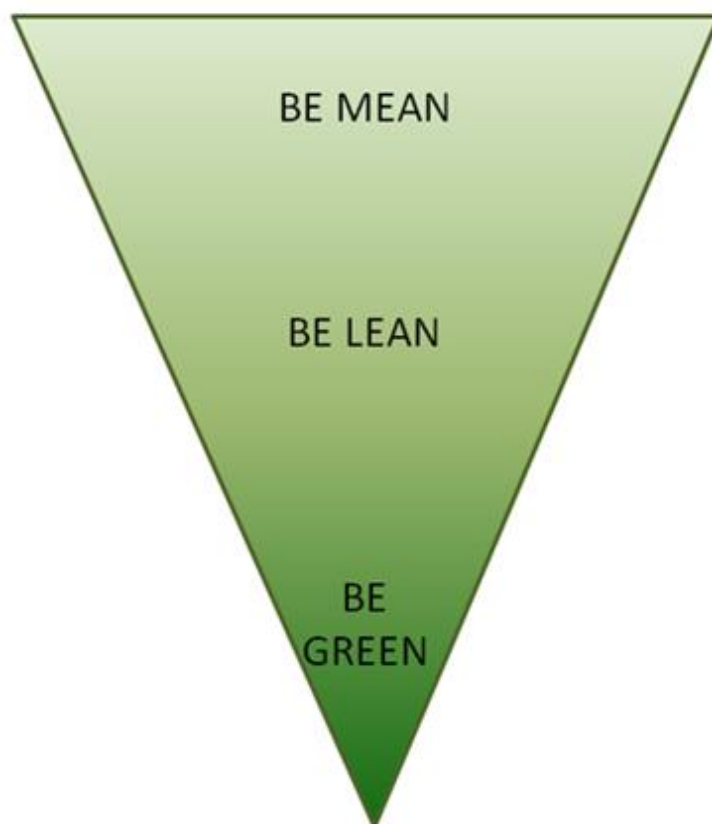


Figure 2: Energy Hierarchy Plan

## 8.1. STEP 1 (BE MEAN) – USE LESS RESOURCES

The following measures will be implemented to reduce the energy consumption of the proposed development:

- High performance U-values;
- Improved air tightness; and
- Improved thermal transmittance and thermal bridging design.

### 8.1.1. HIGH PERFORMANCE U-VALUES

To limit the heat loss through the façade, careful consideration must be shown when designing the external façade. The specification of the insulation utilised, and the continuity of insulation are crucial. Insulation slows the rate at which heat is lost to the outdoors. Heat flows in three ways: by conduction, convection and radiation.

The targeted maximum average elemental U-Values for both the residential and non-residential aspects of the proposed development are outlined in Table 2 and Table 3 below.

Fabric Element	Barrington Tower Maximum Average Elemental U-value (W/m <sup>2</sup> .K)
External Walls	0.18
Flat Roof	0.18
Ground Contact & Exposed Floor	0.18 (0.15 if underfloor heating installed)
External Windows & Doors	1.40

Table 2: Residential Building Envelope Thermal Performance Targets

Fabric Element	Barrington Tower Maximum Average Elemental U-value (W/m <sup>2</sup> .K)
External Walls	0.20
Flat Roof	0.18
Ground Contact & Exposed Floor	0.20 (0.15 if underfloor heating installed)
External Windows & Doors	1.40

Table 3: Non-residential Building Envelope Thermal Performance Targets

### 8.1.2. AIR TIGHTNESS

One major contributing factor to unnecessary heat loss is infiltration. Infiltration is the air leakage of external air into a building due to the pressure difference associated with internal and external temperatures.

It is intended that the residential and non-residential development will both target an air permeability rate of  $3 \text{ m}^3/\text{hr}/\text{m}^2 @ 50 \text{ Pa}$ .



Figure 3: Air Tightness Testing Examples

### 8.1.3. THERMAL TRANSMITTANCE

Thermal bridges occur where the insulation layer is penetrated by a material with a relatively high thermal conductivity and at interfaces between building elements where there is a discontinuity in the insulation. The residential and non-residential aspects of the development will be designed to achieve low thermal bridging values throughout.

#### **Residential:**

A Y value of  $\leq 0.08 \text{ W}/\text{m}^2.\text{K}$  is being targeted for the residential side of the development, in accordance with Part L (2021) – Dwellings requirements. The risks relating to mould growth/ condensation risks will also be assessed, in accordance with Part L (2021) – Dwellings.

