

LRD at Former Dell EMC Premises, Innishmore, Ballincollig, Cork

Scheme Sustainability Statement

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BUILDING PERFORMANCE CONSULTING

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Executive Summary

This statement was prepared to support the planning application for the proposed Large Scale Residential Development at the site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. It addresses the requirement for a Scheme Sustainability Statement set out in Cork City Council's 2022-2028 Development Plan for all residential developments of 25 or more homes. The purpose of this statement is to demonstrate how the proposal positively responds to the impact of climate change through climate change resilience measures - both mitigation and adaption measures.

This report demonstrates how the design of the proposed scheme positively responds to the impact of climate change through mitigation and adaption measures.

Location, Siting & Layout

The proposed development demonstrates strong alignment with climate-responsive and compact urban growth principles through the regeneration of a highly accessible brownfield site within Ballincollig. The design integrates sensitively with surrounding residential areas by stepping building heights appropriately and improving street activation and passive surveillance. The layout prioritises pedestrian movement, permeability, and public realm quality, supporting low-carbon mobility through excellent access to bus services, cycle routes, and local amenities within a 15-minute walking catchment. Daylight, solar gain, micro-climate, and topography have all informed the site layout, ensuring optimal environmental performance and long-term resilience.

Sustainable Drainage Systems (SuDS)

A comprehensive SuDS-led drainage strategy has been integrated throughout the development, replacing an almost entirely impermeable brownfield site with a

multi-layered system of natural and engineered water-management features. Permeable paving, bio-retention areas, rain gardens, SuDS-enabled tree pits, green/blue roofs, and attenuation systems collectively reduce runoff, improve water quality, and enhance biodiversity. Systems are designed to manage extreme rainfall, maintain greenfield runoff rates, and incorporate climate-change allowances, ensuring robust performance over the long term. The design responds to geotechnical and groundwater risk assessments and aligns fully with SuDS principles of water quantity, water quality, amenity, and biodiversity.

Green Roofs & Green Infrastructure

The proposed development employs a comprehensive green-infrastructure framework that transforms a low-value ecological landscape into an interconnected network of biodiverse planting, green roofs, tree pits, and open spaces. Green/blue roofs improve stormwater retention, enhance building thermal performance, and create habitat for pollinators and invertebrates. Public open spaces have been designed to maximise ecological connectivity, respond to micro-climatic opportunities, and promote both active and passive recreation. Native planting, wildflower meadows, and eco-gardens deliver measurable biodiversity gain and contribute to carbon sequestration, urban cooling, and overall climate resilience.

Energy & Carbon

Energy use is reduced through a strong emphasis on passive design, including high-performance building fabric, very low air permeability targets, optimised solar gain, high daylighting levels, and minimised thermal bridging. The development utilises decentralised exhaust-air heat pumps (EAHPs) for apartments and split ASHP systems for duplexes, providing efficient, low-carbon heating, hot water, and ventilation without the need for fossil fuels or complex centralised plant. Whole-life carbon reduction is supported through embodied-carbon targets, including

significant GGBS substitution in concrete and high recycled steel content. The energy strategy continues to be refined through on-going building performance modelling, including Part L compliance and BER modelling, dynamic thermal modelling, daylight and sunlight analysis, and embodied-carbon analysis.

Waste Management

A circular-economy approach underpins all waste-management strategies from demolition through construction and operation. The Construction Resource & Waste Management Plan (CRWMP) ensures soil reuse where feasible, segregation of all construction waste streams, and minimisation of landfill disposal through reuse, recycling, and recovery. Operational waste management is enabled through well-designed Waste Storage Areas, resident education, and strict segregation systems for organic waste, recyclables, glass, and residual waste. The approach aligns with the Waste Action Plan for a Circular Economy and Cork City Council's waste objectives, ensuring continued compliance and high recycling performance throughout the lifetime of the development.

Noise & Vibration

Noise and vibration impacts have been thoroughly assessed and will be managed throughout demolition, construction, and operation. During construction, a suite of mitigation measures including: restricted working hours, perimeter hoarding,

low-noise plant selection, barriers around high-noise equipment, and continuous monitoring, will ensure that noise levels remain within acceptable limits. Operational noise assessments confirm that plant noise and traffic generated by the development will remain below established criteria. Engagement with residents, appointment of a noise liaison officer, and adherence to BS 5228 will ensure robust control of noise impacts. Vibration during both construction and operation is predicted to be negligible.

Air Quality

Air-quality impacts during construction will be effectively controlled through a Dust Management Plan incorporating best-practice mitigation measures such as damping, speed controls, stockpile management, wheel washing, and minimisation of exposed surfaces. Emissions from plant and vehicles will be minimised through the use of well-maintained machinery, reduced idling, and preference for mains power. Monitoring of dust and PM10 will ensure proactive management. In operation, the development introduces no significant sources of air pollution, and changes in traffic volumes should have a negligible effect on NO₂ or particulate levels. Overall, both construction and operational phases will maintain compliance with relevant air-quality standards

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1 Background

Climate change remains one of the most urgent global challenges of our time. Scientific evidence clearly shows that Earth's average temperature is increasing due to elevated concentrations of greenhouse gases (GHGs) in the atmosphere. While some aspects of global warming are caused by natural factors, the human contribution to the increase in greenhouse gases is well established, driven predominantly by activities such as the combustion of fossil fuels, land-use change, and industrial processes.

Building and construction are major contributors to global emissions, with the UN Global Status Report for Buildings and Construction 2024/25 reporting that the buildings and construction sector accounted for approximately 32% of global energy demand and around 34% of global energy-related CO₂ emissions in 2023, underscoring the sector's significant role in global greenhouse gas emissions.

There is a lack of data on carbon emissions associated with construction and operation of the Irish built environment but there is some progress being made in this area. A report by UCD's 'Building in a Climate Emergency Research Group', commissioned by the IGBC, "Whole Life Carbon in Construction and the Built Environment in Ireland", indicates that the Irish built environment is estimated to account for approximately 36% of the overall annual GHG emissions (~23MtCO₂) in a typical year, split in a 2:1 ratio between operational and embodied emissions. The Cork Energy Master Plan (2019) included a baseline energy assessment for Cork City and County and concluded that the residential and non-residential sectors account for over 70% of CO₂ emissions across the study area. Therefore, the need to reduce carbon emissions related to the built environment in Cork and across Ireland is evident.

Policies by governments around the world are aiming to reduce the impact of human activities on global warming, with the ultimate aim of becoming carbon neutral. At a European level, the 2030 Climate and Energy Framework, the

European Green Deal and the EU Biodiversity Strategy to 2030 provide an overall framework for climate action in EU member states. Nationally, the government's 2021 Climate Action Plan (CAP) provides a framework which identified how Ireland will achieve a 51% reduction in Ireland's overall GHG emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050. These legally-binding objectives are set out in the Climate Action and Low Carbon Development (Amendment) Act 2021.

The Cork City Development Plan 2022-2028 demonstrates Cork City Council's (CCC) commitment to transitioning to a low carbon society and economy. "*Climate and the Environment is a cross-cutting theme that transcends all chapters of this Development Plan. The Development Plan seeks to secure compact growth and, in the process, deliver more sustainable, liveable, integrated communities and neighbourhoods.*" (Cork City Council, 2022)

In 2016, Cork City became a signatory to the Covenant of Mayors for Climate and Energy, a movement by local and regional authorities to address climate change. The Council later prepared the Cork City Sustainable Energy and Climate Action Plan (SECAP, 2018) as part of its commitment under the Covenant of Mayors. Implementation of this plan remains on-going. In September 2019 Cork City Council adopted the Cork City Climate Change Adaptation Strategy. Since then, Cork City Council became the first local authority in the country to establish a dedicated Climate Action Committee.

Within Chapter 5 "Climate Change and the Environment" of the Cork City Development Plan 2022-2028, Section 5.56 states:

"In considering and implementing the climate and environment focused policy objectives contained [Chapter 5] and other Chapters of the Development Plan, applicants for large scale residential and commercial development proposals will

be required to submit a Scheme Sustainability Statement with their planning application demonstrating how the proposals address the objectives.” (Cork City Council, 2022)

A Scheme Sustainability Statement is required for all planning applications involving developments of 25 or more homes or over 500sqm of commercial floorspace and should demonstrate how the proposal positively responds to the impact of climate change through mitigation and adaption measures.

2 Introduction

2.1 Purpose of Statement

This statement was prepared to support the planning application for the proposed Large Scale Residential Development at the site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. It addresses the requirement for a Scheme Sustainability Statement set out in Cork City Council's 2022-2028 Development Plan for all residential developments of 25 or more homes. The purpose of this statement is to demonstrate how the proposal positively responds to the impact of climate change through mitigation and adaption measures. The statement focuses on several areas which demonstrate how the design of the proposed scheme positively responds to the impact of climate change through climate change resilience measures - both mitigation and adaption measures.

