Henry J Lyons

Life Cycle Report
Waterfront ~South Central~
Strategic Housing Development

Waterside Block 9 Developments Limited

15th January 2021

Pre-Application Consultation Reference No.: ABP-306158-19

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0.0 INTRODUCTION

INTRODUCTION

The Sustainable Urban Housing; Design Standards for New Apartments - Guidelines for Planning Authorities were published in March 2018 (hereafter referred to as the Apartment Guidelines). The Apartment Guidelines introduced a requirement to include details on the management and maintenance of apartment schemes. This is set out in Section 6.11 to 6.14 - '*Operation & Management of Apartment Developments*'.

Section 6.13 of the Apartment Guidelines requires that apartment applications:

'include a building life cycle report, which in turn includes an assessment of long term running and maintenance costs as they would apply on a per residential unit basis at the time of application'

'demonstrate what measures have been specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents.'

This Building Life Cycle report sets out to address the requirements of Section 6.13 of the Apartment Guidelines. The report is broken into two sections as follows:

Section 1: An assessment of long term running and maintenance costs as they would apply on a per residential unit basis at the time of application.

Section 2: Measures specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents.

This report has been prepared by the following consultants on behalf of Waterside Block 9 Development Limited:

- Henry J Lyons
- Axiseng Consulting Engineers

PROPOSED DEVELOPMENT

Waterside Block 9 Developments Limited are submitting a Strategic Housing Development (SHD) application to An Bord Pleanála for consideration. Waterfront ~South Central~ is located in the Strategic Development Zone (SDZ) defined area of City Block 9, as referenced in the North Lotts and Grand Canal Dock SDZ Planning Scheme. The site is bounded by North Wall Quay and the Liffey to the south, Mayor Street and the Red Luas line to the north the residential City Block 9 lands and Castleforbes Road to the west and North wall Avenue to the east.

The SHD planning application boundary covers 1.15ha and lies within the administrative area of Dublin City Council.

The surrounding dockland area has undergone considerable development in the past few years, most notably the inclusion of: Central Bank; Convention Centre; Capital Dock; Waterside Development; Exo Building; and Spencer Dock.

The proposed development consists of three blocks; Block A, Block B & Block C. The scheme is characterised by the towers of Block B & C, and the expansive green roofs throughout the scheme. Some 1005 apartments will be developed alongside, up to, 4,307m² of other uses.

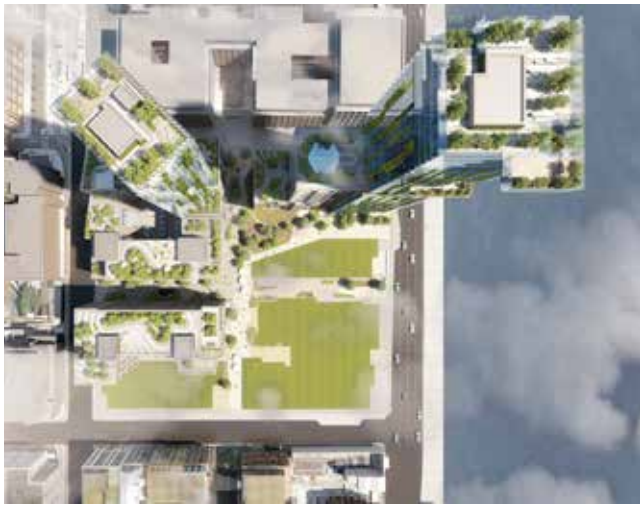
The pedestrian greenways through the site create connections and throughways for the public. A central park is at the heart of the scheme. The scheme is characterised by the use of extensive planting and landscaping. Vertical green wall panels adorn the facades of Block B & C. Roof terraces feature allotments for the residents, play areas, outdoor exercise spaces, gardens etc. Winter gardens and balconies provide more private outdoor space for residents.

Some 100 Part V apartments are provided in Block A and Block B, with access from Mayor Street. A creche facility of 450m² is located on the ground floor of Block A.

The application demonstrates the following;

SHD scheme only (with limited 'Other Uses'). This scenario considers the impacts of the proposed residential scheme with the balance of the site undeveloped.

The Applicant seeks permission for the above scenario as part of this Application. A concurrent commercial application is being made to Dublin City Council on the balance of the site.