#### **Non-residential:**

There are no Psi value targets required for the non-domestic elements of the development. However, the risks relating to mould growth/ condensation risks will still have to be assessed, in accordance with Part L (2021) – Buildings Other Than Dwellings.

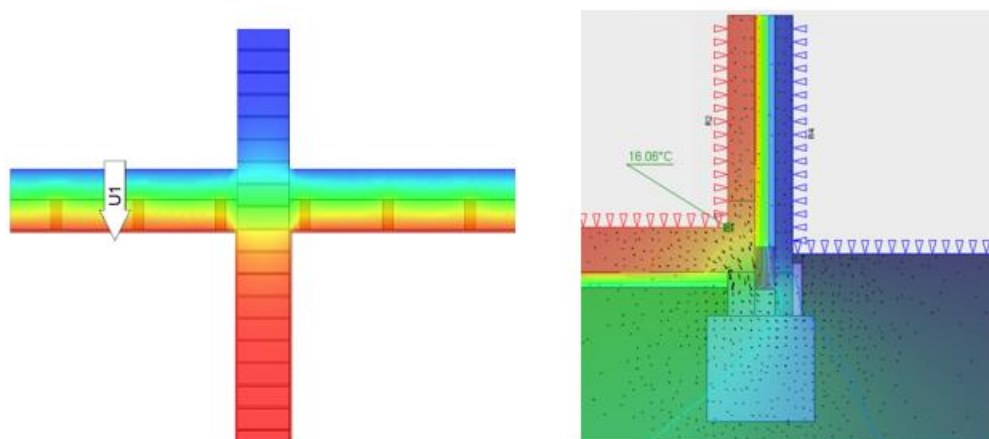


Figure 4: Thermal Bridge Assessment Examples

#### 8.1.4. OVERHEATING ANALYSIS

Due to factors such as climate change, population increase and construction of high-rise buildings there has been an increase in high internal temperatures. Overheating of buildings can be extremely uncomfortable for the occupant and can ultimately lead to costly mitigation measures.

##### **Residential:**

The proposed Barrington Tower residential development will be evaluated and analysed with respect to overheating as outlined in Part L 2021 (Dwellings) and CIBSE TM59 (Design Methodology for the Assessment of Overheating Risk in Homes).

##### **Non-residential:**

The proposed Barrington Tower non-residential development will be evaluated and analysed with respect to overheating as outlined in Part L 2021 (Buildings Other Than Dwellings) and CIBSE TM52 (Limits of Thermal Comfort: Avoiding Overheating in European Buildings).

## 8.2. STEP 2 (BE LEAN) – USE RESOURCES EFFICIENTLY

To maximise the effectiveness of changes to the construction, it is important to use the energy sources within the building as efficiently as possible.

### 8.2.1. LOW ENERGY PLANT - RESIDENTIAL

To improve the overall energy efficiency of the residential aspect of the development, plant is to be selected based on performance and energy efficiency.

**Space Heating:** The plant options for space heating are:

- Community heating via Combined Heat & Power plant (CHP), Air Source Heat Pumps (ASHP), and High Efficiency Condensing Gas Boilers, or
- Exhaust Air Heat Pumps (EAHP).

**Domestic Hot Water:** The plant options for domestic hot water are:

- Community heating via Combined Heat & Power plant (CHP), Air Source Heat Pumps (ASHP), and High Efficiency Condensing Gas Boilers, or
- Exhaust Air Heat Pumps (EAHP).

**Ventilation:** The plant options for ventilation are:

- Mechanical Ventilation and Heat Recovery, or
- Mechanical Extract Ventilation via the EAHP.

**Variable Speed Drives (VSDs):** Variable speed drive motors are to be fitted to all fans and pumps servicing all HVAC systems. Standard fans and pumps operate at a constant speed to meet maximum demand even though only half the building may be occupied. VSDs have the ability to ramp up or down depending on the load requirements, making this the most efficient auxiliary system to install.

### 8.2.2. LOW ENERGY PLANT - NON-RESIDENTIAL

To improve the overall energy efficiency of the non-residential aspect of the development, plant is to be selected based on performance and energy efficiency.

**Space Heating:** The plant options for space heating are:

- High Efficiency Condensing Gas Boilers, or
- Air Source Heat Pumps (ASHP), or
- Variable Refrigerant Flow (VRF) Heat Pumps.

