BUILDING LIFECYCLE REPORT

Proposed Residential Development at
Cherry Orchard Point, Dublin 10

September 2023


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INTRODUCTION

The following report has been prepared in compliance with Section 6.13 of the 2022 Guidelines on design Standards for New Apartments as set out below:

> *Accordingly, planning applications for apartment development shall include a building lifecycle 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, as well as demonstrating what measures have been specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents.*

The report has also been carried out to in compliance with Section 15.9.14 of the Dublin City Council Development Plan, which states:

> *The lifecycle report should include an assessment of the materials and finishes proposed, the ongoing management strategy, the protocol for maintenance and repair, the long term maintenance costs for residents and the specific measures that have been taken to effectively manage and reduce the costs for the benefit of residents.*

Section 01 outlines the process to preparing the long term running and maintenance costs as they would apply on a per residential unit basis at the time of the application. Section 02 outlines the measures specifically considered by the proposer to effectively manage and reduce costs for the benefit of the residents. Section 03 outlines the Building Services Lifecycle.

PROPOSED DEVELOPMENT

The proposed development (GFA of c. 66,399sqm) involves the construction of a residential led mixed use scheme across 16 blocks contained within 9 buildings ranging in height from 4 to 15 storeys. The development includes the provision of 708no. residential apartments comprising 547no. cost rental and 161no. social / affordable units (28no. studio units, 263no. one-bed units, 368no. two-bed units and 49no. three-bed units), together with a convenience retail supermarket (2,523sq.m GFA), 7no. retail / commercial units (totalling 373sq,m GFA), community, arts and cultural spaces delivered across 13no. community and arts / cultural units (totalling 1,222sq.m GFA), and associated external events space and community gardens (1,157sq.m) and a childcare facility (672sq.m GFA) with associated external playing space (200sq.m) and all ancillary accommodation including sub stations, plant, refuse stores, cycle stores, and metre / comms rooms. The proposed development also includes the provision of landscaped public open space of 6,123 sq. m. including a public plaza, play space, outdoor fitness trail, communal amenity space of 5,596 sq. m. Private open space for the apartment units is achieved through the provision of balconies or terraces for all individual apartments.

The proposed development will also involve the provision of sufficient car parking (including accessible car parking) and bicycle parking spaces at undercroft and surface level throughout the development. The

development will also provide for all associated ancillary site development infrastructure including site clearance, boundary treatment, associated public lighting, internal roads and pathways, ESB substations, switch room, water tank rooms, storage room, meter room, sprinkler tank room, comms room, bin storage, bicycle stores, green roofs, hard and soft landscaping, play equipment, attenuation area, green and blue infrastructure including green roofs, PV panels and all associated works and infrastructure to facilitate the development including connection to foul and surface water drainage and water supply. Please refer to the statutory notices for full and complete description of the proposed development.

SECTION 01 – ASSESSMENT OF LONG-TERM RUNNING AND MAINTENANCE COSTS

As required by the Multi-Unit Developments Act 2011, an owners management company must be set up, and the common areas of the development transferred to it, before the developer sells any unit. An assessment of long term running and maintenance costs is undertaken as they would apply on a per residential unit basis at the time of application.

1.1 PROPERTY / OWNER MANAGEMENT OF THE COMMON AREAS OF THE DEVELOPMENT

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 Owners Management Company (OMC) for the ongoing management of the built development. This contract will be for a maximum period of 3 years and in the form prescribed by the PSRA. The Property Management Company also has the following responsibilities for the development once construction is completed and the scheme is operational:

- Timely formation of an Owners Management Company (OMC) – which will be a company limited by guarantee having no share capital.
- Preparation of annual service charge budget for the development common areas.
- Fair and equitable apportionment of the Annual operational charges in line with the Multi Units Development Act 2011 (MUD Act).
- Engagement of independent legal representation on behalf of the OMC in keeping with the MUD Act - including completion of Developer OMC Agreement and transfer of common areas.
- Transfer of documentation in line with Schedule 3 of the MUD Act.
- Estate Management.
- Third Party Contractors Procurement and management.
- OMC Reporting.
- Accounting & Corporate Services.
- Insurance Management.

- After Hours Services & Staff Administration. The Management Strategy Report, included with this planning application, sets out the proposed management strategy for the development including its community area/facilities, public spaces, residential amenities and apartments.

1.2 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 lifts/ life safety systems, security, property management fee, etc., to the development common areas in accordance with the Multi Unit Developments Act 2011 ("MUD" Act).

The Management Strategy Report, included with this planning application, sets out a sample service budget for the proposed development to demonstrate an overall approach. Detailed budget lines and costs will be produced post planning when specifications and finishes are confirmed and final detailed designs are completed.

It should be noted that 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 the sinking fund requirements are listed to show what elements must be covered by this service charge.

SECTION 02 – MEASURES TO MANAGE AND REDUCE COSTS

Measure description	Benefit
Daylighting to Units: Where possible, as outlined in 'Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities (December 2022)' to have regard for quantitative performance approaches to daylight. Medium density buildings daylighting analysis have been tested against the 3rd edition of the guidelines which reference the BS-EN 17037:2018 standards and is the most recent edition of the document. The scheme also tested against IS-EN 17037.	Reduces the requirement for continuous daylighting, thus reducing the expense of artificial lighting
Daylighting to Circulation Areas: Openable window sections are provided to all stair cores within the development providing natural daylight to circulation areas.	Avoids the requirement for continuous artificial lighting.
External lighting: External lighting will comply with the latest standards and achieve: □ Low-level lighting □ Utilise low voltage LED lamps □ Minimum upward light spill Each light fitting is to be controlled via an individual Photoelectric Control Unit (PECU). The operation of the lighting shall be on a dusk-dawn profile.	Lighting will be designed to achieve the required standards, provide a safe environment for pedestrians, cyclists, and vehicular traffic, provide surveillance and limit the impact on the artificial lighting on surrounding existing flora and fauna.
Brickwork façade: Primary facade cladding material used. Lifecycle of 100+ years. Mortar pointing has shorter lifecycle of 25-50 years.	Extremely durable, with low maintenance requirements. Preventative maintenance by monitoring mortar joint deterioration ensures longevity of material.
Render: Only to internal courtyards and selected areas of street elevations. Pigmented render system with lifecycle of circa 25 years. Cleaning of algae and other staining is	Finish does not require repainting every few years.

recommended annually by property maintenance team.	
Flat Roofs: TPO or similar roofing membrane with 22-30 year lifespan installed to manufacturer's proven details. Appropriate protection for access to ensure maintenance of any roof equipment will be carried out without any damage to the membrane. Regular maintenance checks by property maintenance team.	Proven roofing system with regular maintenance prevents needs for repairs and additional cost to residents.
Green Roofs: Extensive Green Roof System. Average life cycle of 13-35 years. Life cycle extended with robust proven detailing and appropriate regular maintenance quarterly every year.	Attenuation for storm water runoff and less burden and maintenance of rainwater goods. Increased thermal and sound insulation to the building, aesthetic appeal and increased biodiversity.
Steel Balconies: Prefinished and capability to be manufactured off site	Minimal ongoing maintenance
Natural/Passive ventilation system: Openable window sections are provided to all stair cores within the development providing Natural/Passive ventilation to common circulation areas.	Avoids costly mechanical ventilation systems and associated maintenance and future replacement.
Natural/Passive ventilation system: Grilles, louvres and pop up vents in the podium area are proposed to provide fresh air to the under podium parking areas.	Avoids costly mechanical ventilation systems and associated maintenance and future replacement
External paved and landscaped areas	All of these require low/minimal maintenance.