SHD Scheme - Birds-eye View

SHD Scheme Proposal

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1.0 SECTION 1

PROPERTY MANAGEMENT OF COMMON AREAS

A property management company will be engaged at an early stage of the development to ensure that all property management functions are dealt with for the development and that the running and maintenance costs of the common areas of the development are kept within the agreed annual operational budget.

The property management company will enter into a contract directly with the Owner Management Company (OMC) for the ongoing management of the built development. This contract will be for a maximum period of 15 years and in the form prescribed by the PRSA.

The property management company also has the following responsibilities for the apartment development once constructed:

- Timely formation of an Owner's Management Company (OMC) - which will be a company limited by guarantee having no share capital. All future purchasers will be obliged to become members of this OMC.
- Preparation of annual service charge budget for the development's common areas.
- Fair and equitable apportionment of the annual operational charges in line with the MUD Act 2011.
- Engagement of independent legal representation on behalf of the OMC in keeping with the MUD Act 2011 including completion of Developer OMC Agreement and transfer of common areas.
- Transfer of documentation in line with Schedule 3 of MUD Act 2011.
- Estate Management.
- Third Party Contractors Procurement & Management.
- OMC Reporting.
- Accounting & Corporate Services.
- Insurance Management.
- After Hours Services.
- Staff Administration.

SERVICE CHARGE BUDGET

The property management company has a number of key responsibilities, primarily the compiling of the service charge budget for the development for agreement with the OMC. The service charge budget covers items such as cleaning, landscaping, refuse management, utility bills, insurance, maintenance of mechanical, electrical, lift, life safety systems, security, property management fee etc., to the development common areas in accordance with MUD Act 2011.

This service charge budget also includes an allowance for a Sinking Fund and this allowance is determined following the review of the Building Investment Fund (BIF) report prepared for the OMC. The BIF report, once adopted by the OMC, determines an adequate estimated annual cost provision requirement based on the needs of the development over a 30 year cycle. The BIF report will identify those works which are necessary to maintain, repair, and enhance the premises over the 30 year life cycle, as required by the MUD Act 2011.

In line with requirements of the MUD Act 2011, the members of the OMC will determine and agree each year at a General Meeting of the members, the contribution to be made to the Sinking Fund, having regard to the BIF report produced.

Note: The detail associated with each element heading i.e. specification and estimate of the costs to maintain, repair or replace, can only be determined after detailed design and the procurement/construction of the development and therefore has not been included in this document.

2.0 SECTION 2

ENERGY & CARBON EMISSIONS

<table>
<tr><th>Measures</th><th>Description</th><th>Outcome</th></tr>
<tr><td>High Performance Construction Fabric</td><td>The proposed construction u-values are lower than u-value requirement set out in the building regulation 2019 technical guidance Document L.

Fabric Element for residential development;

<table>
<tr><th>Element</th><th>U-value (W/m2k)</th></tr>
<tr><td>Window / Curtain wall</td><td>1.0 – 1.2 (g-value 0.45)</td></tr>
<tr><td>External Wall</td><td>0.15 – 0.18</td></tr>
<tr><td>Roof</td><td>0.15</td></tr>
<tr><td>Ground Floor or unheated zones i.e. apartment to basement</td><td>0.15</td></tr>
</table>

The proposed construction u-values are lower than u-value requirement set out in the building regulation 2017 technical guidance Document L.

<table>
<tr><th>Element</th><th>U-value (W/m2k)</th></tr>
<tr><td>Window / Curtain wall</td><td>1.4 (g-value 0.22 – 0.35)*</td></tr>
<tr><td>External Wall</td><td>0.18</td></tr>
<tr><td>Roof</td><td>0.15</td></tr>
<tr><td>Ground Floor or floor to unheated zones i.e. office to plantroom</td><td>0.165</td></tr>
</table>

*It is estimated the clear glass type with solar control measure shall achieve less than g-value of 0.22 required for hot-spot zones with the highest solar load to ensure the compliance in line with under section 1.3.5 ‘Limiting the effects of solar gain in summer’ under building regulation 2017. The types of solar control measure could be assessed and identify a best-fit solution in the latter stage of the detailed design, subjecting to further consult with façade designer.