**Domestic Hot Water:** The plant options for domestic hot water are:

- High Efficiency Condensing Gas Boilers, or
- Air Source Heat Pumps (ASHP), or
- Instantaneous "Under-Sink" Water Heaters.

**Space Cooling:** The plant options for space cooling are:

- Natural ventilation where possible, and/or
- Variable Refrigerant Flow (VRF) Heat Pumps, or
- Air Source Heat Pumps (ASHP), or
- Air-cooled Chillers.

**Ventilation:** The proposed ventilation strategy for the building will be natural ventilation where possible and/or mechanical ventilation. The mechanical ventilation system will be a high efficiency, variable speed drive system that also incorporates heat recovery and CO<sub>2</sub> control.

**Variable Speed Drives (VSDs):** Variable speed drive motors are to be fitted to all fans and pumps servicing all HVAC systems. Standard fans and pumps operate at a constant speed to meet maximum demand even though only half the building may be occupied. VSDs have the ability to ramp up or down depending on the load requirements, making this the most efficient auxiliary system to install.

### **8.2.3. LIGHTING**

The design intent for internal lighting design is to introduce artificial lighting in all applicable areas. Energy efficient light fittings will be installed throughout. The design of the building façade also allows high levels of natural daylight to enter into occupied zones.

### **8.2.4. ONGOING MONITORING**

A BEMS (Building Energy Management System) system is to be installed to monitor the use of all major systems in the building. The BEMS system is a graphical interface that allows the facilities/building manager to monitor and control all systems throughout the building.



### 8.3. STEP 3 (BE GREEN) – USE OF RENEWABLE TECHNOLOGIES

The following renewable technologies are being considered for implementation in the Barrington Tower development.

#### 8.3.1. COMBINED HEAT AND POWER

Combined Heat and Power, or CHP as it is commonly referred to, is the simultaneous generation of usable heat and power in a single process. The system utilises the heat produced in electrical generation rather than releasing it wastefully into the atmosphere. A centralised plantroom will be utilised and will contain the CHP unit, along with all associated pipework and equipment.