2.2 CONSTRUCTION METHODOLOGY

Selected Brick or Render / External Window / Door Opes to have a 100mm deep Brick or Block Reveal. 215mm High Density Concrete Blockwork Inner Leaf with 12mm Plaster Finish 150mm Cavity Fully Filled with High Density Rigid Insulation. In-situ concrete walls will be used for Block 2B based on current structural advice.

In-situ reinforced concrete frame superstructure to stair and lift cores. Precast/in-situ concrete floors to engineers detail.

Construction drawings will provide appropriate information to ensure detailed communication of construction methods.

Managing and reducing costs in construction projects is critical to ensuring project success. Here are some key measures to achieve this:

1. Effective Planning and Design: Cherry Orchard Point has invested considerable time and resources in project planning and design. Along the process, potential cost-saving opportunities, streamline processes, and select materials and methods that optimise cost-efficiency while maintaining quality have been chosen.
2. Value Engineering: Cherry Orchard Point has continuously evaluated design and construction processes to find more cost-effective alternatives without compromising safety or performance. The highly qualified design team has ensured input from experts to identify innovative solutions.
3. Budget Control: A realistic budget has been established and will be monitored closely throughout the project. The team will regularly update cost estimates and adjust the budget as necessary to avoid cost overruns.
4. Supplier and Contractor Selection: Suppliers and contractors have been selected based on their track record, reliability, and competitive pricing.
5. Lean Construction Practices: Cherry Orchard Point will implement lean construction principles to minimise waste, improve workflow, and enhance productivity. This includes (but is not limited to) precast concrete floors, efficient resource allocation, and streamlined project scheduling.
6. Technology Adoption: The project embraces construction technology and software tools such as Building Information Modeling (BIM) to improve communication, collaboration, and project efficiency.
7. Risk Management: The project has identified and mitigated potential risks early in the project to prevent costly delays and changes. Contingency plans have been identified and funds allocated for unexpected issues.
8. Energy Efficiency: The project incorporates energy-efficient designs and materials to reduce long-term operating costs (section 2.3). Sustainable construction practices can lead to savings on energy and maintenance.
9. Regular Monitoring and Reporting: Cherry Orchard Point will establish a robust monitoring and reporting system to track project costs and performance against benchmarks. This data will be used to make informed decisions and adjustments.

By implementing these measures, this project can better manage and reduce costs while delivering high-quality results, ensuring long-term success for both the project and the organisation.

2.3 MATERIAL SPECIFICATION

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 life of buildings and their parts.

The materials within the development have been chosen to find a balance between the capital costs and ongoing maintenance. The final materials specification will be provided as part of the detailed design process post any planning permission grant. By way of example of the robust materials specification available at this stage of the design development process see below:

External Walls:	The following variety of materials have been chosen for external walls - Buff Brick Finish - Buff coloured brick in stretcher bond - Red Brick Finish – Red coloured brick in stretcher bond - Black/Grey Brick Finish - Black/grey coloured brick in stretcher bond - Cement Render Finish - Buff coloured cement render system
Windows:	Light grey coloured Aluminium or Aluclad window system with integral aluminium cills
Balconies:	Light grey coloured polyester powder coated, galvanised mild steel balcony system
Doors & Screens:	Light grey coloured Aluminum or Aluclad window system with integral aluminium cills

Warranties for all products within the project will be contained within the Health and Safety File and be retained by the Property management company on behalf of the OMC. A minimum of 25 years will be required for the primary elements.

By carefully specifying materials like brick and concrete, construction projects can streamline material procurement, reduce waste, and avoid unnecessary overruns or changes. This not only helps control initial construction costs but also contributes to the long-term sustainability and cost-effectiveness of the built environment. Proper material specification aligns project goals with efficient resource utilisation, ultimately resulting in cost savings and improved project outcomes.

2.4 LANDSCAPE

A Landscape Design Report has been prepared by Mitchell + Associates and is included within the planning application. The following design and management measures will be undertaken in relation to landscape maintenance:

Hard Landscape Materials:	Sustainable, robust materials, with high slip resistance to be used for paving. Durable and robust finishes to be selected for all furniture and bicycle storage units. Hard materials will be sourced from local surfaces where possible. Benefit: Materials selected to minimise ongoing maintenance inputs. Reduction in Carbon Footprint.
Soft Landscape Materials:	Planting proposals have been formulated to complement the local setting as well as being fit for purpose in respect of private and public realm uses. Native tree species have been selected in significant numbers for planting across the public open space. The tree & plant selection proposed has a proven record to thrive in the Irish climate.

Maintenance aware landscaping:	Minimising maintenance costs while maximising value: extensive native meadow, forest planting and hedgerows instead of more intensive large areas of mown grass, clipped hedges, and feature planting beds. Amenity mown lawn kept only to specific areas for intended use (kick about space, picnic lawn etc.). Feature planting beds only to small key areas - e.g. extensive perennial gravel beds to main plaza, otherwise replaced by native groundcover perennial planting with wild bulbs, meadow planting Extensive maintenance, higher biodiversity, and diverse nature experience - "a wilder look" Community involvement in maintenance - community gardens Benefit: Ongoing maintenance cost reduced. Community involvement can help reduce vandalism and antisocial behaviour issues.
Site layout and design:	Pedestrian and cyclist friendly hierarchy of open spaces are complemented by generous and high-quality landscape treatments providing long term high quality public space environments. Benefit: Safe, high quality public space environments reduce vandalism and antisocial behaviour issues.
Sustainability & Biodiversity:	The sustainable aspects of the scheme include the partial retention of the existing townland boundaries hedgerows. Native trees and planting are proposed where possible, complemented with pollinator friendly flowering trees and planting with the overall objective to enhance biodiversity across the site. The landscape design incorporates nature-based solutions to Sustainable Urban Drainage (SuDS) with planting areas designed to receive surface water run-off from adjacent footpaths and cycle lanes where the levels allow. Refer to Landscape Design Report prepared by Mitchell & Associates. Benefit: Enhanced sustainability of long term building management. Reduction of rainwater run-off. Reduction in rainwater goods that would require maintenance and repair.

2.5 WASTE MANAGEMENT

The following measures will be undertaken in relation to waste management in order to help reduce potential waste charges:

1. An Operational Waste Management Plan has been prepared by AWN Consulting and forms part of the EIAR. This will be integrated into the Final Management Plan.

2. Competitive tender for waste management collection, separation of grey, brown and green waste.
3. Provision of organic waste bins to be provided.