2.2 Requirements

Section 11.272 of CCC's Development Plan 2022-2028 sets out the minimum requirements of the Scheme Sustainability Statement. It states:

"The Scheme Sustainability Statement is required, as a minimum to demonstrate how the following climate change mitigation and adaptation considerations inform the proposal:

- 1. How the location, siting, layout, design and drainage proposals maximise climate adaptation opportunities;*
- 2. How the SUDS strategy integrates the four pillars of SUDS Design – water quantity, water quality, amenity and biodiversity;*
- 3. The use of green roofs other green infrastructure as a means of contributing towards sustainable urban drainage, improving biodiversity and influencing heat loss/gain from the building;*

- 4. Energy efficiency through thermal insulation, passive ventilation and cooling, passive solar design and any technologies used to help occupants better manage energy usage;*
- 5. The use of district, renewable and/or low-carbon energy supply opportunities;*
- 6. How the proposals at all stages embrace the Circular Economy approach in relation to waste management from construction through to the operation of the building(s);*
- 7. How noise and air pollution will be managed across all stages of development from construction through to operation of the building(s)." (Cork City Council, 2022)*

Most of the topics outlined in points 1-7 above are dealt with in greater detail in dedicated reports or other supporting documentation. Therefore, this report will generally focus on the high level strategies surrounding climate resilience (mitigation & adaptation), referencing other supporting documentation as necessary to provide further detail.

2.2.1 Relevant Policy, Guidance Documents & Statutory Regulations

The following policies, guidance documents and statutory regulations have been used to inform the development of this statement:

- Building Regulations 2017 Part L (SI No. 538 2017)
- Building regulations TGD L – Buildings Other than Dwellings: "Conservation of Fuel and Energy"
- Cork City Council Development Plan 2022-2028
- A Guide to District Heating in Ireland (Codema and BioXL on behalf of the Irish Bioenergy Association, 2016)

2.3 Development Description

Castle Peak Properties Ltd intend to apply for planning permission for a Large-Scale Residential Development (LRD) at this c. 1.0 ha site of the former DELL EMC premises, Innishmore, Ballincollig, Cork.

The proposed development will consist of the demolition of the existing former 2 no. storey DELL EMC building (c. 3882 sq m) and ancillary plant area, with associated site clearance works. The proposed development will provide for the 130 no. residential units, arranged in 3 no. blocks in a development ranging in height from 3 to 6 no. storeys.

The development will comprise a mix of 108 no. apartments (total apartment blocks area - c. 10,657 sqm), arranged in 2 no. blocks, providing a unit mix of 52 no. 1-bed and 56 no. 2-bed apartment units. In addition, the proposed development will provide 22 no. duplex units (total duplex block area - c. 2,159 sqm), arranged in 1 no. block, providing a unit mix of 4 no. 1-bed, 9 no. 2-bed, and 9 no. 3 beds.

Vehicular, cyclist and pedestrian access to the proposed development will be via 2 no. entrances from Innishmore Lawn (to the north east) and Mechterstadt Road (to the south west) and the development will include for pedestrian and cyclist permeability. Additionally, pedestrian access points are provided to the west of the subject site and to the south, off Mechterstadt Road.

The development will also include the provision of private, communal and public open space (including all balconies); car parking at ground floor level and undercroft; bicycle parking; internal roads and pathways; bin stores; hard and soft landscaping; boundary treatments; the provision of new surface water and foul drainage pipes and any associated pipe diversion works; retaining walls; changes in level; services provision and related ducting, piping and cabling; electric vehicle charging points; attenuation tanks; SUDS; signage; 1 no. ESB substation; wayfinding structures; public realm works including public lighting; and all site development and excavation works above and below ground.



Figure 1: Extract of Proposed Site Layout Plan (Source: Meitheal Architects Drawing Ref. 231064-MA-ZZ-00-DR-A-1005-P10)



Figure 2: CGI of Proposed Development

3 Location, Siting & Layout

The location, siting, layout and design aim to maximise climate adaptation opportunities. The scheme has gone through several iterations of design in consideration of the various factors impacting climate resilience.

Location & Siting

The site is centrally located within Ballincollig and benefits from walkable access to a wide range of day-to-day services. It also has a wealth of natural amenities nearby including the River Lee and Ballincollig Regional Park.

The site adjoins established residential areas to the south and east, creating a logical and seamless extension to the existing settlement structure. The arrangement of duplex and apartment blocks responds sensitively to adjoining building heights and residential character, ensuring:

- Appropriate transitions in scale and massing,
- Strong active frontages along Mechterstadt Road and Innishmore Lawn.
- Enhanced passive surveillance, increasing perceived safety and supporting community resilience.

This integration strengthens the neighbourhood's social and spatial cohesion.

Strategic Objective "SO1 – Compact Liveable Growth" of the Cork City Development Plan (CCDP) is to:

"Deliver compact growth that achieves a sustainable 15 minute city of scale providing integrated communities and walkable neighbourhoods, dockland and brownfield regeneration, infill development and strategic greenfield expansion adjacent to the existing city."

The development repurposes an underutilised brownfield site currently occupied by a vacant commercial building and extensive surface car parking. Its

redevelopment for residential use represents a more sustainable and climate-efficient alternative to greenfield expansion by:

- Reducing pressure on greenfield lands and associated carbon-intensive sprawl.
- Making optimal use of existing utilities, roads, drainage networks, and social infrastructure.
- Supporting the principles of the National Planning Framework and Compact Settlements Guidelines 2024 by delivering higher-density homes within an existing serviced urban footprint.

This approach minimises embodied carbon associated with new infrastructure and reinforces sustainable settlement patterns that reduce long-term environmental impacts.

The site benefits from a modest natural gradient that allows the development to step down from the higher Mechterstadt Road toward existing residences to the north, improving accessibility and natural drainage behaviour. It takes advantage of opportunities for integrating SuDS measures and nature-based solutions within the landscaped central open space and provides increased visual and physical permeability due to opening up previously enclosed or inactive site edges. Re-grading and siting choices also minimise surface water runoff concerns and allow SuDS features to operate efficiently in mitigating localised flood risks.

The location aligns directly with multiple national and regional policy objectives on climate action, including:

- Concentrating growth in urban areas with high levels of accessibility.
- Prioritising modal shift towards active travel and public transport.
- Encouraging higher-density living in sustainable, service-rich locations.

- Reducing emissions by limiting long-distance commuting and car dependency.

By situating new homes in a location with strong access to employment, education, retail, and services, the development contributes to lower-carbon everyday living and long-term climate resilience.

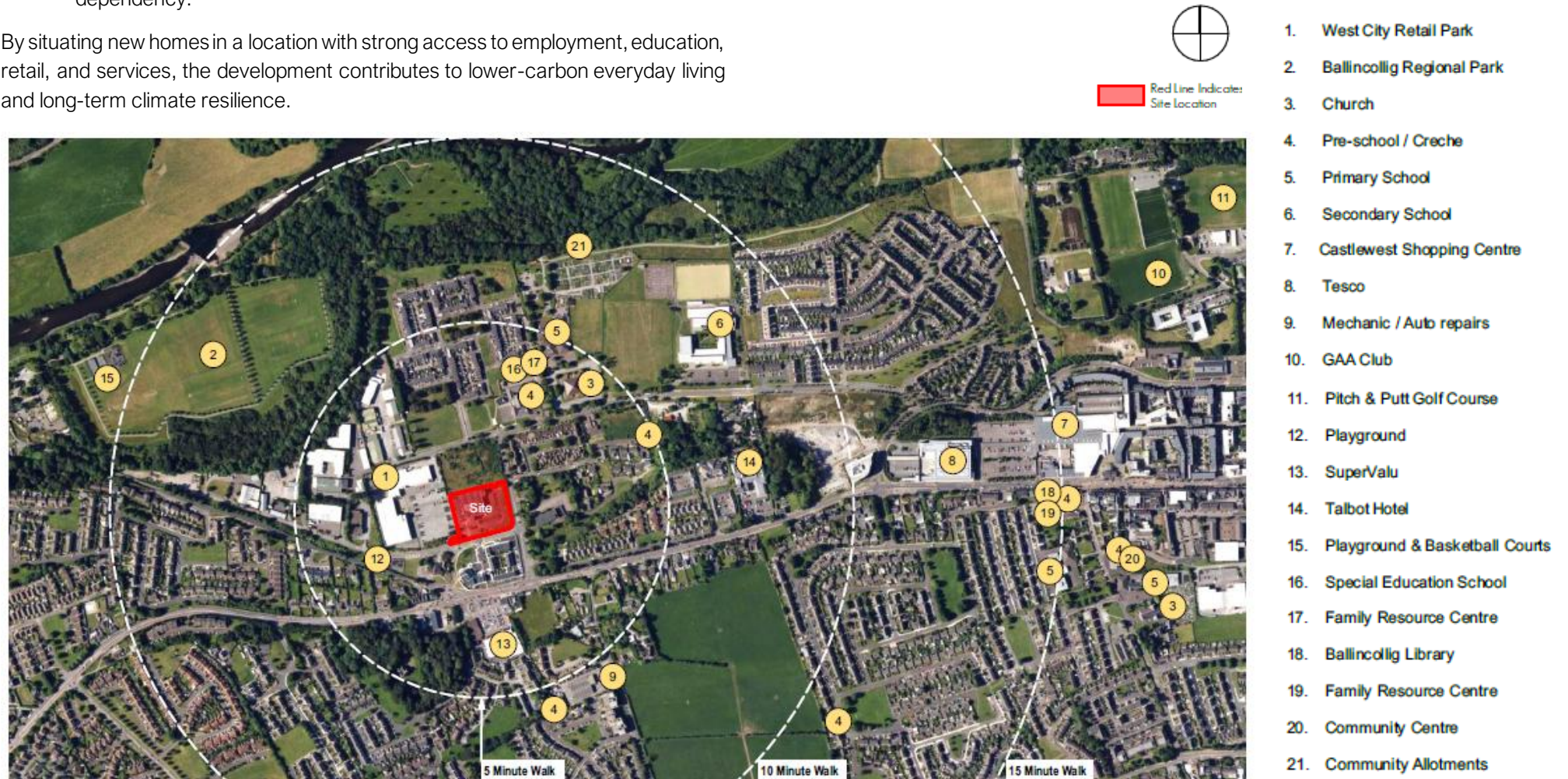


Figure 3: Aerial Map of Ballincollig showing access to services, retail, community facilities, education, employment and amenities (Image Credit: Meitheal Architects)