Passive solar design has been considered including the window design option for maximising daylight and solar heat gains during winter to reduce the artificial lighting and space heating load while minimising overheating impact in habitable room during summer time. A further analysis will be required once details on façade built-up during detail design.
The high-performance wall, roof, and glazing is being considered and selected to minimise the heat transfer into the internal spaces. Aside from the reduction in heating energy consumption and carbon emissions, the reduction in heating loadresults in reduced HVAC capacity and size. This has the net effect of reducing embodied energy consumption associated with manufacture and transportation associated with the plant, as well as the reduced input from the national electricity grid for heating purposes.</td><td>Minimise heat losses through the building fabric thus lowering energy consumption and carbon emission

Minimise heat loss and gain impact on heating load requirement all-time during year, thus lowering energy and carbon footprint impact.</td></tr>
<tr><td>Air Tightness Construction</td><td>Airtightness construction, the building will be designed to ensure it is in compliant with the building regulation and achieving air tightness of 3.0 m3/(h.m2) or 0.15 ach infiltration.

It is technically feasible to reduce the air permeability between 2.5 to 1.5 m3/(h.m²), this can be achieved if the on-site inspection and quality control is in place to ensure the design intention is achieve in the place.</td><td>Minimise heat losses through the building fabric thus lowering heating load.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

<table>
<tr>
<td>Thermal Bridging</td>
<td>The limitation of thermal bridging will be achieved in according with guidance under section 1.3.3 within technical guidance Part L regulation, where provision for thermal bridging is made in accordance with guideline. To account for thermal bridging allowances for additional heat loss, it is assumed construction elements between the junction will be designed to achieve allowance less than 0.08 (W/m2k) factor.

When the details of construction element between junction are known, the transmission heat loss coefficient shall be calculated using the psi values based on construction details.

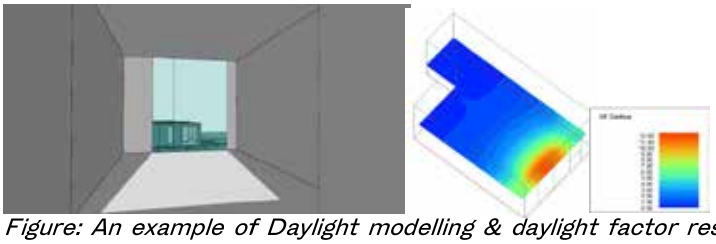
It is assumed that the u-value of the façade built-up details within commercial development will be calculated taking account of thermal bridging factor. See below table figure on thermal bridging modelled for commercial blocks;

<table>
<tr><th colspan="3">Thermal Bridging</th></tr>
<tr><td>Type of junction</td><td>Junction (metal) psi (W/(m.k))</td><td>Junction psi (w/(m.k))</td></tr>
<tr><td>Roof-wall</td><td>0.3</td><td>0.12</td></tr>
<tr><td>Wall-ground floor</td><td>0.32</td><td>0.172</td></tr>
<tr><td>Wall-wall (corner)</td><td>0.18</td><td>0.07</td></tr>
<tr><td>Wall-floor (not ground)</td><td>0</td><td>0.07</td></tr>
<tr><td>Lintel above window/door</td><td>0</td><td>0.3</td></tr>
<tr><td>Sill before window</td><td>0</td><td>0.04</td></tr>
<tr><td>Jamb at window/door</td><td>0</td><td>0.05</td></tr>
</table>

On-site inspection and quality control will be carried to ensure continuity of insulation and to limit local thermal bridging at junction between construction element and other locations e.g. around windows, door and other wall openings.</td>
<td>Minimise heat losses at junctions between construction element, thus lowering energy consumption and carbon emission.

Air permeability and thermal bridging inputs should be reviewed to allow a reduction in thermal qualities of the façade elements.</td>
</tr>
<tr>
<td>Daylight & Lighting</td>
<td>Provision of natural daylight in buildings creates a positive environment by providing connectivity with the outside world, assisting with the well-being of the building inhabitants.

Daylight also represents an energy source - reducing the reliance on artificial lighting. The potential of full-height glazing on the elevations maximises the use of natural daylight and enhances visual comfort, without compromising thermal performance.

 
Figure: An example of Daylight modelling & daylight factor result in typical apartment room taken from radiance toolkit, IESVE software

The majority of lamps selected will be based LED type (A+ Rated) located externally, and internally in circulation spaces, bedroom, lobby, living/dining etc in 30-35% reduction in electrical energy usage.

It is assumed the total wattage power for each apartment</td>
<td>Reducing lighting electricity energy consumption, thus reducing carbon emission footprint overall.

Enhance healthier residence environment the use of natural daylight.

Minimise the time in controlling the lighting system, thus reducing cost.