The following measures illustrate the intentions for the management of Waste:

Measure	Description	Benefit
Storage of Non-Recyclable Waste and Recyclable Household Waste	Waste bin storage is included in the ground floor layouts of each block. Please see Figure 4 for proposed refuse storage areas.	Easily accessible by all residents and minimizes potential littering of the scheme
	Domestic waste management strategy: • Grey, Brown and Green bin distinction. • Waste management collection will be provided.	Helps reduce potential waste charges and amount of waste going to landfill.
	Glass bins have also been allocated for use by the residents & commercial tenants	Helps reduce potential waste charges and amount of waste going to landfill.
Construction and Demolition waste management plan	A significant amount of waste is produced from either the materials imported to the development site or from those generated on site during the construction process and it is crucial to have a plan on how it will be reused, recycled, or disposed in a landfill. To accomplish this goal, a set of guidelines can be provided to subcontractors to follow for their waste management activities: • Housekeeping • Waste minimization • Maximizing product use • Materials management from contamination and deterioration • Recyclable (timber, metals, glass, concrete, commingled), general non-recyclable, and hazardous waste segregation according to types of material • Segregated areas • Pick-up frequency and transport of refuse materials to designated disposal landfill • Measurement of waste material (weight or volume)	Lower costs by using materials more effectively, reducing the amount of waste going to landfill, lower CO2 emissions, lower risk of pollution incidents.

A waste generation model (WGM) developed by AWN has been used to predict waste types, weights and volumes expected to arise from operations within the proposed development. The WGM incorporates building area and use and combines these with other data, including Irish and US EPA waste generation rates.

The estimated quantum / volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units, while the floor area usage (m^2) has been used to estimate the waste arising from the commercial units (retail units, cultural/community units and crèche unit).

The estimated waste generation for the proposed development for the main waste types is presented in tables below.

Waste Type		Waste Volume (m^3 / week)		
	Block 1 Residential Units (Combined)	Block 1 Retail Units (Combined)	Block 2a Residential Units (Combined)	Block 2b Residential Units (Combined)
Organic Waste	0.34	0.68	0.43	1.63
DMR	2.40	13.44	2.94	11.13
Glass	0.07	0.37	0.08	0.31
MNR	1.26	5.60	1.71	6.47
Total	**4.07**	**20.09**	**5.16**	**19.54**

Waste Type	Waste Volume (m^3 / week)		
	Block 2a & 2b Retail Units and Community/Cultural Units (Combined)	Block 3 Residential Units (Combined)	Block 3 Community/Cultural Units (Combined)
Organic Waste	0.19	0.60	0.14
DMR	3.83	4.41	2.79
Glass	0.11	0.22	0.08
MNR	1.60	2.10	1.16
Total	**5.73**	**7.33**	**4.17**

Waste Type	Waste Volume (m^3 / week)		
	Block 5 Residential Units (Combined)	Crèche Unit (Block 5)	Block 6 & Block 7 Residential Units (Combined)
Organic Waste	1.14	0.07	2.81
DMR	8.32	2.61	19.91
Glass	0.22	0.01	0.54
MNR	3.96	1.16	10.47
Total	**13.64**	**3.85**	**33.73**

Waste Type	Waste Volume (m^3 / week)		
	Block 6 & 7 Community/Cultural Units (Combined)	Block 8 & Block 9 Residential Units (Combined)	Block 10 Residential Units (Combined)
Organic Waste	0.21	2.27	1.05
DMR	4.04	16.11	7.41
Glass	0.11	0.44	0.20
MNR	1.69	8.47	3.90
Total	**6.05**	**27.29**	**12.56**

BS5906:2005 Waste Management in Buildings – Code of Practice has been considered in the calculations of waste estimates. AWN's modelling methodology is based on recently published data and data from numerous other similar developments in Ireland and is based on AWN's experience, it provides a more representative estimate of the likely waste arisings from the proposed development.

Waste Storage Areas

Thirteen (13 no.) Waste Storage Areas (WSAs) have been allocated in the design of this development. The locations of all Waste Storage Areas (WSAs) can be viewed on the drawings submitted with the planning application.

Block 1

One (1 no.) WSA has been allocated for use by the residents of Block 1. This WSA Is located at ground floor level in Block 1, adjacent to the residential bicycle store and residential stair core.

One (1 no.) WSA has been allocated for use by the retail units in Block 1. This WSA is located at lower ground floor level, in the delivery area adjacent to the large retail unit.

Block 2a and Block 2b

One (1 no.) WSA has been allocated for use by residents of Block 2a. This WSA is located at upper ground floor level in Block 2a, adjacent to the bicycle store.

One (1 no.) WSA has been allocated for use by residents of Block 2b. This WSA is located at upper ground floor level in Block 2b.

One (1 no.) WSA has been allocated for use by the retail units and community and cultural units in Blocks 2a and 2b. This WSA is located at upper ground floor level in Block 2b, adjacent to the residential bin store and bicycle store.

Block 3

One (1 no.) WSA has been allocated for use by residents of Block 3. This WSA is located at lower ground floor level in Block 3, adjacent to the bicycle store and community and cultural units.

One (1 no.) WSA has been allocated for use by the community and cultural units in Block 3. This WSA is located at lower ground floor level, adjacent to the covered bike stand.

Block 5

One (1 no.) WSA has been allocated for use by residents of Block 5. This WSA is located externally, adjacent to Block 5.

One (1 no.) WSA has been allocated for use by the creche unit. This WSA is located externally adjacent to Block 5, beside the bicycle store.

Blocks 6 & 7

One (1 no.) WSA has been allocated for use by residents of Block 6 and Block 7. This WSA is located externally between Blocks 6 & 7.

One (1 no.) WSA has been allocated for use by the community and cultural units in Blocks 6 & 7. This WSA is located externally between Blocks 6 & 7, adjacent to the bicycle store.

Blocks 8 & 9

One (1 no.) WSA has been allocated for use by residents of Block 8 and Block 9. This WSA is located externally between Blocks 8 & 9.

Block 10

One (1 no.) WSA has been allocated for use by residents of Block 10. This WSA is located externally adjacent to Block 10.

Waste Storage Requirements

Using the estimated waste generation volumes in Tables 4.1, above, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the WSAs. It is envisaged that DMR, MNR, organic and glass waste will be collected on a weekly basis.

Estimated waste storage requirements for the operational phase of the proposed development are detailed in Table 5.1, below. The WSAs have been appropriately sized to accommodate the weekly waste requirements for waste receptacles.

Waste storage requirements for the proposed development

Area/Use	**Bins Required**			
	MNR[1]	**DMR[2]**	**Glass**	**Organic**
Block 1 Retail WSA	6 x 1100 L	13 x 1100 L	2 x 240 L	3 x 240 L
Block 1 Residential WSA	1 x 1100 L 1 x 240 L	2 x 1100 L 1 x 240 L	1 x 240 L	2 x 240 L
Block 2a Residential WSA	2 x 1100 L	3 x 1100 L	1 x 240 L	2 x 240 L
Block 2b Residential WSA	5 x 1100 L	10 x 1100 L	2 x 240 L	7 x 240 L
Block 2a & Block 2b Retail Units and Community/Cultural WSA (Combined)	2 x 1100 L	4 x 1100 L	1 x 240 L	1 x 240 L
Block 3 Residential WSA	2 x 1100 L	4 x 1100 L	1 x 240 L	3 x 240 L
Block 3 Community/Cultural WSA	1 x 1100 L 1 x 240 L	3 x 1100 L	1 x 240 L	1 x 240 L
Block 5 Residential WSA	4 x 1100 L	8 x 1100 L	1 x 240 L	5 x 240 L
Creche WSA (Block 5)	2 x 1100 L	3 x 1100 L	1 x 240 L	1 x 240 L
Block 6 & Block 7 Residential WSA (Combined)	10 x 1100 L	19 x 1100 L	3 x 240 L	12 x 240 L

Block 6 & Block 7 Community/Cultural WSA (Combined)	2 x 1100 L	4 x 1100 L	1 x 240 L	1 x 240 L
Block 8 & Block 9 Residential WSA (Combined)	8 x 1100 L	15 x 1100 L	2 x 240 L	10 x 240 L
Block 10 Residential WSA (Combined)	4 x 1100 L	7 x 1100 L	5 x 240 L	1 x 240 L

The Operational Waste Management Plan is included within the planning application.