Layout & Form

The design concept for the proposed residential development was informed by a series of exploratory massing studies. The studies assessed various spatial arrangements, unit typologies, building heights, public space strategies, and levels of engagement with the surrounding streetscape. In parallel, the design team carefully considered a number of site-specific constraints, including changes in ground level, existing wayleaves, vehicular access points, the proximity of surrounding developments, and the need to maintain appropriate setbacks and defensible space.

The proposed development adopts a compact, efficient, and context-responsive layout that strengthens sustainable urbanism and enhances climate resilience. The scheme transforms an inward-facing commercial plot into a permeable, pedestrian-focused neighbourhood through a series of well-considered urban design moves.

A key feature is a large, publicly accessible green open space, framed by apartment blocks and duplexes to create enclosure, amenity value, and strong opportunities for social interaction. Clear pedestrian routes, running east–west and north–south, are embedded into the site design, improving permeability and linking residents to surrounding amenities and transport networks.

Building heights are arranged to step down from the higher Mechterstadt Road towards the lower-lying northern residential areas, creating appropriate transitions in scale, and considering visual impact and climatic performance. Apartment buildings form a strong urban frontage along the southern and eastern edges, improving passive surveillance and street activation, while the northern duplexes mediate scale between the higher apartment blocks and the adjacent Part 8 development.

The reuse of a previously enclosed commercial site, characterised by impermeable surfaces and car-focused access, represents a major improvement in terms of

urban compactness, placemaking, and low-carbon land use, consistent with national compact settlement policy.

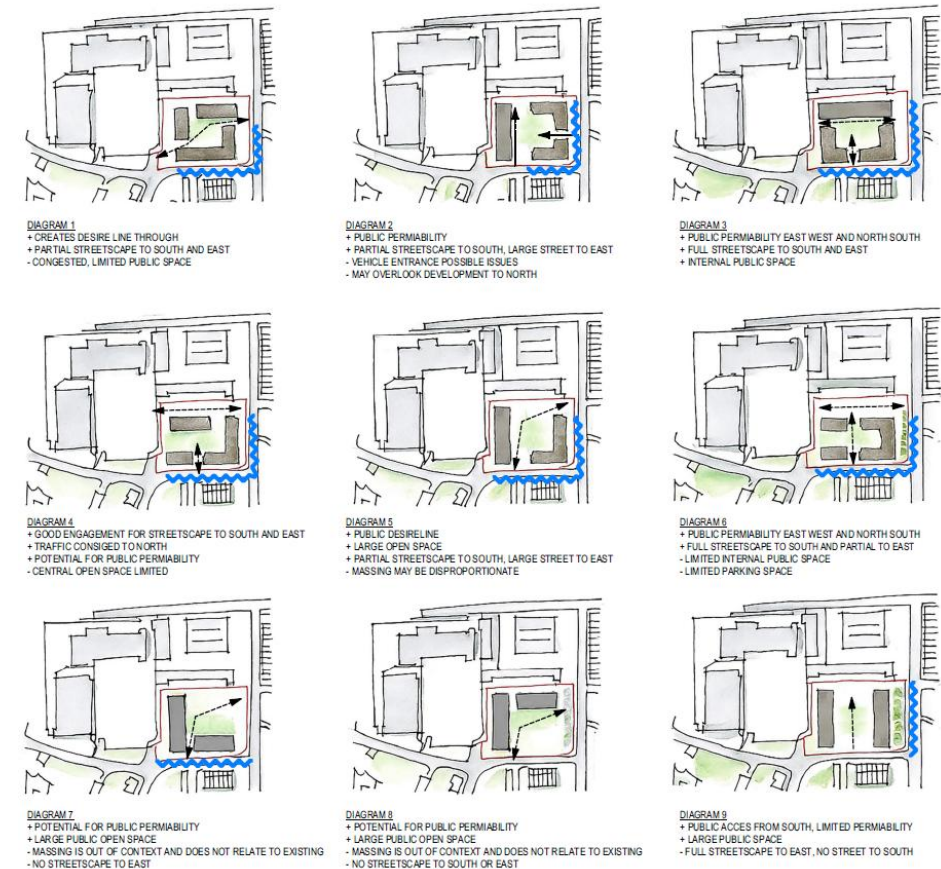


Figure 4: Concept Development Massing & Layout Studies (Image Credit: Meitheal Architects)

Transport & Connectivity

The scheme is exceptionally well located to support low-carbon mobility choices and reduce transport-related emissions. The site has a wide range of local services, schools, shops, community facilities, and employment centres, all within 5–15 minutes walk (see Figure 3) supporting the principles of 15-minute neighbourhoods.

A primary urban cycle route runs directly along the eastern site boundary, connecting the development to Ballincollig, Cork City, and adjacent greenways, thereby encouraging active travel in a safe and integrated manner.

There is robust public transport provision with multiple bus stops located approximately 100 metres south of the site serving the 220 and 220X routes, as well as the 233 Cork-Macroom route. These routes provide high-frequency, 24-hour services to Cork City and regional destinations.

Additionally, the emerging route of a proposed LUAS line (dotted blue in) which will run from Ballincollig to Mahon via Bishopstown, Wilton, and the City Centre would provide further enhancement to the areas connectivity and multimodal transport network.

The scheme's layout consolidates car parking beneath podium level, enhancing public realm quality, reducing hard surfacing, and allocating more space to communal green infrastructure. Local streets within the site boundary further prioritise pedestrians and cyclists over vehicles, contributing to safer, climate-adapted mobility patterns.

Overall, the strong connectivity supports car-free and low-car lifestyles aligning with national and regional planning policies that prioritise accessibility, reduced car dependency, and active travel.