Free heating from solar load, reducing heating load.</td>
</tr>
</table>

<table>
<tr><td></td><td>compartment is 395 watts.

The following proposed on the lighting installed power and control are modelled in the commercial development;

<table>
<tr><th>Room</th><th>W/m2</th><th>lux</th><th>Control</th></tr>
<tr><td>Open Plan Office</td><td>7</td><td>400-500</td><td>Dimming</td></tr>
<tr><td>Lobby</td><td>7</td><td>200</td><td>Auto on/off</td></tr>
<tr><td>WC</td><td>6</td><td>200</td><td>Auto on/off</td></tr>
<tr><td>Stairs</td><td>7</td><td>150</td><td>Auto on/off</td></tr>
<tr><td>Lift Lobby</td><td>7</td><td>300</td><td>Dimming</td></tr>
<tr><td>Reception</td><td>12</td><td>300</td><td>Dimming</td></tr>
<tr><td>Cafe</td><td>10</td><td>350</td><td>Dimming</td></tr>
<tr><td>Kitchen</td><td>10</td><td>350</td><td>Man on/off</td></tr>
</table></td><td></td></tr>
<tr><td rowspan="2">HVAC system</td><td>Ventilation System
Each apartment compartment is to be fitted dedicated supply and exhaust ductwork arrangement through Exhaust Air Heat Pump Unit (EAHP).

The specific fan power and efficiency of EAHP are selected on the basis of lower specific fan power. In this case, the specific fan power less than 0.32 W/l/s which has been taken into consideration.

The number of intermittent fans and passive vents shall depend on EAHP design solution come with ducting arrangements in line with number of bedroom and bathrooms per apartment compartment.

The inclusion of thermal wheel heat recovery unit into the ventilation systems within commercial development allows for heat transfer between exhaust and supply air before the heating and cooling coils thus reducing heating and cooling load. The AHU and local fan coil unit are selected upon the low specific fan power rating i.e. less than 1.8 w/l/s for AHU unit and 0.2 w/l/s for FCU.</td><td>Heat recovery via exhaust air from wet room and kitchen to allow for heat transfer to incoming air thus reduce the heating load requirement in the apartment compartment, thus increasing heating plant operating performance overall.</td></tr>
<tr><td>Heating & DHW system
Each apartment compartment in proposed development building will be designed to facilitate Exhaust Air Heat Pump (EAHP), a Joule / NIBE / Comfort zone unit providing heating, domestic hot water and ventilation.

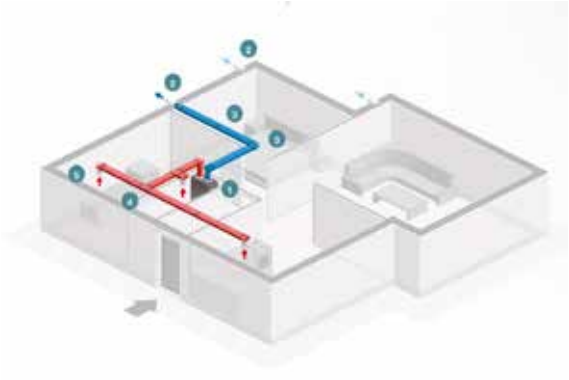
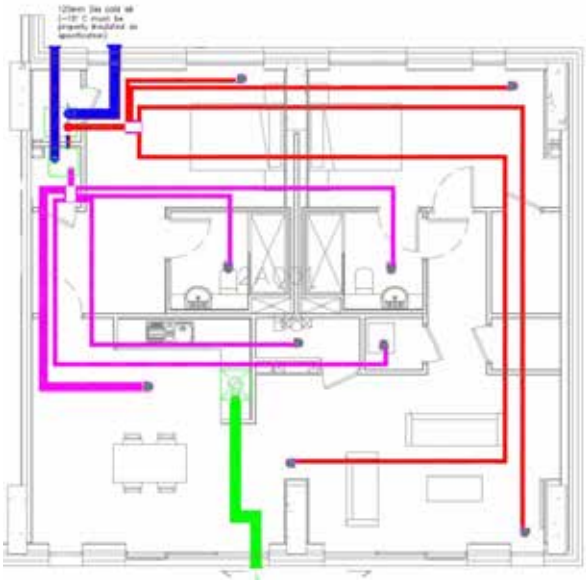
Exhaust air heat pump is an energy recycling system, where it collects energy from warm inside air via the ventilation system and re-uses it to temper incoming fresh air and water thus reducing electricity consumption.