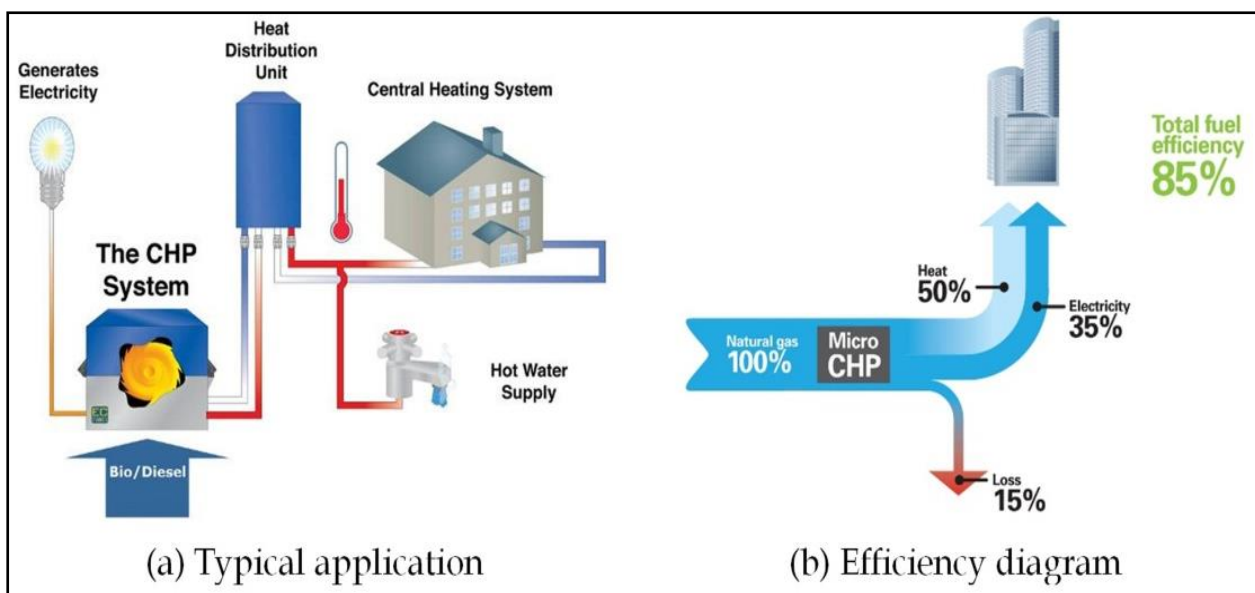


Figure 5: CHP Diagram

### 8.3.2. AIR SOURCE HEAT PUMP - RESIDENTIAL

Air source heat pumps convert energy from the air to provide heat and hot water for buildings. They are powered by electricity and are highly efficient. The air source heat pump is located outside in the open air and it uses a fan to draw air across it. This air then flows over a heat exchanger, which contains a refrigerant liquid. An evaporator uses the latent heat from the air to heat the refrigerant sufficiently until it boils and turns to a gas. This gas is then compressed which causes a significant rise in temperature. An additional heat exchanger removes the heat from the refrigerant which can then be used as useful heat within a building.

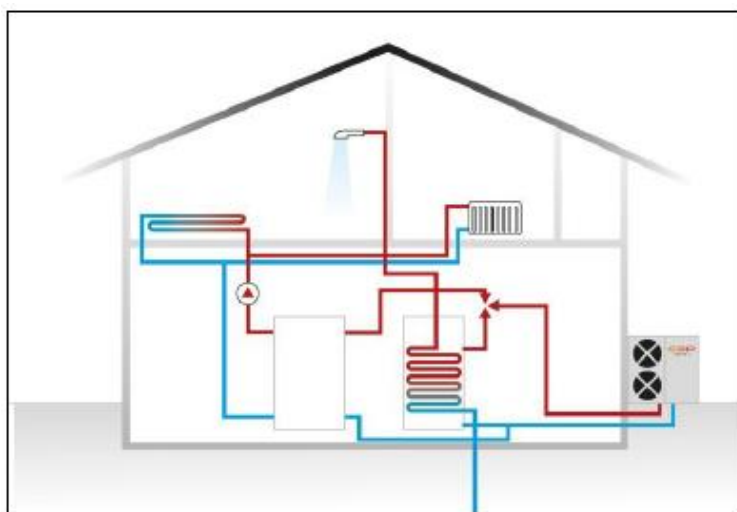


Figure 6: Air-Source Heat Pump Diagram

### 8.3.3. EXHAUST AIR HEAT PUMP

Exhaust air heat pumps collect warm air as it leaves a building via the ventilation system and then reuse the heat that would otherwise be lost to the outside to heat fresh air coming into the building or to heat water. Exhaust air heat pumps operate on a similar basis to other heat pumps such as air source heat pumps and ground source heat pumps and are suitable for providing hot water and heating for buildings such as houses, apartments or flats.