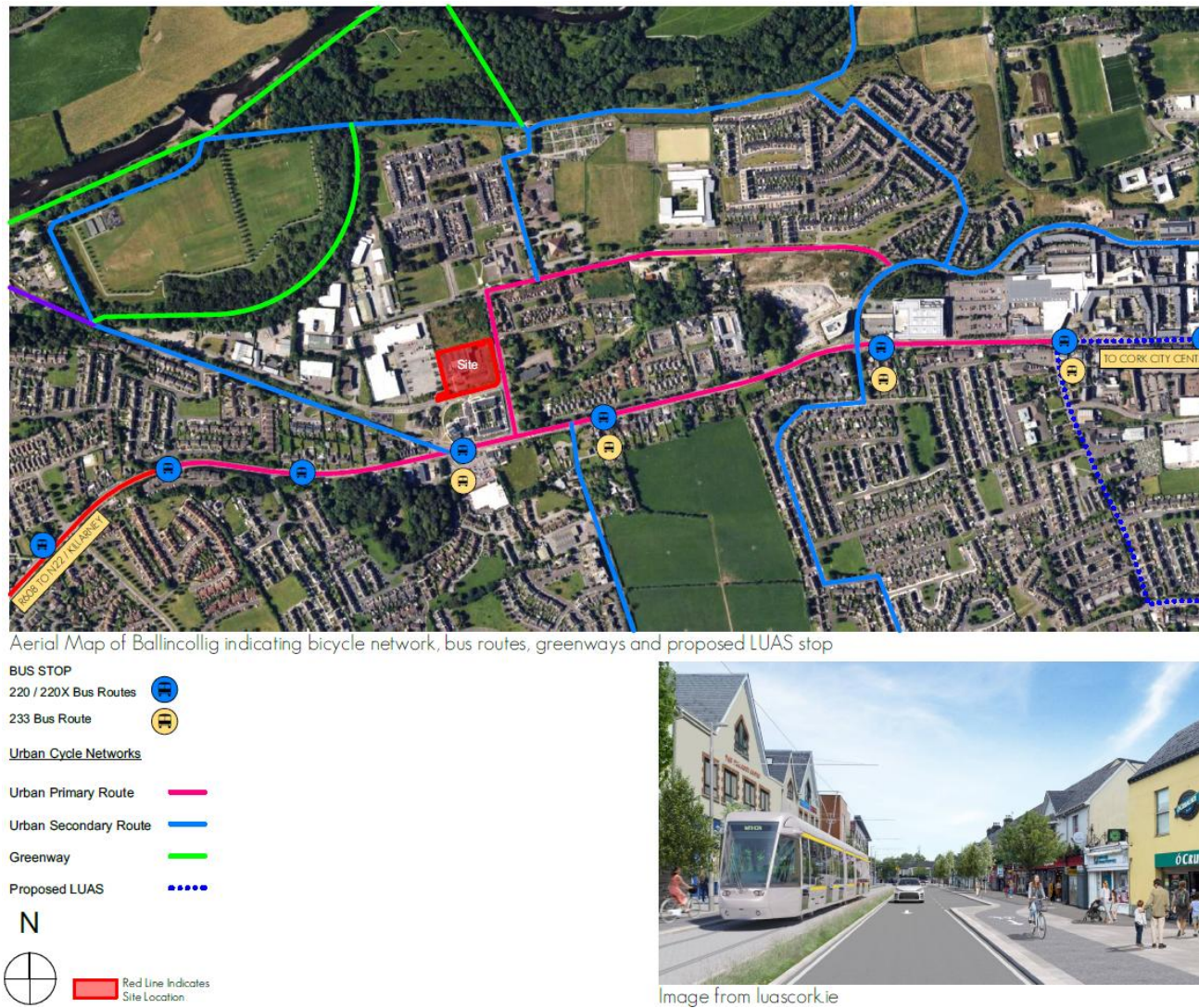


Figure 5: Transport Links & Immediate Site Connections (Image Credit: Meitheal Architects)

Flooding & Drainage

The proposed development adopts a robust, climate-responsive and sustainability-led approach to flooding and drainage, integrating best practice guidance, nature-based solutions, and SuDS measures to ensure long-term climate resilience. The strategy is informed by detailed hydrological assessments, site-specific modelling, and guidance as set out in the Planning System and Flood Risk Management Guidelines (2009), the Greater Dublin Strategic Drainage Study (GDSDS), CIRIA SuDS Manual (C753), and relevant Cork City Development Plan objectives.

The site's natural topography with higher ground along Mechterstadt Road sloping northwards shaped the development pattern and supports climate-resilient surface water management. The existing conditions demonstrate significant impermeable surfaces and minimal engagement with natural drainage processes. The proposed scheme replaces this with a landscaped layout that provides permeable surfaces and provides opportunities for integrated nature-based drainage solutions and SuDS strategies.

The central open space is strategically positioned within the site to accommodate planting, permeable surfaces, and attenuation features, reducing runoff rates and improving water management. Increased tree planting and soft landscaping along site boundaries, particularly to the south and east, provide further opportunities for rainfall interception, evapotranspiration, and urban cooling, enhancing the scheme's capacity to cope with extreme rainfall events linked to climate change.

A comprehensive flood risk assessment accompanying this planning application has been conducted by DOSA Consulting Engineers. This confirms that the entire site lies within Flood Zone C, the lowest-risk category for fluvial or coastal flooding, meaning there is less than a 0.1% annual probability of flooding. There is no record of historic fluvial, pluvial, groundwater, or drainage-system flooding at the site, as verified through floodmaps.ie, CFRAM datasets and Cork City Council mapping.

Although the baseline flood risk is low, the project nonetheless adopts a precautionary and resilience-oriented approach by:

- Designing drainage infrastructure to accommodate 1 in 100-year storm events, with a 20% allowance for climate change, in line with GDSDS guidance, and
- Ensuring runoff rates do not exceed greenfield discharge levels, thereby protecting downstream catchments during extreme rainfall events.

This approach future-proofs the development against the increased rainfall intensities projected over the coming decades.

The drainage strategy places nature-based SuDS features at the core of the stormwater management approach, reflecting best practice in climate adaptation and water quality protection. The SuDS strategy has been fully developed and integrated into the design and includes a tiered "SuDS treatment train" of source control, conveyance, and attenuation measures. The SuDS strategy is discussed in more detail in the following section of the report.

Energy Efficient Design

Energy efficient design is being implemented through good quality external materials and insulation, efficient heating systems, use of green and blue roofs, and sustainable water use and drainage design. The design and layout of the buildings have also been carefully considered to optimise daylight provision and solar gain to the apartments. (See section 6 of this report to see further information on the energy strategy for the development.)

Please reference the following reports which accompany this planning application for further information:

- *Architectural Design Statement (Meitheal Architects)*
- *Infrastructure Report (DOSA)*
- *Drainage Impact Assessment Report (DOSA)*
- *Site Specific Flood Risk Assessment (DOSA)*

4 Sustainable Drainage Systems (SuDS)

The traditional method of disposing of surface water runoff from impermeable surfaces such as roofs, roads and carparks is collection and redirection to drainage systems. This can result in localised flooding, higher waste treatment costs and the transfer of contaminants (such as oil from carparks) directly to water courses, resulting in pollution and affecting a river's ability to recharge naturally. Sustainable Urban Drainage Systems (SUDS) offer a more integrated approach to rainwater management. It involves a method of replicating the natural characteristics of rainfall runoff from any site, ensuring water is infiltrated or conveyed more slowly to the drainage system and ultimately to water courses via permeable paving, swales, green roofs, rain water harvesting, detention basins, ponds and wetlands.

"Sustainable Urban Drainage Systems (SuDS) comprise a series of water management measures designed to reduce and manage surface water (rainwater) in an environmentally sustainable way. When implemented correctly, SuDS not only help reduce the risk of localised flooding but also help to alleviate downstream flood risk. SuDS that incorporate nature-based solutions (NBS) such as green roofs, rainwater harvesting, swales, filter strips, and attenuation ponds offer the additional benefit of creating habitat and biodiversity betterment, improving water quality and greening our city." (Cork City Council, 2022)

The existing site area is a brownfield area mostly covered with impermeable surfaces and with minimal engagement with natural drainage processes. The proposed surface water drainage system has been designed to manage runoff from all hard surfaces within the development, including roadways, roofs, footpaths, and parking areas. The completed development will comprise a mix of hard paving, roofing, and soft landscaping, with the site's relatively flat topography forming a single catchment area. Surface water will be collected via a piped network and discharged through one designated outfall point to the existing stormwater network traversing the site. To ensure compliance with best practice in sustainable drainage

and environmental protection, a comprehensive Stormwater Management Plan has been developed.

The surface water drainage strategy incorporates a range of SuDS (Sustainable Drainage Systems) features, including:

- Permeable paving to promote infiltration and reduce surface runoff
- Bio-retention planting areas to treat and filter runoff while supporting biodiversity
- Full retention petrol/oil interceptors to treat runoff from roadways and parking areas
- Green roofs to be applied in high density developments
- Attenuation tanks to store excess runoff and regulate discharge rates
- Hydro-brake flow control devices to restrict discharge to greenfield runoff rates (Q bar)

Surface water runoff from roofs and paved areas will be directed to the piped network via conventional gullies and downpipes. The runoff will then pass through the attenuation and treatment systems before being discharged to the existing council stormwater asset via a newly constructed surface water manhole. The design ensures that discharge rates are restricted to pre development (greenfield) levels, thereby mitigating flood risk and protecting downstream infrastructure.

The surface water drainage strategy incorporates a range of SuDS (Sustainable Drainage Systems) features. These include:

- Permeable Paving used extensively within parking bays, paths, and hard landscaped areas:
 - Reduces surface runoff by enabling infiltration at source.
 - Filters pollutants and sediments through engineered sub-bases.

- Mimics natural drainage pathways, reducing peak flows and runoff volumes.
- Bioretention Areas / Rain Gardens are distributed throughout landscaped zones. These vegetated basins:
 - Provide on-surface storage and slow infiltration.
 - Improve stormwater quality through biological and soil filtration.
 - Enhance biodiversity and support urban greening.
- Tree Pits with SuDS Function incorporate sub-surface engineered soil cells with integrated drainage functions, enabling:
 - Interception storage and evapotranspiration
 - Reduction of surface temperatures and heat-island impacts.
 - Improved infiltration and treatment of runoff.
- Green / Blue Roofs on Apartment Blocks capture and store rainfall, providing:
 - Reduced runoff rates and volumes.
 - Enhanced thermal performance and biodiversity.
 - Contributions to attenuation volumes on-site.
- Attenuation Tanks and Flow Controls
 - Sufficient storage for the critical 1 in 100-year storm (plus climate change).
 - Flow regulation via hydro-brakes to restrict discharge to greenfield rates (2.7 L/s).

Infiltration-based SuDS elements were carefully assessed, and only low-risk infiltration components (such as minor interception and tree pit absorption) have been selected. Attenuation systems have been lined to prevent unwanted infiltration where there may be potential for subsoil instability associated with limestone formations, as identified in the Drainage Impact Assessment's Karst Risk Review. This ensures that the drainage design is safe, appropriate, and geotechnically resilient.

The SuDS features have been designed not only for hydraulic performance but also to contribute positively to the visual character of the development, enhance local amenity, and support ecological value. This design ensures that post-development runoff does not exceed pre-development levels, thereby protecting both the site and downstream infrastructure. Overall, the surface water drainage system will reduce and manage surface water (rainwater) in an environmentally sustainable way, integrating the four pillars of SUDS Design – water quantity, water quality, amenity and biodiversity.