2.6 HUMAN HEALTH AND WELLBEING

The design and layout of the proposed development on the subject lands has been carefully considered with regard to human health and wellbeing. Some of the features provided within the scheme that positively contribute to the wellbeing of the residents include:

- Provision of a hierarchy of open spaces complemented by generous and high-quality landscaped treatments together with new green links and pedestrian and cycle paths – promoting green space, reduced parking, and encouraging active travel and ensuring long term high quality public environment
- Inclusion of play area, multi-use games area and a number of flexible use community and art / cultural spaces – encouraging community and recreational activities
- Carefully considered apartment layouts – with increased level of dual aspect units optimising the daylight / sunlight ingress, increased window openings, the provision of quality private amenity space, and units that have been designed in accordance with the requirements of Universal Design Standards
- Sufficient level of communal and residential amenities has also been provided throughout the scheme
- The provision of community, arts / cultural spaces including external event spaces and community gardens
- The provision of retail use in close proximity to the residential units thus reducing the need for private vehicle trips to services located further afield

Measure	Description	Benefit
Natural / Day Light	The design, separation distances and layout of the apartment blocks have been designed to optimize the ingress of natural daylight/ sunlight to the proposed dwellings to provide good levels of natural light.	Reduces reliance on artificial lighting thus reducing energy costs.
Accessibility	All units, including access and egress will comply with the requirements of Part M/K and a universal access statement is provided within the design statement of this submission.	Reduces the level of adaptation, and associated costs, potentially necessitated by residents' future circumstances.
Security	The scheme is designed to incorporate passive surveillance with the following security strategies likely to be adopted: - CCTV monitoring details - Secure bicycle stands	Access to all residents to reduce the risk of crime, littering within the development. Help to reduce potential security/management costs.
Natural Amenity	Nature inclusive playgrounds, Sports (Outdoor gym, basket, amenity lawn for kick about, running trail, table tennis), Seating together spaces for sociability with possible small events, Community gardens and picnic tables, pedestrian and cycle access are all included.	Facilitates community interaction, socializing and play - promotes a healthy lifestyle and improved wellbeing.

2.8 ENERGY AND CARBON EMISSIONS

The following are an illustration of the energy measures that are planned for the units to assist in reducing costs for the occupants as outlined in the Sustainability Strategy

Energy Efficiency Measures

<table>
<tr><th>Measure</th><th>Description</th><th>Benefit</th></tr>
<tr><td>Part L Compliance & BER Certificates (Domestic)</td><td>The routes and options to compliance with 'Technical Guidance Document L-Conservation of Fuel and Energy - Dwellings' are set out in the '22-011 Cherry Orchard Part L Options' completed by the Waterman Moylan Consulting Engineers Limited. This document sets out the building fabric, mechanical and electrical specifications required for compliance with Part L and the Nearly Zero Energy Building (NZEB) Standard.

A Building Energy Rating (BER) certificate will be provided for each dwelling in the proposed development which will provide details of the energy and carbon performance of the building. The BER calculation includes energy use for space and hot water, heating, ventilation, and lighting and occupancy. It is proposed to target an A3 rating for the residential units which will equate to the following emissions for each residential unit.

A3: >50 & ≤ 75 kwh/m²/year with CO_2 emissions circa 12kg CO_2/m² year.

Table 1: Annual Tonnes of CO_2 emissions per m2 on the basis of typical occupancy.
<table>
<tr><th>Rating</th><th>2 Bed</th><th>3 Bed Semi-D</th><th>4 Bed Semi-D</th><th>Detached House</th><th>Large House</th></tr>
<tr><td>A3</td><td>1</td><td>1.4</td><td>2</td><td>2.7</td><td>4.1</td></tr>
</table>
</td><td>Higher BER ratings reduce energy consumption and CO_2 emissions and thus running costs.</td></tr>
<tr><td>Part L Compliance & BER Certificates

(Non - Domestic / Commercial)</td><td>The design team will develop a proposed mechanical and electrical strategy and NEAP specifications for the commercial blocks. The purpose of this specification is to give future tenants and building owners a pathway to 'Technical Guidance Document L - Buildings other than Dwellings' and NZEB compliance for their subsequent fitout. The tenant is at liberty if they so wish to implement an alternative strategy for their BCAR compliance and completion process, noting that it is the responsibility of the tenant to ensure that their fitout achieves compliance with TGD Part L 2021.

A minimum of an A3 BER rating is targeted for the commercial buildings in the development.</td><td>Higher BER ratings reduce energy consumption and CO_2 emissions and thus running costs.</td></tr>
</table>

<table>
<tr><th>Measure</th><th>Description</th><th>Benefit</th></tr>
<tr>
<td>Fabric Energy Efficiency</td>
<td>
Building Fabric Performance

The proposed U-values for the development are in compliance with the requirements set out by the current regulatory requirements of 'Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings' for the residential units, and Technical Guidance Document Part L "Conservation of Fuel and Energy Buildings other than Dwellings" for the commercial units.

Before considering efficient building services or renewable energy systems, the form and fabric of a building must be assessed and optimized so as to reduce the energy demand for heating, lighting and ventilation.

Target performance levels have been identified by the design team and are presented below. The U-Value of a building element is a measure of the amount of heat energy that will pass through the constituent element of the building envelope. Increasing the insulation levels in each element will reduce the heat lost during the heating season and this in turn will reduce the consumption of fuel and the associated carbon emissions and operating costs.

Table 2: Proposed U-Values - Residential Units
<table>
<tr><th>U-Values</th><th>Part L 2021 Compliant Values</th><th>Proposed Specification</th></tr>
<tr><td>Floor</td><td>0.18 W/m²K</td><td>0.12 – 0.18 W/m²K</td></tr>
<tr><td>Roof</td><td>0.16W/m²K</td><td>0.12 - 0.16 W/m²K</td></tr>
<tr><td>Walls</td><td>0.18 W/m²K</td><td>0.12 - 0.18 W/m²K</td></tr>
<tr><td>Windows</td><td>1.4 W/m²K</td><td>1.0 - 1.4 W/m²K</td></tr>
</table>
Table 3: Proposed U-values – Non-Domestic Commercial Units
<table>
<tr><th>Element</th><th>Part L Maximum U-values (U-value W/m2K)</th></tr>
<tr><td>Ground and Exposed Floors</td><td>≤ 0.21</td></tr>
<tr><td>Roof</td><td>≤ 0.16</td></tr>
<tr><td>Walls</td><td>≤ 0.21</td></tr>
<tr><td>Windows</td><td>≤ 1.6</td></tr>
<tr><td>Vehicle Doors</td><td>≤ 1.50</td></tr>
<tr><td>Personnel Doors</td><td>≤ 1.60</td></tr>
</table>
</td>
<td>Lower U-values and improved air tightness are proposed in adherence with the fabric first design approach to minimize heat losses through the building fabric, lower of energy consumption and thus minimize carbon emissions to the environment.</td>
</tr>
</table>