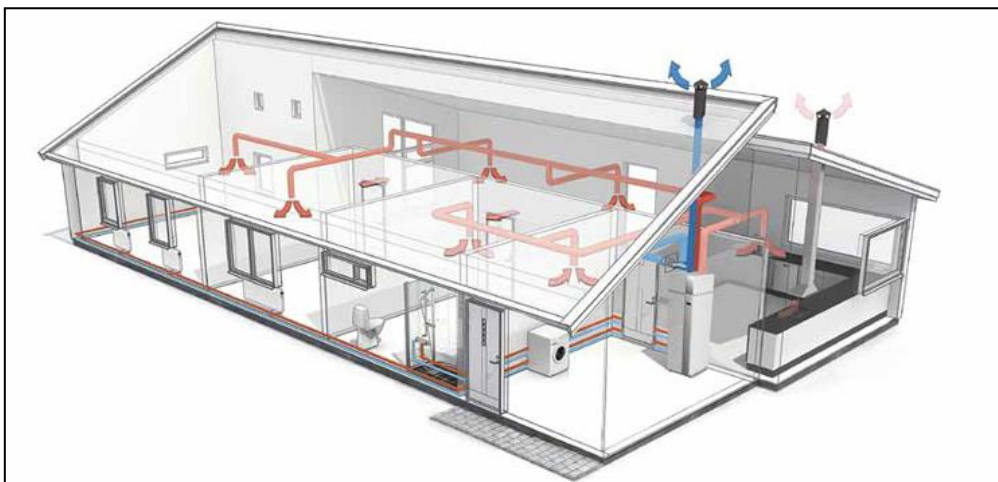


Figure 7: Example Diagram of Typical Exhaust Air Heat Pump Layout

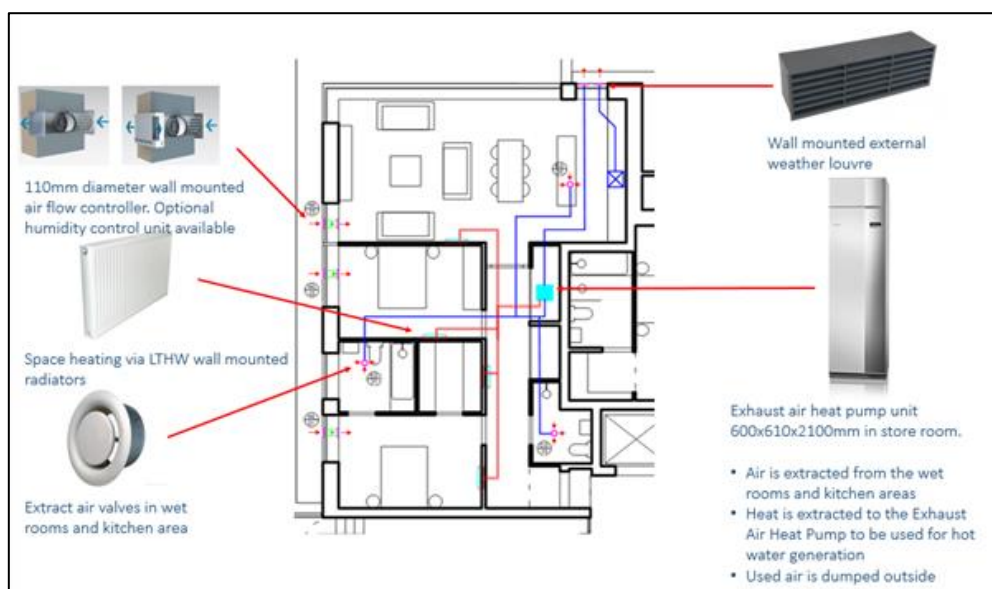


Figure 8: Example Diagram of Typical Exhaust Air Heat Pump Layout

#### 8.3.4. AIR SOURCE HEAT PUMP - COMMERCIAL

Air-Source Heat Pumps (ASHP) are deemed a renewable energy technology under Part L 2021 (Buildings Other Than Dwellings). In heating mode, ASHPs are designed to extract heat from the ambient outside air and release it inside the building via heat emitters. In cooling mode, the cycle is reversed with heat being extracted from inside the building to the outside.



Figure 9: Air-Source Heat Pump

### 8.3.5. SOLAR PHOTOVOLTAICS

Photovoltaic (PV) Panels convert the solar radiation into electricity, which can be connected to the mains supply of a dwelling. The panels are placed on the roof and are most efficient with an incline angle of 30°. Panels are typically arranged in arrays on building roofs, with the produced electricity fed either directly into the dwelling, office or into the landlord's supply.

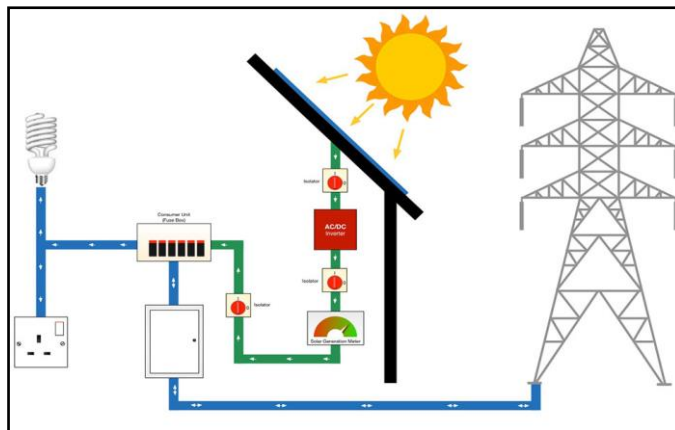


Figure 10: Solar PV Diagram

### 8.3.6. VRF HEAT PUMPS

Variable Refrigerant Flow systems utilise heat pumps in order to provide space heating as well as space cooling. These systems are capable of serving multiple zones with different heating and cooling requirements and they can modulate their output according to zone requirements, increasing system efficiencies and reducing the energy demand of these systems.