Model: Joule / NIBE / Comfort zone
Type of Heat Pump: Exhaust Air to Water
Installation provide: Heating and DHW
Back Up Water heater: Yes, electricity
Type of DHW: Separate or integrate Hot Water Storage
Temperature Applicable: Low temperature (35 - 45°C)
Efficiency of Main Heating System: 604 -665%
Efficiency of Main Hot Water System: 212 - 240%

The following figure illustrates the typical layout and set up of EAHP</td><td>Potential lower capital cost in comparison to central plant installation. The heat pump provides 4 to 5 times more heat energy than the electricity consumed, comparing to other heat generator technologies leading to lower energy and running costs.

Heat recovery via air drawn through ducts to the heat pump from the bathrooms, utility and kitchen areas.

Eliminate traditional gas fuelled system by substitution with EAHP.</td></tr>
</table>

	unit within an apartment compartment;  Figure: *Joule* EAHP arrangement  Figure: *Comfort zone* EAHP layout The selection of EAHP manufacturer model are subject to further review on its cost, spacing requirement, ducting arrangement and performance The proposed HVAC system pertinent to the commercial floorsis selected based upon their efficiencies performance, which has been assessed to ascertain their seasonal coefficient performance in terms of heating, cooling and hot water generation. All open plan offices will be fitted with centralised heating and cooling from variable refrigerant flow (VRF) heat pump plant system, whilst providing full climatic control and minimise energy. Domestic hot water will be generated by same VRF system.	Small footprint plant space. Heating output to be reusable. Eliminate the need of boilers and its capital cost. Eliminate the need of heat generator plants thus reducing plant footprint and hard cost.
	Hot Water System & Appliances All hot water taps including the shower head fitting in the proposed development are to be fitted with intelligent water flow regulators to all for full water flow until the discharge rate reaches six litres per minute, to allow for the conservation of water uses well as energy used to heat hot water. Water storage tank will be fitting with factory insulated with thickness up to 100mm to minimise heat loss.	Minimise hot water usage, thus reducing heating energy load and increasing heating plant operating performance and reducing the cost

	Type of System: Unvented Hot water system Water Storage volume (litres): • 180 – 200 litres for each apartment compartment • Approx. 1000 litres for each commercial block The hot water usage target must be achieved with less than 125 litres per day.	
	Heating Interface Unit (HIU) An HIU is an integrated solution for delivering and recording the heat consumed by each apartment compartment. HIU provide the occupant with localised control and metering of their heating usage in real-time consumption, allowing for a monitoring of their heating energy use and allowing them to reduce the energy and carbon emission.	Reduction in operating costs and maintenance access issues. Robust and cost-effective solution to heating and hot water. Acts as a positive incentive for an occupant to reduce energy.
District Heating	There is a potential of designing the heating systems to facilitate integration of a future District Heating (DH) system. The design philosophy includes the following provisions for future connections: - Space allocations for future heat exchanging plant. - Centralised primary/secondary heating systems with low loss headers to facilitate integration of DH service in commercial development. - EAHP unit to be fitted with docking kit to facilitate integration of DH to allow for supplementary of hot water and heating. - Incoming pipework installed through the basement box wall to facilitate ease of future connection and to eliminate future builder's work. - Space allocation provision in service risers for future heating pipework. District heating offers many benefits and real cost-saving advantages. It will allow users to decide when, where and how much energy they need, ensuing maximum comfort, whilst providing hot water on demand.	A future district heating system which is proposed to be served from a sustainable and efficient process will potentially eliminates any carbon emissions produced on site for space heating. Not taken into account in the Part L assessment.
Building Energy Management System	Central BMS (Building management system)– check metering (heating) of all individual floors to monitor & optimise substantive energy use. The energy management system will continuously review and fine-tune the operational efficiencies and strategy for the various building services, significantly reducing clients' overall energy consumption and carbon footprint, and reducing energy costs.	Continuous energy monitoring allows for further energy saving opportunities to be quantified through building lifecycle thus lowering overall cost and carbon footprint.
Part L (NZEB) Result	**Residential Development** The Part L (NZEB) has undertaken on sample apartment units located on the ground, mid-level and upper floor apartment, which are selected to assess the worst-case scenario in each instance. Energy Performance Coefficient (EPC) = 0.235 – 0.284 √ Carbon Performance Coefficient (CPC) = 0.227 – 0.280 √ Renewable Energy Ratio (RER) = 0.24 – 0.38 √ BER = A2 √ The apartment compartment has achieved compliance with Part L of the building regulations. The calculation of EPC, CPC are less than maximum permitted CPC of 0.35 and EPC of 0.3. A minimum level of energy provision of renewable energy from EAHP unit is achieved with more than 20% of total energy consumption exceed minimum	In compliance with building regulation Part L (NZEB)