Please reference DOSA's Drainage Impact Assessment and Infrastructure reports for more detailed information on the surface water drainage strategy. Surface water run-off calculations are provided in Appendix B of the Infrastructure Report. All storm drainage works will be undertaken in accordance with the local authority requirements.

Please reference the following reports which accompany this planning application for further information:

- *Infrastructure Report (DOSA)*
- *Drainage Impact Assessment Report (DOSA)*
- *Site Specific Flood Risk Assessment (DOSA)*

5 Green & Blue Roofs & Green Infrastructure

The use of green and blue roofs other green infrastructure will contribute towards sustainable urban drainage, improving biodiversity and influencing heat loss/gain from the building.

At present, the site comprises a disused office building with a large car park. The existing vegetation within the subject site, is largely limited to some perimeter shrubs with limited ecological value. The transition to the design proposals will be one that positively transforms the site.

The proposed development integrates a comprehensive Green and Blue Infrastructure (GBI) strategy to enhance ecological value, support sustainable water management, and improve resident well-being. The approach aligns with best-practice landscape and sustainability principles, incorporating green roofs, tree planting, biodiverse open spaces, and nature-based SuDS components throughout the site

This framework supports the creation of a resilient, climate-adaptive environment while contributing to the wider ecological network of Ballincollig, including links to the Pollinator Corridor and green spaces extending toward Ballincollig Regional Park.

Green roofs are incorporated within the development as a key SuDS and biodiversity measure. They provide multiple environmental and functional benefits, including:

- Rainwater attenuation and slowed runoff, contributing to flood-risk mitigation.
- Habitat creation for pollinators and invertebrates through biodiverse, pollinator-friendly planting.
- Reduction of the urban heat island effect.

- Visual amenity benefits for upper-level apartments and surrounding buildings.
- Improved local air quality and microclimate moderation.

These roofs are proposed as extensive green/blue roofs, designed to capture and slowly release rainfall while supporting a hardy vegetated layer suitable for local climatic conditions.



Figure 6: Site Green Infrastructure will be ecologically orientated

Green roof installation will utilise a system compliant with the European Federation of Green Roof Associations (EFB), ensuring:

- Protection of waterproofing membranes during installation.
- Specialist substrate layers that support planting while retaining stormwater.
- Drainage layers enabling controlled discharge to the overall SuDS network.

- Lightweight, low-maintenance vegetated cover suitable for residential developments.

Green roofs are proposed primarily within private curtilages, and their long-term maintenance will be the responsibility of the management company. A minimum of two inspections per year will ensure ongoing performance, including:

- Clearing of debris and unwanted vegetation.
 - Inspection and maintenance of drainage outlets.
 - Application of organic slow-release fertiliser where required
- The site's green infrastructure strategy prioritises:
- Ecological connectivity, linking internal green spaces with the wider urban ecological network.
 - Biodiversity enhancement through native tree planting, wildflower meadows, and pollinator-friendly species.
 - Sustainable water management utilising SuDS features such as rain gardens, tree pits, permeable paving, and green roofs.
 - Accessible, high-quality open space supporting recreation, social interaction, and nature engagement.

These principles are aligned with Cork County Development Plan Objective GI 14-3.

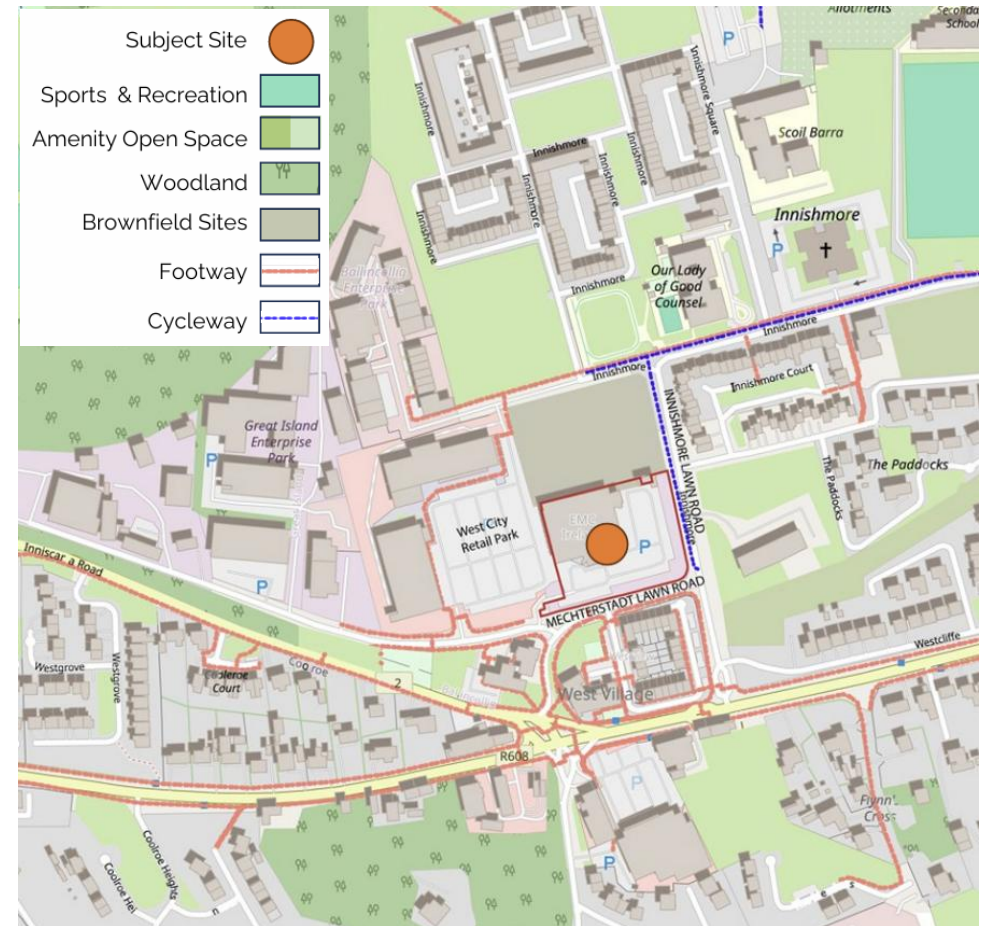


Figure 7: Surrounding green infrastructure



Figure 8: Proposed Site Landscape Masterplan

An extensive quantity of well-connected open space is provided as part of this development. Within the developable area, the scheme fully complies with Section 5.3.3 of the Sustainable Residential Development and Compact Settlements Guidelines, providing 18% public open space.

The public open space strategy for the development has been designed to provide a variety of high-quality, functional green spaces to serve residents of all ages. Two distinct types of open space are proposed:

- A larger, informal “kick-about” area, suitable for active recreation, a play area that will encourage natural play.
- A series of smaller, more intimate landscaped spaces, offering opportunities for passive recreation and quiet enjoyment.

This approach ensures a balanced and inclusive provision of open space that is both sustainable and adaptable to different needs.

Each space is carefully designed by Cunnane Stratton Reynolds Land Planning and Design to provide pedestrian connectivity, public spaces and extensive planting. This all combines to provide the scheme with an extensive open space amenity with variety throughout.

Each of the open spaces is provided with passive surveillance from the adjacent residential units and a network of public lighting ensures that all the spaces remain safe. All proposed open spaces, pedestrian walkways and communal spaces are designed to be universally accessible. The proposed footpaths and cycle paths promote active travel from the development to the wider area.



Figure 9: 3D model of site showing indicative landscaping

Please reference the following reports which accompany this planning application for further information:

- Landscape Design Rational (CSR)
- Infrastructure Report (DOSA)
- Drainage Impact Assessment Report (DOSA)
- Architectural Design Statement (Meitheal Architects)

6 Energy

The design of the proposed scheme is being developed in a manner that aims to reduce its energy consumption, provide energy as efficiently and cleanly as possible, and to minimize its carbon footprint through the use of renewables. The strategy follows this energy hierarchy structure of:

- Energy Demand/Use Reduction
 - └─> Energy efficiency
 - └─> Renewable Energy

(If net-zero-carbon is the ultimate target then the final step in achieving this would be carbon offsets.)