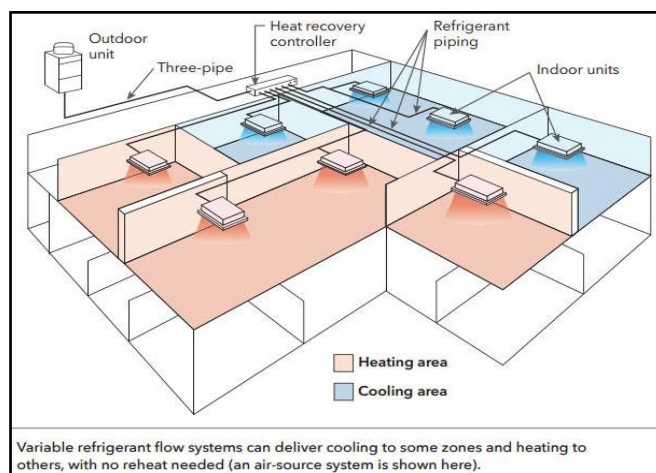


Figure 11: Typical VRF Schematic Diagram

## 9. KEY SUSTAINABLE FEATURES

The location of the Proposed Barrington Tower development provides availability to alternative modes of transportation, use of water efficient fixtures, consideration for materials and resources and indoor environmental quality for the building occupants.

### 9.1. LOCATION AND TRANSPORTATION

The proposed development will offer occupants travelling to and from the development alternative modes of transport other than the need to rely on a car. Developing in an area that has strong public transport nodes offers users the opportunity to travel to and from the site using alternative modes of transport.

The following figures identify the local Luas stops, Dublin bus stops and bicycle lanes/trails, Local Car sharing locations and their proximity to the proposed development.