Measure	Description	Benefit
Air Tightness	A major consideration in reducing the heat losses in a building is the air infiltration. This relates to the ingress of cold outdoor air into the building and the corresponding displacement of the heated internal air. This incoming cold air must be heated if comfort conditions are to be maintained. In a traditionally constructed building, infiltration can account for 30 to 40 percent of the total heat loss, however construction standards continue to improve in this area. In order to ensure that a sufficient level of air tightness is achieved, air permeability testing will be specified carried out for all dwellings. An air permeability of 5 $m^3/h/m^2$ is the maximum allowable value for compliance with TGD Part L 2021. For the residential units an air permeability of <3 $m^3/h/m^2$ is proposed.	The provision of high quality air tightness reduces the amount of heating / cooling required to control building temperatures.
Energy Labelled White Goods	The white good package planned for provision in the apartments will be of a very high standard and have a high energy efficiency rating. It is expected that the below appliance ratings will be provided: • Oven - A + • Fridge Freezer - A + • Dishwasher - AAA • Washer/Dryer - B	The provision of high rated appliances in turn reduces the amount of electricity required for occupants.
External Lighting	The proposed lighting scheme within the development consists of range of luminaires, each selected to suit the specific location on the site. All fittings selected will be LED and will be mounted on columns. • Low level lighting • Low voltage LED lamps • Minimal upward light spill • Prep approved by Dublin City Council Each light fitting shall be controlled via an individual Photoelectric Control Unit (PECU). The operation of the lighting shall be on a dusk-dawn profile.	The site lighting will be designed to provide a safe environment for pedestrians, cyclists and moving vehicles, to deter anti-social behavior and to limit the environmental impact of artificial lighting on existing flora and fauna in the area. Having PECU allows for the optimum operation of lighting which minimizes costs.
Internal Lighting	Light is important for visual performance and safety thus can influence the productivity, focus, and the opinions of people inside the building. The Light-Emitting Diodes (LED) work through a process called electroluminescence which generates light as an electric current passes through a semiconductor material. The technology and design consideration of using LED lighting and controls for internal lighting of buildings is a highly energy efficient solution, specially when fueled by solar panels. LED lightings use from 25 to 80% less and last approximately 25 times longer than the traditional lighting systems. In addition, about 90% of the energy from traditional bulbs is emitted as heat which makes them a very wasteful option.	LED lightings are energy efficient, lasting longer, offering significant reduction on operational costs, saving money through replacements. These lights are dimmable and safer with a lower heat output.

The following are the low energy technologies that are being considered for the development. During detailed design stage of the development the specific combination from the list below will be decided on and then implemented to achieve a minimum of an A3 BER Rating.

Measure	Description	Benefit
Condensing Boilers	Condensing boilers will be assessed as they have a higher operating efficiency, typically over 90%, than standard boilers and have the benefit of lower fuel consumption resulting from the higher operating efficiencies. Condensing boilers use the heat losses from the boiler flue to preheat the circulating heating water	• By preheating the water, the boiler can achieve efficiencies in excess of 90% • Their improved efficiency also lowers greenhouse gas emissions, aligning with environmental regulations. • Condensing boilers require less maintenance due to cleaner combustion and prolonged equipment life. • They have a higher BER rating • Condensing boilers offer significant cost savings and management benefits. They operate with exceptional energy efficiency by recovering heat from exhaust gases, thus reducing fuel consumption and heating bills.
Natural Ventilation	Natural Ventilation is being evaluated as a ventilation method to minimize energy usage and noise levels and it will be an option.	Advantages of natural ventilation: • Low noise impact for occupants • Passive system and therefore no energy required • By utilising prevailing winds and temperature differentials, it minimizes the need for mechanical HVAC systems, resulting in lower energy bills and reduced maintenance costs • Improved air circulation also enhances occupant comfort and productivity, reducing the likelihood of sick building syndrome
Mechanical Ventilation	There is no requirement for a separate Mechanical Extract Ventilation (MEV) systems when an exhaust air heat pump is used as the heat pump draws the air from all wet rooms in the same manner as an MEV system would. The fan will run continuously to ensure that the minimum ventilation rates are maintained and the supply air to the dwelling is provided through trickle vents in each habitable room. Heat Recovery Ventilation would then be provided in order meet the ventilation needs of the apartments. Air is extracted from wet rooms and supplied to living spaces via a central unit which contains supply and extract fans and a heat exchanger. This system recovers the heat from the warm air being extracted from the dwelling and uses the heat recovered to raise the temperature of the incoming air stream leading to improved overall efficiency.	• Heat recovery ventilation (HRV) systems offer notable cost savings and management benefits. HRV systems recover and reuse heat from exhaust air to preheat incoming fresh air, significantly reducing heating and cooling energy consumption. • This results in lower utility bills and a reduced carbon footprint. • Improved indoor air quality through continuous ventilation leads to healthier occupants and reduced absenteeism, contributing to productivity gains. • Additionally, HRV systems require minimal maintenance and can extend the lifespan of HVAC equipment, saving on repair and replacement costs.

Measure	Description	Benefit
Solar PV Panels	Photo Voltaic or PV Solar panels produce electricity for dwellings. PV Solar Panels will be considered as an option for both houses and apartments in order to meet the renewable energy contribution required by Part L of the Building Regulations. The minimum renewable energy contributions defined in Part L 2021 is 20% of the total energy consumption for the dwelling. These panels convert sunlight into electricity which can be used within the dwelling. Generally, an average of 1 PV panels will be required for each apartment.	They generate clean, renewable energy from sunlight, reducing electricity bills significantly. Solar panels also require minimal maintenance, leading to lower upkeep costs compared to traditional power sources. They enhance property value. Solar panels represent a smart financial and sustainable choice, offering both immediate savings and long-term energy management benefits.
Combined Heat and Power (CHP)	Combined heat and power (CHP) is a technology being evaluated. This technology generates electricity and captures the waste heat from the generation unit that can be used within the development. The CHP unit uses gas as its energy source to create electricity results in the generation of waste heat which can then be used. It contributes the overall 20% of renewable energy requirement since it uses the waste heat.	These systems simultaneously generate electricity and useful heat from a single fuel source, increasing overall energy efficiency. Captured waste heat can be used for heating, cooling, or industrial processes, further improving energy utilisation. CHP systems enhance resilience by providing a reliable power source during grid outages.
Air Source Heat Pump	As part of the overall energy strategy for houses, the use of Air Source Heat Pumps will be assessed. These systems utilize the grid electricity to extract heat energy from the outside air and, using a refrigerant cycle, raise the temperature of the heat energy using a refrigerant vapour compression cycle. Due to high operating efficiency of these systems, a significant portion of heat is considered as renewable energy.	Air source heat pumps (ASHPs) provide cost savings and efficient heating and cooling management. They use electrical energy from the grid to drive the refrigerant cycle. They typically provide 4 to 5 times more heat energy to the dwelling than the electrical energy they consume, offering high energy efficiency and reduced utility bills. ASHPs can both heat and cool spaces, eliminating the need for separate systems and lowering maintenance costs. These systems are relatively easy to install and have lower upfront costs compared to some alternatives. they represent a cost-effective and environmentally friendly solution for climate control in residential and commercial settings.
Electric Vehicle Charging Infrastructure	As part of the proposed development, it is proposed to install 222 no electric vehicle (EV) charging points. The proposal includes for the provision of centrally located electric vehicle charging spaces at a rate of 50% of the total number of spaces.	For businesses, installing charging stations can attract more customers and enhance their revenue stream. Workplace charging can also boost employee satisfaction and productivity. For individuals, owning an EV often leads to lower fuel and maintenance costs compared to traditional vehicles. Home charging can take advantage of lower electricity rates during off-peak hours, resulting in further savings.