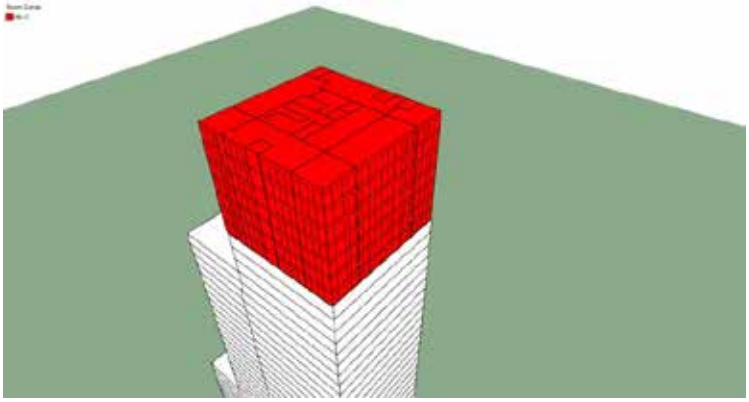
requirement under the Part L.

Commercial Development

An NZEB assessment has been carried out on commercial floors achieving the following energy performance coefficient, carbon performance and renewable energy ratio between block;

Block	CPC<1.15	EPC< 1.0	RER	BER	NZEB Criteria
C	0.80	0.82	0.23	A2	√

Block C



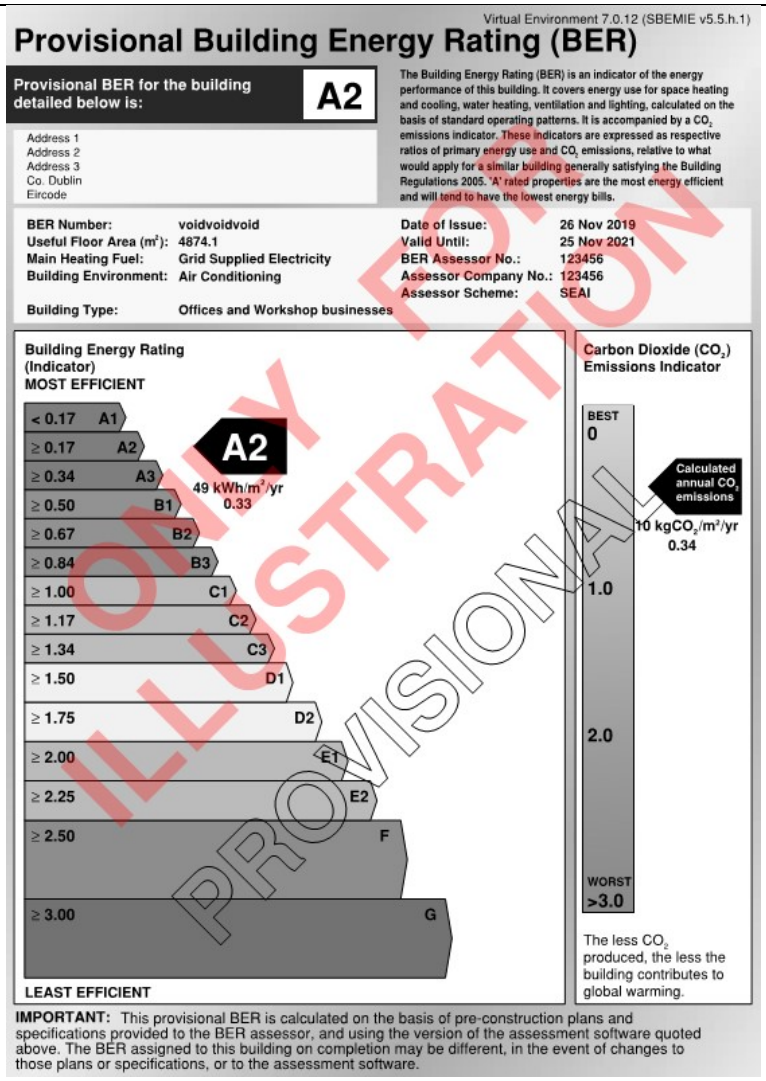
BRIRL

Primary Energy Consumption, CO2 Emissions, and Renewable Energy Ratio

The compliance criteria in the TGD-L have been met.