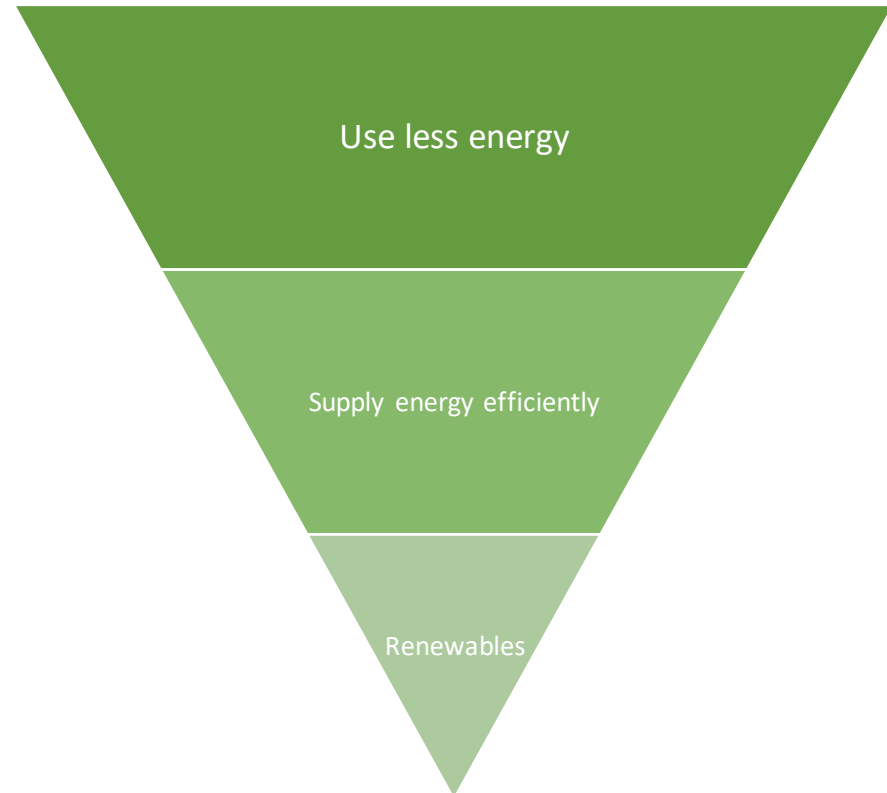


Figure 10: Energy Hierarchy

6.1 Energy Use/Demand Reduction

The first step to reduce future energy consumption when designing a building should be to reduce the *need* for energy as much as possible. This section focuses on ways the design of the building can reduce energy demand and energy consumption (predominantly through passive means). The following strategies will be implemented to reduce the energy consumption for the proposed development:

- Low air permeability
- High performance u-values
- Limiting thermal bridging
- Optimisation of solar gain
- Maximising daylight

6.1.1 Building Airtightness

A potential source of significant heat loss from a building is through air infiltration. Air infiltration is the movement of air into a building. (Air exfiltration can also occur, which is the movement of air out of a building.) Air flows into or out of a building because of pressure differences between the internal and external environments. These pressure differences can be caused by wind or differences in internal and external temperatures.

The air permeability of a building can be measured by means of a pressure test. Based on Building Regulations TGD L 2022 (Domestic & Non-Domestic) the air permeability of a building should not exceed $5\text{m}^3\cdot\text{m}^2\cdot\text{hr}@50\text{Pa}$ under the relevant test conditions. The target for the buildings in this development will be $\leq 3\text{m}^3/\text{m}^2\cdot\text{hr}@50\text{Pa}$.

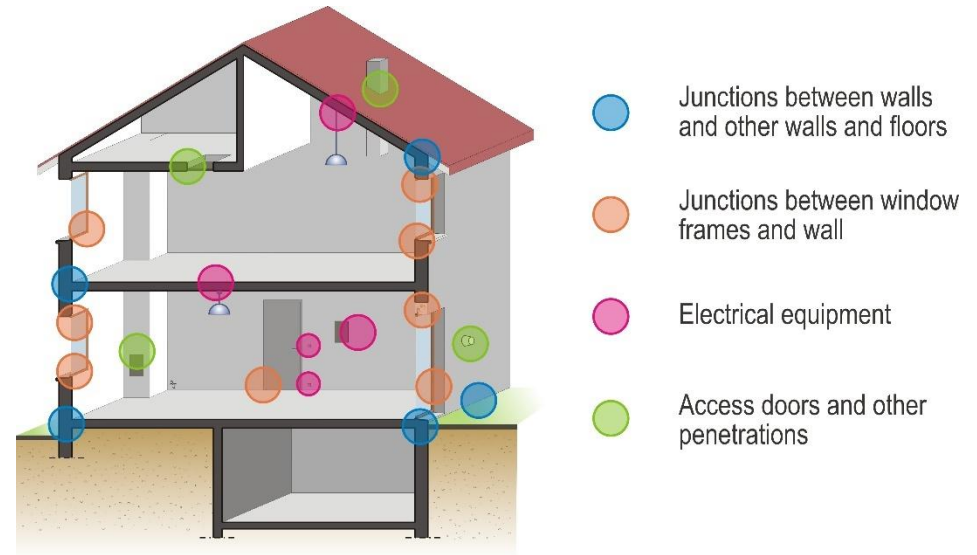


Figure 11: Common Air Leakage Locations

6.1.2 U-Values

Heat loss will be limited through careful design of the external building envelope. The design will ensure appropriate specification of insulation (with low thermal transmittance), continuity of insulation and appropriate detailing to limit heat loss at junctions. The target area-weighted average elemental U-values will be less than the Building Regulations TGD L (2022) maximum elemental U-values. The proposed U-values are provided in Table 1 and Table 2 for the domestic buildings (apartments, etc.) and non-domestic building/spaces, respectively. These are subject to change. The final figures for each element will be determined as the design progresses into the detailed design stage.

Table 1: Proposed Building Fabric U-Values for Domestic Buildings

Fabric Elements	TGD Part L (2022) Maximum Average Elemental U-value (W/m ² K)	Proposed Elemental U-Value (W/m ² . K)
Flat Roofs	0.20	0.16
Pitched Roofs	0.16	0.16
Walls	0.18	0.18
Ground Contact & Exposed Floors	0.18 / 0.15 ¹	0.15
External doors, windows and rooflights	1.4	1.3

Table 2: Proposed Building Fabric U-Values for Non-Domestic Buildings/Spaces

Fabric Elements	TGD Part L (2017) Maximum Average Elemental U-value (W/m ² . K)	Proposed Elemental U-Value (W/m ² . K)
Flat Roof	0.20	0.16
Walls	0.21	0.18
Ground Contact & Exposed Floors	0.21 / 0.15 ¹	0.15
Windows (incl. frame)	1.6	1.3
External Doors	1.6	1.6
Curtain Walling (Glazed)	1.8	1.4
Curtain Walling (Opaque) (Spandrel Panels)	1.8	1.4

¹ Where the source of space heating is underfloor heating, a floor U-value of 0.15 W/m²K is the maximum permitted average u-value (if using the elemental analysis method.) This will be the target u-value for any spaces with underfloor heating.

6.1.3 Thermal Bridging

A thermal bridge (also called a cold bridge or a heat bridge) is an area or component within a construction element which has higher thermal conductivity than the surrounding area. They typically occur around openings such as windows and doors and at junctions such as wall-to-floor junctions, etc. The heat loss through these elements is described by a linear thermal transmittance factor (ψ) (W/m.K). In order to reduce heat loss due to thermal bridging it is important to properly design construction details for these elements. Acceptable construction details provided by the Department of Housing Planning and Local Government will be adopted where appropriate (i.e. typical/standard junctions). For key bespoke junctions, details which have been certified by a third party certification body (such as Agrément or equivalent) or calculated by an NSAI registered thermal modeller will be used.

For the domestic buildings, the DEAP calculation of primary energy use and CO₂ emissions takes account of thermal bridging effects by applying a heat loss factor known as a Y-value to each dwelling. The Y-value used in the calculation depends on approach used to limit thermal bridging. Based on the approach used, the Y-value is either set a default value or it can be calculated. The default and proposed Y-values ($\text{W/m}^2\text{K}$) are provided in Table 3.

For the non-domestic spaces, the default NEAP thermal bridging coefficients are currently assumed as the minimum targets, but these should be improved upon as the design progresses and construction details are developed. The default values

are provided in Table 4. (These are based on BRE IP 1/06² values degraded by the greater of 0.04 W/mK or 50%.) (Note: The common/landlord areas of the apartment blocks fall under the non-domestic building regulations.)

In all cases, irrespective of the approach to limit and/or calculate thermal bridging, appropriate provision for on-site inspection and related quality control procedures should be made.

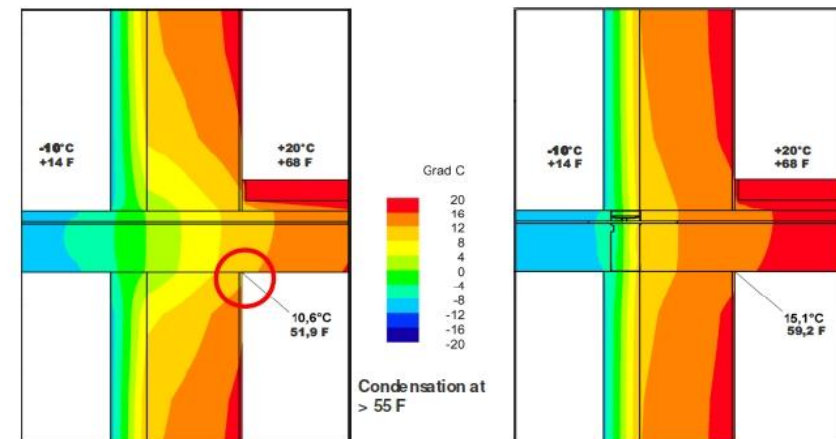


Figure 12: Thermal Break Technology: thermal bridging through an unbroken slab (left) allows cold temperatures (yellow) to reach the living space, while a thermally broken slab (right) keeps the interior much warmer (red and orange).