Measure	Description	Benefit
Thermal Bridging	Thermal bridges occur at junctions between planar elements of the building fabric and are typically defined as areas where heat can escape the building fabric due to a lack of continuity of the insulation in the adjoining elements. Careful design and detailing of the manner in which insulation is installed at these junctions will reduce the rate at which the heat escapes. Standard good practice details are available and are known as Acceptable Construction Details (ACD's). Adherence to these details is known to reduce the rate at which heat is lost. The rate at which heat is lost is quantified by the Thermal Bridging Factor of the dwelling which is entered into the overall dwelling Part L calculation. It is intended that all building junctions will either be designed in accordance with the Acceptable Construction Details (issued by The Department of the Environment) or that thermal modelling will be carried out for all thermal bridges on the dwellings within proposed development. For the residential units it is proposed that the Thermal Bridging Factor will be <0.08. For buildings other than dwellings Part L 2021 outlines 3 alternative approaches with regard to limitation of thermal bridging, one of which must be followed: • Adopt Acceptable Construction Details for wall constructions similar to those for dwellings where appropriate (see Appendix D, Table D1 Part L 2021) and/or other certified details (as defined in (ii) below) for all key junctions. https://www.gov.ie/en/publication/d82ea-technical-guidance-document-l-conservation-of-fuel-and-energy-dwellings/#acceptable-construction-details Use certified details which have been assessed in accordance, and comply with Appendix D Part L 2021, e.g., certified by a third-party certification body such as Agrément or equivalent; or certified by a member of the NSAI approved thermal modellers scheme or equivalent; or certified thermal bridging details from an accredited database such as the BRE Certified Thermal Details and Products Scheme for all key junctions. Use alternative details which limit the risk of mould growth and surface condensation to an acceptable level as set out in paragraph D.2 of Appendix D Part L 2021 for all key junctions. Irrespective of which approach is used, appropriate provision for on-site inspection and related quality control procedures should be made (see sub-sections 1.5.2 and 1.5.3 Part L 2021).	Thermal bridging mitigation offers cost savings and effective energy management. By reducing heat transfer through building envelope components, such as walls and roofs, it enhances insulation efficiency, resulting in lower heating and cooling bills. Reduced energy consumption also contributes to a smaller carbon footprint, aligning with environmental goals and potential incentives. Additionally, less temperature variation within a building improves occupant comfort and productivity, reducing potential health-related costs. In summary, addressing thermal bridging not only lowers operational expenses but also promotes sustainability and occupant well-being, making it a valuable consideration in construction and retrofit projects.

2.9 TRANSPORT AND ACCESSIBILITY

Access by Walking

Overall, walking access is good to the rail based public transport serving an east-west corridor. Access is also possible to the bus based north-south corridor. Access also is proficient to local amenities and community services. Residents can walk to nearby parks such as New Cherry Orchard Park, Cherry Orchard Playground, and Cherry Orchard community childcare services, which are all within a 15 minute radius. As a mode of transportation, walking requires no fuel expenses or vehicle maintenance, saving individuals and communities money. Promoting walking infrastructure within Cherry Orchard Point, like footpaths and pedestrian-friendly walkways, can reduce the need for costly road repairs and expansions. Additionally, regular walking contributes to better health, lowering healthcare costs and improving overall well-being. For businesses and urban planners, walkable environments attract customers and residents, boosting local economies. Overall, walking is an economical and sustainable choice for individuals, communities, and businesses, providing both immediate cost savings and long-term management advantages.

Car Parking

The proposed provision of car parking will be 444 spaces with 328 spaces for the 709 residential units, 11 spaces for car sharing and 105 spaces for the retail, creche and community facilities. 21 accessible spaces (5%) will also be provided. The provision of the 444 spaces for the residential units will include 222 spaces with charging facilities for electric vehicles (50%) and 222 spaces designed to facilitate the relevant infrastructure to accommodate future EV charging. Electric vehicle (EV) parking facilities offer notable cost savings and management benefits. They attract environmentally-conscious customers and tenants, enhancing revenue streams for businesses and property owners. Forward-thinking investment in EV parking also aligns with sustainability goals and can increase property values. Car parking for the supermarket has been increased from the 20 spaces based on the City Development Plan to 92 spaces to cater for residents in the immediate surrounding area and the ongoing viability of a supermarket at Cherry Orchard Point. 7 Pay and Display spaces will be provided on Park West Avenue. Modern technologies like automated payment systems and real-time occupancy monitoring enhance revenue collection and operational efficiency. Thoughtful car parking solutions offer cost savings, efficiency, and sustainability in urban planning and development.

Bus Services

Bus services in the area of the proposed are a combination of historic services operated by Dublin Bus and new services are provided under the auspices of Bus Connects. Dublin Bus Routes 79 and 79a which formerly served the Park West Avenue, and the Park West / Cherry Orchard Station were replaced by Routes G1 and 60 in October 2022. Bus stops are located on Park West Avenue, Barnville Walk and Cedar Brook Way. Bus services reduce the need for residents to own and maintain personal vehicles, saving on purchasing, maintenance, and fuel costs. By providing reliable public transportation, social housing developments can attract more tenants, leading to increased revenue. Additionally, it promotes a sense of community and accessibility, enhancing residents' quality of life and overall satisfaction. Moreover, reduced traffic congestion and environmental benefits align with sustainable development goals, potentially leading to incentives and support from local governments.

Rail Services

Park West & Cherry Orchard which opened in 2008, is an intermediate station on the Kildare Commuter Line with regular commuter and inter-city services including stopping services from Portlaoise and Newbridge to Heuston Station and from Hazlehatch & Celbridge to Grand Canal Dock. The journey time to Heuston is some 9 - 11 minutes and the journey time to Grand Canal Dock is some 40 – 45 minutes. There are 5 existing services from Park West and Cherry Orchard to the City Centre during the AM Peak Hour 8 – 9. Rail users at Park West Cherry Orchard Station represent a very low modal split of 2%. This is despite its central location and despite 2,550 people having access to the station within a 15-minute walk. The DART Expansion Project proposed by Irish Rail will deliver new electrified rail services between the existing DART network in the City Centre City Centre and Hazlehatch, Co. Kildare. The service through Park West & Cherry Orchard will provide an increased service frequency and enhanced passenger capacity. Similar to bus services, the well-connected rail services will offer residents the option of public transport as opposed to spending time and money on fuel for a personal vehicle. Reduced traffic congestion and environmental benefits will also be positive outcomes.