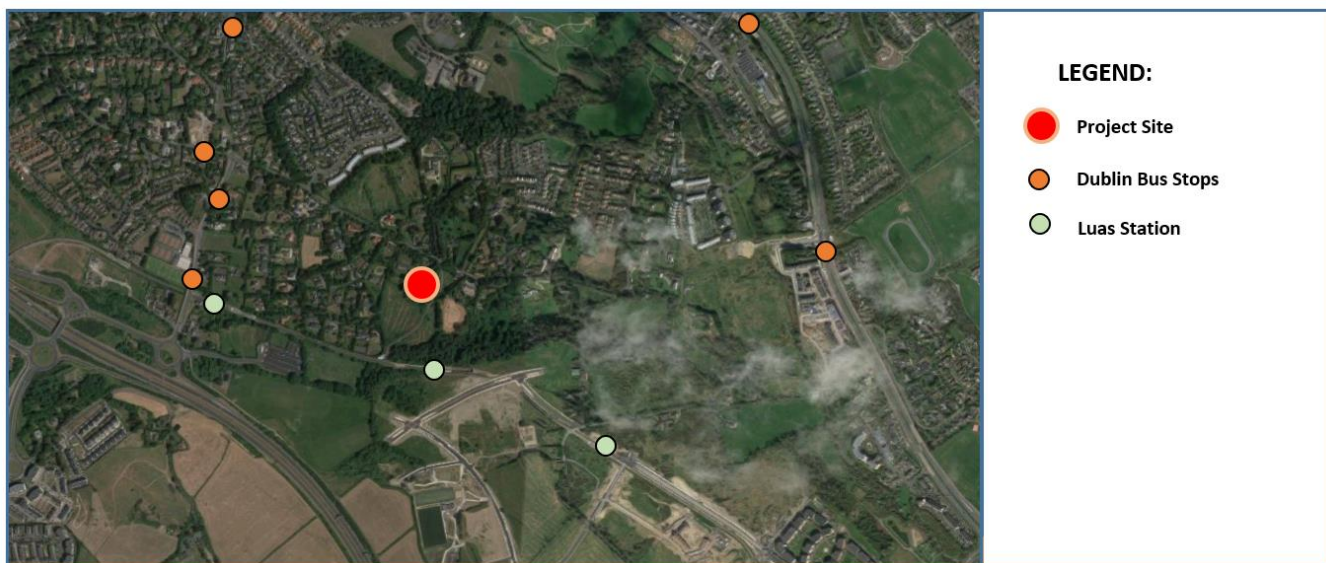


Figure 12: Local Luas and Dublin Bus Stops



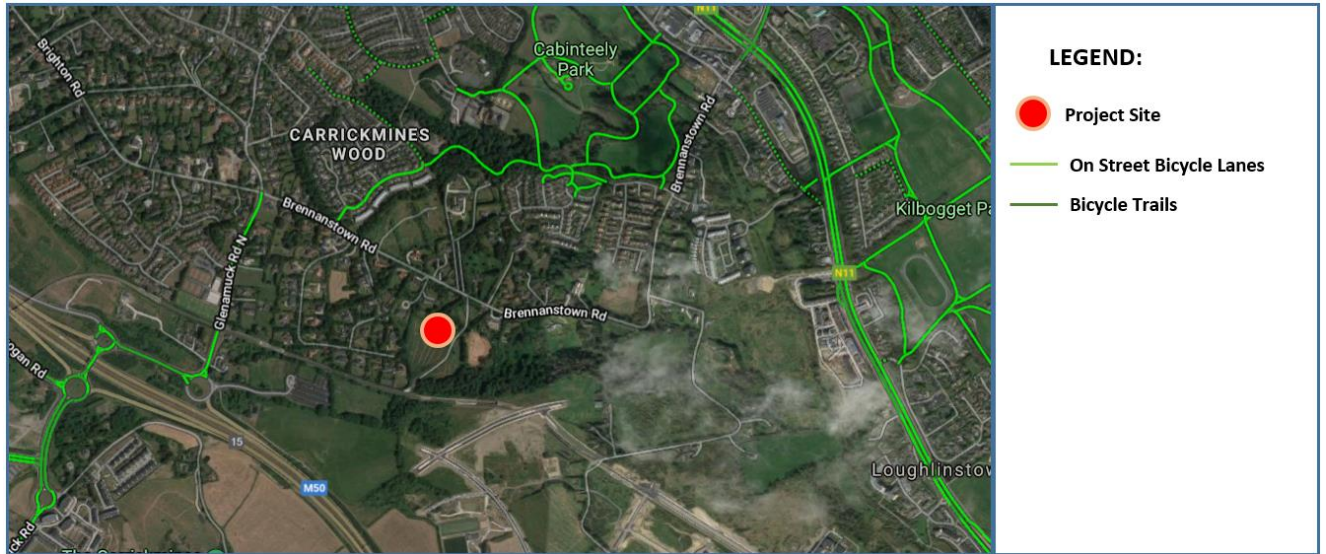


Figure 13: Local Bicycle Lanes and Trails

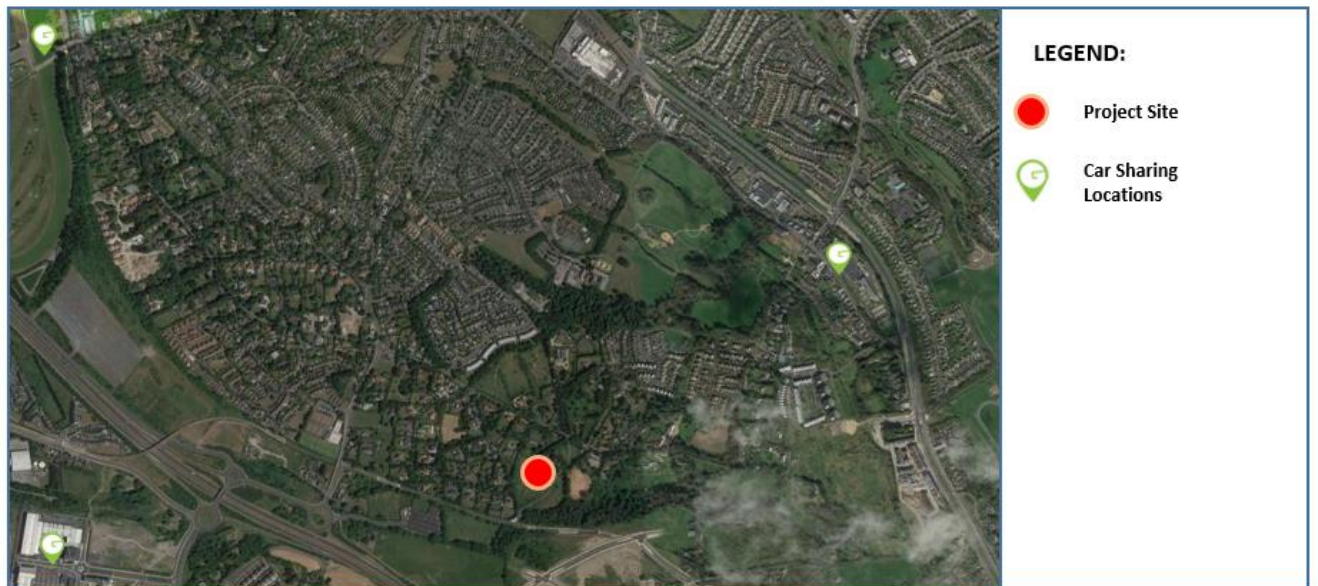


Figure 14: Local Car Sharing Locations to proposed site

## 9.2. COMMISSIONING

To ensure efficient operation of the building all systems will be commissioned. Commissioning of a developments systems ensures that the sustainable energy-design can be fully realised, with fewer operational issues during the building's lifetime. Building users' productivity improves and operational costs decrease also.

## 9.3. MATERIALS AND RESOURCES

The development will be designed and operated with the aim of a reduction in waste generation through construction and operation. Where possible waste streams will be separated on site and recycled or re-used. Where possible local materials will be specified, and in addition materials that contain recycled content will be considered as preferable.

## 9.4. WATER EFFICIENCY

With increasing costs associated with potable water use, the proposed development will incorporate measures to reduce water usage through the appropriate selection of low consumption sanitary fittings, leak detection systems and water monitoring facilities.

## 9.5. BICYCLE FACILITIES

Cycling offers a sustainable alternative to personal vehicle use, which reduces gas and particulate emissions, noise pollution and also congestion in busy urban areas. The proposed development will provide private bicycle spaces for tenants/occupants.

## 9.6. INDOOR ENVIRONMENTAL QUALITY

As part of the sustainable design strategy, consideration of occupants and staff will be an integral part of the design process. As the productivity and well-being of building users depends strongly on the quality of the indoor environment, the following aspects will be addressed:

- Adequate ventilation and filtration;
- Low-emitting materials; and
- Natural daylight and views to the external environment.



## 9.7. ELECTRIC VEHICLE CHARGING

As part of the sustainable design strategy, the development shall provide the following provisions relating to electric vehicle charging:

### **Residential Dwellings:**

- Installation of 'infrastructure' for E.V charging for residential buildings with more than 10 car parking spaces, to allow for future installation of recharging points.