² IP 1/06 Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings, BRE, 2006.

Table 3: Overall Thermal Bridging Factor (Y-Value [W/m^2K]) for Domestic Buildings

Y-Value (W/m^2K)		
ACDs (sections 1-6) ³ used for all key junctions (Default value)	Combination of ACDs (sections 1-6), Appendix 2 ³ , certified details or other alternative details complying with Appendix D of TGD L. (Default value)	Proposed Value
0.08	0.15	0.05

Table 4: Default Global Psi values from the NEAP database ($W/m.K$)

Type of junction	Involving metal cladding	Not involving metal-cladding
Roof to wall	0.42	0.18
Wall to ground floor	1.73	0.24
Wall to wall (corner)	0.38	0.14
Wall to floor (not ground floor)	0.04	0.11
Lintel above window or door	1.91	0.45
Sill below window	1.91	0.08
Jamb at window or door	1.91	0.09

³ Acceptable Construction Details (ACDs) for typical constructions are shown in sections 1 to 6 of the document "Limiting Thermal Bridging and Air Infiltration – Acceptable Construction Details" (2021), published by the Department of Housing, Local Government and Heritage. Appendix 2 in each section 1-6 of the same document provides alternative details.

6.1.4 Solar Gain

Thermal modelling is being performed to optimise solar gain to the buildings over the course of the year. The aim is to use solar gain to reduce heating requirements in the colder months while avoiding the need for active cooling and reducing the risk of overheating during the summer.

The glazing type and total solar transmittance (g-value) of the glazing will vary depending on several factors such as location, orientation and amount of glazing. In general, for the residential buildings/spaces a higher g-value will be preferred to maximise winter solar gain. However, this will be balanced against the need to mitigate the risk of overheating. Where balconies or other external shading devices provide sufficient shading to windows, minimal solar control will be required on the glazing itself. Where there are large south facing windows with minimal external shading, glazing with a lower g-value will be selected. All of the glazing selections will be informed by detailed building performance modelling which will assess solar gain over the course of a typical and worst case scenario year. Overheating risk assessments will also be performed.

The typical proposed glazing g-values are provided below:

- Residential minimal solar control: g-value of 0.45 (approx.)
- Residential solar control glazing: g-value of 0.35 (approx.)
- Large commercial/(non-domestic) glazing with south, east, west orientation and minimal external shading: g-value: 0.30 (approx.)
- Typical commercial glazing: g-value of 0.35.

At certain locations the buildings will also make use of vertical fins and overhangs to control solar gain.

6.1.5 Daylight

Well daylit spaces will rely less on electric lighting, thus reducing energy consumption. A number of strategies are being incorporated into the design to maximise the number of rooms meeting the daylight recommendations of the BRE guide BR209 and BS EN 17037 (UK National Annex).

Layout & Form

The layout and form of the overall development as well as the individual blocks has been carefully considered to maximise daylight and reduce overshadowing.

Depth of balconies

The depths of balconies have been minimised where possible, within the constraints of planning requirements for balcony sizes, in order to minimise the obstruction of daylight to rooms immediately below the balconies.

Floor to Ceiling Heights

Higher floor-to-ceiling heights on lower floors coupled with floor-to-ceiling height glazing will allow daylight to penetrate deeper into the spaces compared to spaces with lower floor-to-ceiling heights. The lower floors have a floor-to ceiling heights of 2.70m with upper floors at 2.40m.

Glazing Visible Light Transmittance (VLT)

A VLT of at least 65% is targeted for all proposed glazing. With lower g-values VLT typically also reduces. However, the aim is to keep the VLT as high as possible while also providing adequate solar control. The proposed VLT corresponding to the different glazing g-values are:

- Glazing with g-value ≥ 0.35 : Target VLT of at least 70%.
- Glazing with g-value of <0.35 : Target VLT of 65%.

Materials

Different materials and colours reflect visible light in different ways. Generally, brighter colours with reflect more visible light (for similar materials.) Materials such as wall, floor and ceiling finishes will all be carefully selected with respect to visible light reflectance.



Figure 13: Example of model being used for daylight analysis.

A daylight assessment has been performed for the proposed development in line with the recommendations of BRE's "Site Layout Planning for daylight and sunlight, a Guide to good practice" (BRE Building Technology Group, 2022) and BS EN 17037. With respect to internal daylight within the proposed development, the

results show that 86% of the habitable rooms meet or exceed the minimum recommendations for internal daylight.

Section 6.1.5 Daylight Reference Documentation:

For further information on the daylight analysis performed for the proposed development see the "Daylight and Sunlight Assessment Report" accompanying this planning application.

6.2 Energy Efficiency

After limiting energy demand, the next priority in the energy hierarchy is to assess the options for efficiently servicing the building. Various strategies are currently being explored for heating, domestic hot water, ventilation and space cooling. The following sections discuss some of the preferred solutions.

6.2.1 Heating Systems

6.2.1.1 Apartments

It is currently envisaged that the apartments will use Exhaust Air Heat Pumps (EAHPs) for heating, domestic hot water (DHW) and ventilation. These are standalone units with no external central plant requirements, i.e. each unit will have all of its heating, hot water and ventilation equipment within the unit.

EAHPs extract heat from pre-heated extract/exhaust air through a heat pump cycle to provide the heating hot water and domestic hot water (DHW) for the dwelling. The heating will be provided by low temperature hot water radiators. The DHW will be provided from a calorifier served by the EAHP and also equipped with an electric immersion. The heat pump and calorifier can be a self-contained unit or come as a separate heat pump and calorifier that integrate with one another.

With respect to ventilation, the systems typically operate in one of two ways depending on their configuration:

1. The first is an extract only system where the make-up air is passively drawn into spaces through wall vents by the negative pressure created by the extract air. This type of system is often referred to as Mechanical Extract Ventilation (MEV).
2. The second variation is a dual duct (or double duct) system where an additional unit/component is added to the system to preheat the incoming fresh air and then supply it to the required areas. This is generally referred to as Mechanical Ventilation with Heat Recovery (MVHR).

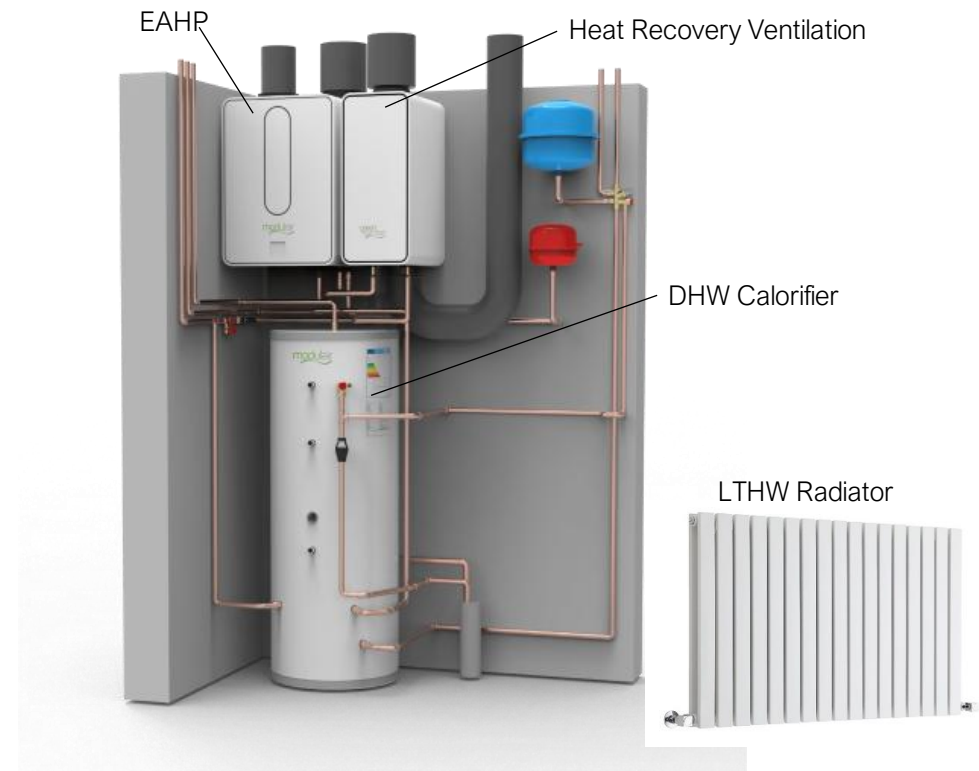


Figure 14: Exhaust Air Heat Pump with integrated MVHR (Dual Duct Heat Pump) (left). EAHP will serve LTHW radiators (right) [Image left courtesy of (Joule)]

Appendix A provides example schematics for an Exhaust Air Heat Pump system, including example ductwork layouts.

There are a number of advantages of a Dual Duct Heat Pump system over an exhaust air only heat pump system, and as a result this is likely to be the preferred option for the apartments in the development. The advantages include:

- Reduced load on the radiators.
- Reduces the need for individual wall openings per habitable room to a single penetration for the dwelling.
- Prevents cold air from “dumping” directly into spaces.
- Less wall openings reduce the potential for noise pollution.