Cycle Facilities

The cycle access to the proposed development have been integrated with the proposals for the surrounding road network. This development provides for upgraded footpaths and cycle tracks on the Park West Avenue together with pedestrian and cycle phases in the signalised junction at Barnville Walk. There are a number of new cycling facilities proposed in the area of the subject site including new / improved off road cycle facilities along Ballyfermot Road, within the adjacent City Edge development area and as part of the Grand Canal Greenway. The proposed provision of cycle parking will be a total of 1,618 number spaces comprising 1,552 spaces for residents/visitors and 66 spaces for staff, customers and visitors at the supermarket, retail, creche and community. Promoting this sustainable way to travel will have mental and physical health benefits for residents, meaning an overall reduction in health implications in the future and therefore healthcare costs. Additionally, it contributes to a more sustainable, eco-friendly environment, aligning with green initiatives and garnering support from local authorities. Overall, cycling services within social housing complexes foster healthier, cost-effective, and environmentally responsible living.

SECTION 03 – BUILDING SERVICES LIFECYCLE

3.1 MECHANICAL AND ELECTRICAL SYSTEMS

Waterman Moylan Consulting Engineers have prepared a Climate Action Energy Statement for Cherry Orchard Point Residential Development. The Climate Action Energy Statement document outlines the importance of compliance with Part L 2022 of the Building Regulations. **The below is an extract on pages 9-13 from that report. The full report is available within the planning application.**

Heat Sources & Renewable Energy Options & Proposals

Part L of the building regulations requires that all new residential buildings must meet overall energy performance levels (as defined by the Energy Performance Coefficient - EPC) and must have a portion of their annual energy demand provided by renewable energy sources.

The renewable energy source can be thermal energy such as solar thermal collection, biomass boilers or heat pumps or it can be electrical energy as generated by photovoltaic solar panels or wind turbines. The minimum renewable energy contributions defined in Part L 2022 Part (b) is 20% of the total energy consumption for the dwelling.

Furthermore, as set out in Section 3 of the report (Climate Action Energy statement), the development must comply with the requirements of the Dublin City Council Development Plan 2022- 2028, regarding the choice of energy systems and the methods used to assess each system.

In order to comply with the requirements of the Development Plan, a detailed feasibility assessment has been carried our by Waterman Moylan to investigate the options available to meet the heating and hot water demands of the site and to assess the feasibility of (a) implementing a district heating solution or (b) delivering a site which is "district heating enabled".

A copy of the full report (Climate Action Energy statement) which details the findings of this study has also been submitted with the planning application for this development. A description of the systems considered within the study are summarised below along with an overview of the findings of the study.

Option 1 - Connection to a 3rd Party Off-Site District Heating Network

This approach would involve the installation district heating pipework throughout the scheme to distribute the heat generated by a 3rd party off-site district heating network. Each apartment would be served via a heat interface unit (HIU). The HIU will both control and meter the consumption of heat and hot water within each individual dwelling allowing occupants to set the times they need space heating and ensuring they are charged accordingly.

The source of heat for the 3rd party district heating network could be waste heat from nearby commercial or industrial systems such as data centres, or from municipal geothermal heat sources.

Option 2 - On-Site District Heating

This approach would involve the generation of heat in a central location on the site and the distribution of this heat to each apartment via a network district heating pipework. The central plant used to generate the heat could include either Air Source Heat Pumps, Combined Heat and Power (CHP) plant, high efficiency gas fired condensing boilers, or, a combination of all of these systems.

The large Air Source Heat Pumps (ASHPs) operate in the same manner as the smaller units incorporated in houses or apartments but at a larger scale. They utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the ambient air. While the electricity consumed is not renewable energy, the efficiency at which a heat pump operates allows a significant portion of the heat delivered be considered as renewable. Typically, approximately 40% to 50% of the heat supplied is considered to be renewable energy

A CHP unit uses gas as its energy source to create electricity which can be utilised within the proposed development. This process of creating electricity results in the generation of "waste heat" which can then be used to meet a proportion of the heating and hot water demands of the housing development. Since the waste heat is captured it can be considered to be renewable energy and therefore contributes towards the overall 20% renewable energy requirement.

The gas fired boilers can be provided to top-up the heat produced by the CHP and heat pumps by raising the temperature of district heating system to the required level and by supplementing the overall heat production in the coldest periods of the year.

2 distinct options were considered for the delivery of an on-site district heating network:

*The first (**Option 2A)** included central plant made up of a combination of heat pumps, CHPs and gas boilers.*

*The 2nd approach **(Option 2B)** assumed that no fossil fuels would be consumed on site that heat pumps would provide the majority of heat on the site, with the possible addition of direct acting electric boilers.*

Heating pipework will be installed throughout the scheme to distribute the heat generated in the plant room throughout the apartment development, serving each apartment via a heat interface unit (HIU). The HIU will both control and meter the consumption of heat and hot water within each individual dwelling allowing occupants to set the times they need space heating and ensuring they are charged accordingly.

Option 3 – Exhaust Air Heat Pumps

Exhaust Air heat pumps (EAHPs) operate in a very similar manner to the more conventional air source heat pumps and utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the internal air within the apartment. The internal air is extracted from kitchens and wet rooms and is drawn into the heat pump via ductwork in the ceiling void. The heat pump extracts heat from this air before expelling it from the apartment.

The electricity consumed is not renewable energy but the efficiency at which a heat pump operates allows a significant portion of the heat delivered to the dwelling be considered as renewable.

There are a number of manufacturers offering products of this type and the certified seasonal efficiencies of some models can exceed 450% in heating mode and 170% to 190% in hot water mode. These efficiencies can deliver Part L 2022 compliance in most circumstances but in some instances may need supplementary PV panels in order to meet the required energy targets.

There is no requirement for a separate Mechanical Extract Ventilation (MEV) systems when an exhaust air heat pump is used as the heat pump draws the air from all wet rooms in the same manner as an MEV system would. The fan will run continuously to ensure that the minimum ventilation rates are maintained and the supply air to the dwelling is provided through trickle vents in each habitable room.

Option 3 –Exhaust Air Heat Pumps + District Heating Enabled

As set out in the Development Plan, the feasibility of delivering a scheme which is "district heating enabled" must also be assessed. In this regard, the study investigated the technical and economic feasibility of including measures to enable future connection to a 3rd party off site district heating network.

Apartment Corridors/Landlord Areas

In accordance with the requirements of Part L 2022, the common areas within the apartment blocks are required to meet the requirements of Part L 2022 for "Buildings Other Than Dwellings". Under Part L 2022, a portion (10% to 20%) of the energy demand of the common areas must be met by a renewable energy source. The energy demand within these spaces will be exclusively provided by electrical energy (lighting, space heating & lifts etc) so a photovoltaic array would be best suited to meet this renewable energy demand.

Study Findings

The preceding sections of the report (Climate Action Energy statement) set out the regulatory requirements with which the scheme will have to comply while identifying a number of technologies and design approaches that may be utilised to achieve compliance.