### **Non-residential Buildings:**

- Where the development has more than 10 car parking spaces, to provide one car recharging point for E.V charging;
- Where the development has more than 10 car parking spaces, to provide at least one accessible recharging point (or 5% of total recharging points – whichever the greater), as also outlined within Part M;
- Where the development has more than 10 car parking spaces, to provide mandatory 'infrastructure' for E.V charging for at least one in every 5 parking bays to allow for future installation of recharging points.

## 10. CONCLUSION

A holistic sustainable approach has been adopted by the design team for the proposed Barrington Tower residential development located at Brennanstown Road, Dublin 18. Through detailed design, a number of sustainability and efficiency features have been considered throughout.

The proposed residential development will comply with residential Part L 2021 (Dwellings), as well as targeting an A2/A3 BER, while the proposed non-residential development will comply with non-residential Part L 2021 (Buildings Other Than Dwellings), as well as targeting an A3 BER.

The optimised approach is based on the Energy Hierarchy Plan - Be Mean, Be Lean, Be Green.

### **Be Mean**

- The façade performance specification has been optimised to limit heat loss, improve air tightness and thermal transmittance and to maximise natural daylight.

### **Be Lean**

- High efficiency plant will be specified to take advantage of the optimised façade design measures that have been introduced;
- A low energy lighting design will be utilised to further reduce energy consumption and increase occupant thermal comfort.

### **Be Green**

- Renewable energy technologies such as Combined Heat and Power (CHP), Air Source Heat Pumps (ASHP), Exhaust Air Heat Pump (EAHP), Solar PV and VRF Heat Pumps will be considered for implementation.

A number of sustainable design features have been considered within the design to achieve the sustainability targets of the proposed development. These include:

- The proximity of the development to public transportation networks;
- Water efficiency measures such as low consumption sanitary fittings; and
- Improved indoor environmental quality.

This report confirms that if the energy and sustainability strategy is successfully implemented, the proposed Barrington Tower development will satisfy all Part L and BER requirements.



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