Calculated CO2 emission rate from Reference building	11.8 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	9.6 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	0.82
Maximum Permitted Carbon Performance Coefficient (MPCPC)	1.15
Calculated primary energy consumption rate from Reference building	60.9 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	49 kWh/m2.annum
Energy Performance Coefficient (EPC)	0.8
Maximum Permitted Energy Performance Coefficient (MPEPC)	1
Renewable Energy Ratio (RER)	0.23
Minimum Renewable Energy Ratio	0.1

Building Energy Rating



The commercial development situated on the 41st - 43rd floor in Block C has achieved compliance with Part L of the building regulations. The calculation of EPC, CPC are less than maximum permitted CPC of 1.15 and EPC of 1.0. A minimum level of energy provision of renewable energy from multipurpose unit (four-pipe chiller) and VRF system is achieved with more than 23% of total energy consumption exceeding minimum requirement under the Part L.

MATERIALS

Action	Commentary	Benefits
	Consideration is given to the requirements of the Building Regulations and includes reference to BS 7543:2015, 'Guide to Durability of Buildings and Building Elements, Products and Components', which provides guidance on the durability, design life and predicted service of buildings and their parts. All common parts of the proposed apartment buildings and the durability and performance of these are designed and specified in accordance with Figure 4; Phases of the Life Cycle of BS7543; 2015. The common parts are designed to incorporate the guidance, best practice principles and mitigations of Annexes of BS 7543; 2015 including: • Annex A – Climatic Agents affecting durability • Annex B – Guidance on materials and durability • Annex C – Examples of material or component failures • Annex D – Design Life data sheets	Ensures the long term durability and maintenance of materials is an integral part of the design and specification of the proposed development.
Cladding Materials	Glazed facades, Jura Limestone, glazed balconies and solid metal panels are used throughout the development. Metalwork is to have marine grade PPC finish.	Choosing robust materials reduces ongoing maintenance and repairs
Windows	Use of factory finished alu clad windows and doors	Requires no ongoing maintenance.

LANDSCAPE

Action	Commentary	Benefits
Site Layout & Design	Generous and high quality landscaped ground level & terraces have been designed within the proposed development. This includes street tree planting and soft and hard landscaping at ground level and a new east west pedestrian street. Generous roof level terraces have been included that feature; allotments, exercise areas, play areas and biodiversity gardens.	An improved environment and access to natural elements within the development.
Green Roofs	Use of green roofs throughout the development	Attenuation provided by the green roof reduces the burden on rainwater goods, resulting in fewer elements that could require repair.
Materials	Use of robust materials with high slip resistance to be used for paving. Durable and robust equipment to be used throughout.	Robust materials and elements reduce the frequency of required repair and maintenance.

MANAGEMENT

Measure	Description	Benefits
Home User Guide	Once a purchaser completes their sale, a homeowner box will be provided which will include: **Homeowner Manual** – This will provide important information for the purchases on details of their new property. It typically includes details of the property such as MPRN and GPRN, information in relation to utility connections/ communication providers, contact details for all relevant suppliers, and user instructions for appliances and devices in the property. **A Residents Pack** – This is prepared by the OMC which will typically provide information on contact details for the managing agent, emergency contact information, transport links in the area, and a clear set of the rules and regulations.	Residents are as informed as possible so that any issues can be addressed in a timely and efficient manner.

HEALTH & WELL BEING

Action	Commentary	Benefits
Daylight & Sunlight	The design, separation distances and layout of the apartment blocks have been designed to optimise the ingress of natural daylight & sunlight to the proposed apartments to provide good levels of natural light.	Reduces the reliance on artificial lighting thereby reducing running costs.
Accessibility	All units will comply with the requirements of Part M and Part K.	Reduces the level of adaption and associated costs potentially necessitated by residents future circumstances.
Security	The scheme is designed to incorporate natural surveillance wherever possible and supplemented by the following strategies: • CCTV monitoring • Access control to lower ground car park • Secure bicycle stands covered by CCTV • Routine access fob audits	Help to reduce potential security & management costs.
Natural Amenity	A pocket park is located at the centre of the communal space at ground floor. Private communal areas are located on roof terraces.	Facilitates community interaction, socialising and play resulting in improved well being.
Central Location	The site is located in a very central location with good access to public transport, river Liffey and public spaces .	Encourages interaction with the city and the outdoors to promote a healthy lifestyle.