***Option 1** offers the best performance in terms of carbon emissions and running costs and is expected to have capital costs that are in line with the most cost effective alternative solutions. However as there are no known 3rd party off-site district heating networks available for connection to the site this option must be discounted.*

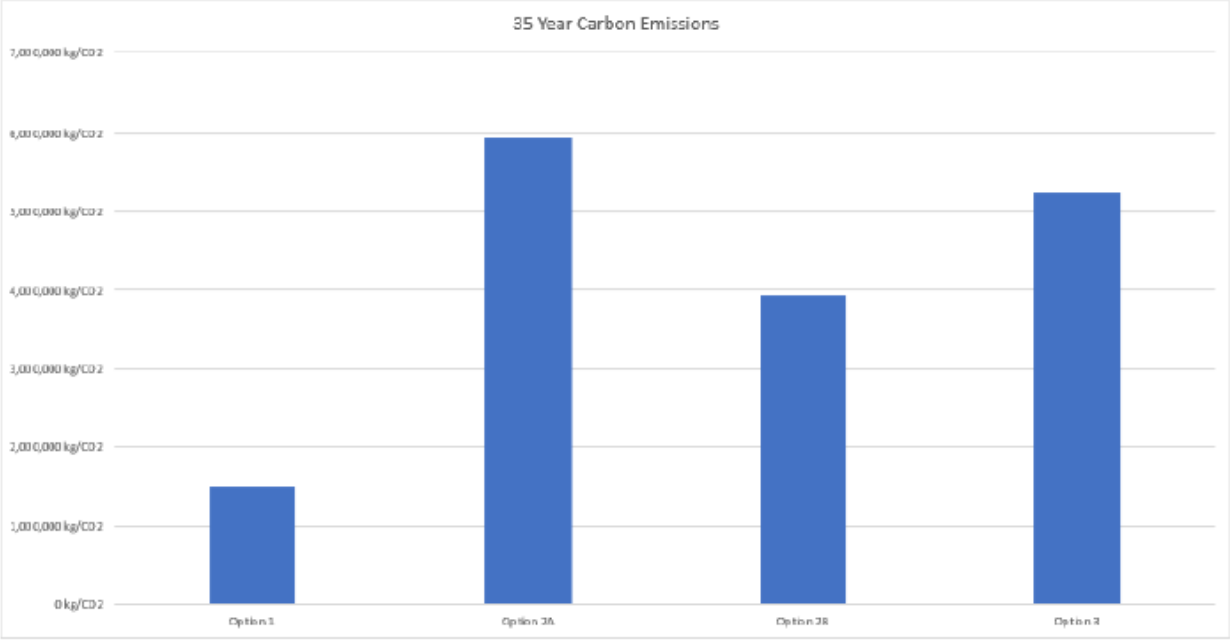
***Option 2A** is the only proposed solution that involves the longer term use of fossil fuels on site. The analysis shows that **Option 2A** will have a higher running costs and higher carbon emissions than alternative approaches unless the 3rd party network is available within 12 years of occupancy. The capital costs for Option 2A are also estimated to be 18% higher than those for the most cost effective alternative systems. Therefore, based on a combination of factors, this option must be discounted.*

***Option 2B** involves the use of an on-site district heating system utilising only air source heat pumps. At the time of writing, it is unclear if large commercial heat pumps can be correctly accounted for within the regulatory compliance procedures set out by the SEAI for residential developments and this may present compliance problems for the development if this approach were to be adopted. The analysis shows that **Option 2B** will have a higher running costs than the counterfactual system and will have higher carbon emissions than the counterfactual system unless the 3rd party network is available within 21 years of*

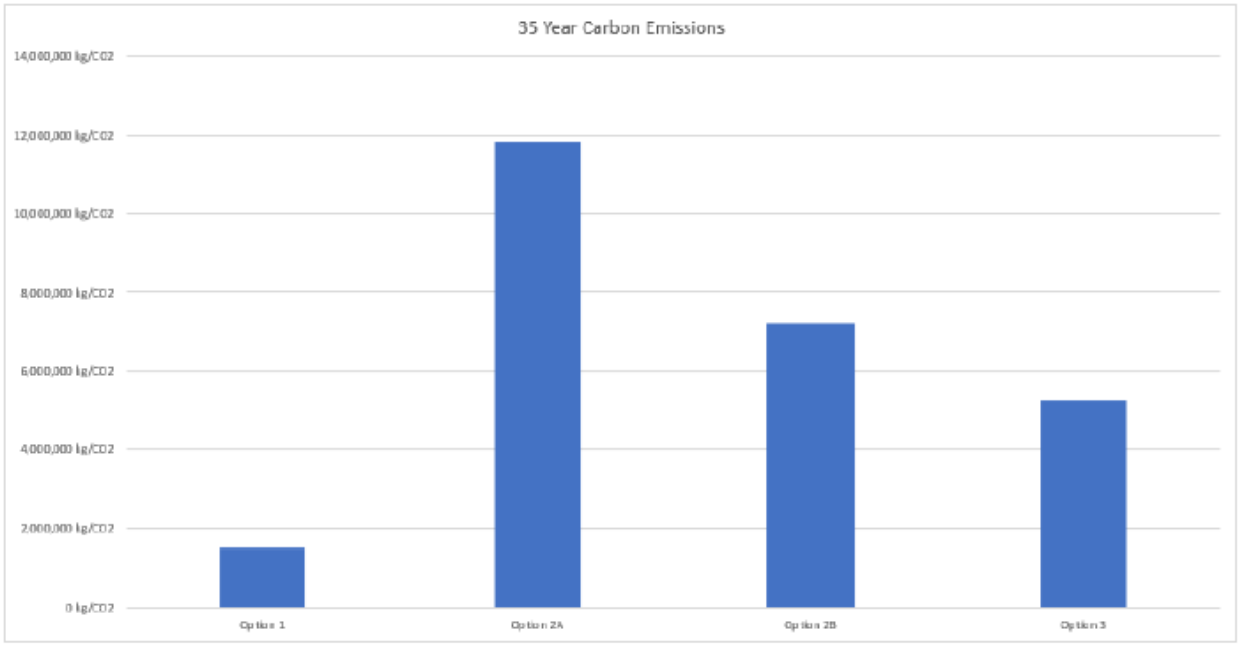
*occupancy. The capital costs for **Option 2B** are also 17% higher than those for alternative systems. Therefore, based on a combination of factors, this option must be discounted.*

***Option 3** involves the use of individual heat pumps within each residential unit and is therefore the same as the counterfactual scenario. This option is seen to have the lower carbon emissions than Option 2A and Option 2B if the 3rd party off-site network does not become available within 12 years and 21 years respectively. It is also shown to have lower running costs from the outset. It is for this reason that Option 3 has been identified as the most advantageous system for the site, both in terms of carbon performance and economic feasibility.*

*The assessment then considered the impacts that including a **District Heating Enabled Option** would have on the performance of the scheme. As this would include the exact same as those in the Option 3, the performance in terms of running costs and carbon emissions would be identical. The capital costs of the **active systems** installed on Day 1 are also identical however there would be significant additional costs associated with the provision of additional plant space, below ground heating pipework, space within each building for DHS sub-stations and the installation of pipework within the common areas of each apartment block. The costs associated with this additional installation is significant with an estimated cost uplift of 35% over the counterfactual scenario. This would add approximately € 6,000 to the cost of each apartment and would potentially impact on the overall viability of the development as a whole.*



*Carbon Emissions of 4 assessed systems assuming a low carbon 3rd Party Off Site District Heating Network is available within **10 years** of site completion.*



Carbon Emissions of 4 assessed systems assuming ***no low carbon 3rd Party Off Site District Heating Network becomes available during the first 35 years of site operation.***