WASTE MANAGEMENT

Mitigation measures proposed during the construction phase include: -

1. On-site segregation of all waste materials into appropriate categories including:

- made ground, soil, subsoil, bedrock
- concrete, bricks, tiles, ceramics, plasterboard
- metals
- dry recyclables e.g. cardboard, plastic, timber.

2. All waste materials will be stored in skips or other suitable receptacles in a designated area of the site.

3. Wherever possible, left over materials (e.g. timber off cuts) and any suitable demolition materials shall be re-used on-site.

4. Any potentially contaminated soil to be removed from site will be tested to confirm its contamination status and subsequent management requirements.

5. All waste leaving site will be recycled, recovered or reused where possible, with the exception of those waste streams where appropriate facilities are currently not available.

6. All waste leaving the site will be transported by suitable permitted contractors and taken to suitably licensed or permitted facilities.

7. All waste leaving the site will be recorded and copies of relevant documentation maintained.

During the operational phase, in order to minimise the disposal of waste material to landfill, the mantra of “reduce, reuse, recycle” will be promoted throughout the development. In addition, the following mitigation measures will be employed;

1. Suitable waste materials will be stored in bins or other receptacles in designated, easily accessible locations.

2. Waste leaving the site will be transported by suitable permitted contractors and taken to suitably permitted/licensed facilities.

3. Where necessary, waste leaving the site will be recorded and copies of relevant documentation maintained.

4. Where necessary, waste from the development will be segregated and stored in designated centralised waste storage areas in the basement.

5. These mitigation measures will ensure the waste arising from the Development is dealt with in compliance with the provisions of the Waste Management Act 1996 (as amended 2001), and associated Regulations, the Litter Act of 1997 and the Dublin Waste Management Plan (2005 - 2010), and achieve optimum levels of waste reduction, re-use and recycling.

TRANSPORT

Action	Commentary	Benefits
Access to Public Transport (LUAS/ Light Rail)	The Point LUAS stop is located immediately adjacent to the proposed Development.	The availability, proximity and ease of access to high quality public transport services contribute to reducing the reliance on the private motor vehicle for all journey types.
Access to Public Transport (Bus Services & Rail Services)	Under the new bus connects proposal the site will be served by 6 bus routes; C1/2, N4, 20/22, 95. The subject site is located approx. 750m east of the Docklands railway station. Services from this station operate towards Sligo, serving commuter towns in Meath and Kildare. Pearse Street & Tara Street railway stations are 1.7km to the southwest of the subject site; Connolly Railway station, to which the subject site is connected by the LUAS light rail line, is approx. 1.5km to the west. Intercity rail services from these stations operate towards Belfast, Sligo and Rosslare, serving commuter towns in counties Dublin, Meath, Louth, Kildare, Wicklow and Wexford. Frequent DART rail services also operate via these stations, between Malahide/Howth in the north and Greystones in the south. A limited number of commuter rail services also operate from these stations to Newbridge in southern Kildare, via the newly reopened Phoenix Park rail tunnel.	These bus services provide access to a range of additional destinations above that serviced by the LUAS services. The proximity, frequency and range of additional destinations served by these local bus services enhance the accessibility levels of the proposed residential development in addition to providing a viable and practical sustainable alternative to journeys undertaken by the private motor car.
Permeable Connections	Provision and subsequent maintenance of dedicated pedestrian and cycle infrastructure on-site, and their connectivity with adjoining third party lands and the off-site networks, providing convenient access to local services including shops, schools, restaurants and doctor's surgeries.	Ensure the long-term attractiveness of walking and cycling to a range of local education, retail and community.
Bicycle Storage	The provision of high-quality secure bicycle parking facilities, for both short term and long-term parking requirements. Over 1000 secure bicycle parking spaces are located at basement level.	Accommodates the uptake of cycling and reducing the reliance on the private motor vehicle.
Motorcycle Parking	The implementation of secure, attractive, best practice motorcycle parking facilities for residents at basement level.	Reduces the reliance on the private motor vehicle in parallel with reducing oil dependency.
Car Sharing	The scheme will include designated car club spaces for exclusive use of the residents.	Reduces the reliance on the private motor vehicle and reducing oil dependency.

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