Due to the heat pump using tempered exhaust air from the dwelling as its heat source the heat pump can operate at consistently high efficiencies (COPs) over the course of the year resulting in high seasonal efficiencies (SCOPs). The SCOP for this type of system may be as high as 5.0. The system can switch modes to operate as heating only when there is sufficient DHW in the calorifier to ensure that lower temperature, higher efficiency operation is maximised.

Other advantages of Dual Duct Heat Pump System:

- No external plant requirements and limited distribution required – single heat pump unit for domestic hot water, ventilation and space heating.
- No additional MVHR unit required for ventilation
- Overall, less maintainable equipment compared to centralised system (e.g. with central plant, and Heat Interface Units (HIUs) and calorifiers in the apartments.)
- Quick installation time
- All power provided through apartment distribution board
- Smaller risers. No LTHW pipework or ventilation ductwork in central risers.
- Lower capital and maintenance cost

In terms of energy efficiency and sustainability there are very few drawbacks to using EAHP (Dual Duct) systems. The main disadvantages are:

- There is more equipment with maintenance requirements within apartments compared to some centralised systems. (Increases issues around access, security, etc.)
- Limited suppliers in the market.

6.2.1.2 Apartment Circulation Areas

As much as possible, the need for mechanical heating systems will be avoided in the common circulation areas. Many internal corridors will not require heating. Where heating is required, the intent is to use electric panel radiators. While these do not operate at the same high efficiencies heat pump systems serving LTHW radiators, they remove the need for central plant and LTHW risers and pipework serving circulation areas. This in turn reduces capital expenditure (CAPEX) and operational expenditure (OPEX). Additionally, the pumping energy and circulation losses associated with a LTHW system serving circulation and other common areas will reduce the efficiency advantage of a heat pump system in comparison with a direct electric system.



Figure 15: Electric Panel Heater

6.2.1.3 Duplexes

The duplexes will use a split heat pump systems with separate MVHR. There is more outdoor space to support the installation of outdoor units for the duplexes, so this is the preferred choice as it reduces equipment and ductwork requirements within the units compared to the EAHPs.

The split systems have indoor and outdoor units. Outdoor unit extracts heat from the outside air transferring it to an indoor unit via refrigerant pipework. Heat Pump system provides heating hot water and DHW. Ventilation is provided via a separate MVHR unit.

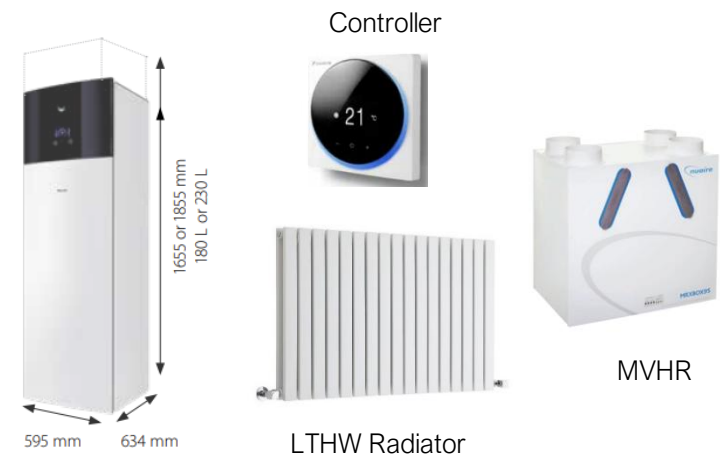
External Plant

Outdoor Split Heat Pump Unit



Plant In Apartment

Indoor Heat Pump Unit with integrated hot water tank



6.2.2 Cooling and overheating

The development design aims to minimise adverse impacts on the urban heat island through design, layout, materials and the incorporation of green infrastructure. The design also aims to reduce the potential for internal overheating and reliance on air conditioning systems. The following sections outline the strategies used to meet these aims.

6.2.2.1 *Reduce Heat Entering the Building*

Solar gain will be controlled through shading, high albedo materials, fenestration, insulation and the provision of green infrastructure. The total solar transmittance of the glazing and the external shading have been optimised to reduce solar gain. Further analysis is currently underway using advanced building performance modelling software to optimise the design with respect to solar gain. (See section 6.1.4 for further information with respect to Solar Gain.)

6.2.2.2 *Minimising Internal Heat Generation*

Plug-loads and occupant densities cannot be altered beyond the client's brief. Therefore, the main area that can be targeted with respect to internal heat gain is the lighting. Low energy, high efficacy LED lighting will be used throughout the development to minimize internal heat gains.

6.2.2.3 *Mechanical Ventilation*

Mechanical ventilation can be used to help mitigate overheating in some cases. Mechanical ventilation with heat recovery will provide fresh air to all occupied spaces. It is recommended that all MVHR ventilation systems are supplied with a summer bypass. A summer by-pass will open and allow the incoming air to bypass the heat exchanger automatically when the temperature of the extracted air reaches a certain temperature. This will allow the incoming air to be the same temperature as the outside air. It is possible that the outdoor supply air could be cooled by exhaust air if the indoor temperature falls below the outdoor air temperature. High level extract can also help with overheating.

6.2.2.4 *Active Cooling Systems*

Active cooling systems are the most energy and emissions intensive means of mitigating overheating. Every effort will be made to reduce the requirement for active cooling using passive design strategies as much as possible. There will be no mechanical cooling in the apartments, except in certain communal areas. Where mechanical cooling is required, this will mainly be provided by high efficiency VRF systems. The target cooling efficiency of these VRF units will be an SEER >6.00. (The cooling plant in the reference building used in the Non-Domestic Energy Assessment Procedure [NEAP] for Part L compliance, i.e. the theoretical building proposed new buildings are compared to, has an SEER of 4.5.)

6.2.3 Lighting

Careful analysis of the required lighting levels is being performed for each space type to ensure that spaces are not over-illuminated. Over-illumination of spaces, i.e. providing higher illuminance levels than are required to perform the predominant tasks in a specific space, can be a significant source of wasted energy. The CIBSE SSL Lighting Handbook (2009) recommends between 50-150lux for most "quasi-domestic", based on the space type.

All spaces will have a high efficiency LED lighting design coupled with PIR occupancy sensing where appropriate. Daylight dimming controls will be included in perimeter zones of commercial spaces where beneficial. In commercial spaces, the lighting design will aim to achieve a lighting efficiency of 1W/m² per 100lux. This means for a 500lux design the lighting power density (LPD) should be ≤5W/m². This lighting design will result in a lower annual energy consumption figures then the targets set by the LENI calculations (measured in kWh/m².yr) the Building Regulations Non-Domestic TGD L 2022. For the apartments/domestic units A+ Rated bulbs with an efficacy of at least 94 lumen/cW will be installed.

6.2.4 Other Energy Efficiency Considerations

6.2.4.1 *Reduce HVAC oversizing*

Substantial oversizing of HVAC equipment can cause excessive energy use in buildings and increased wear on equipment. Detailed load calculations in building performance analysis software are being performed to ensure equipment is appropriately sized.

6.2.4.2 *Metering and Energy Information Systems*

“If you can’t measure it, you can’t manage it.” Metering is an effective way to raise awareness of energy use and to bring about behavioural change. At a minimum, all domestic units will have smart energy meters installed with graphical displays that allow users to monitor their energy consumption.

Commercial users with a large energy spend should install submetering and an Energy Information System (EIS). These may also be integrated with a Building Energy Management System (BEMS). (The EIS and BEMS may be a single

system.). The difference between an EIS and a BEMS is that an EIS just provides information but a BEMS can typically provide some automatic control. Energy management systems should include monitoring and targeting with alarms for out of range values. The systems should be easily accessible by the onsite facilities/energy management teams.

6.2.4.3 *Commissioning*

Commissioning is a systematic process, which configures a building’s HVAC system and integrated control systems to operate at peak performance. Commissioning building systems can provide significant benefits such as improving occupant comfort, reducing energy cost, improving indoor air quality, enhancing building operations and extending equipment life. Hence, extensive commissioning of systems will be undertaken at project-handover.

6.3 Renewables

Section 5.34 of the Development Plan states:

"In supporting the compact, connected and sustainable growth of Cork City to 2028, all development proposals are encouraged to consider the use of renewable energy infrastructure from the project inception stage. This should as a minimum include the exploration of roof-top solar photovoltaic panels, solar thermal collector panels and ground or air source heat pumps but depending on the locational circumstances and nature of the development proposal, there will be opportunities to consider other forms of renewable and low carbon energy generation."

Several renewable technologies have been assessed for this development. Not all of the technologies are strictly "renewable" but any technology assessed that can contribute to the building's Renewable Energy Ratio (RER) as defined under NEAP or DEAP (Domestic and Non-domestic Energy Assessment Procedures, respectively) has been included in this section.

6.3.1 Exhaust-Air Heat Pumps

EAHPs extract heat from pre-heated extract/exhaust air through a heat pump cycle to provide the heating hot water and domestic hot water (DHW). The DHW is typically provided from a storage calorifier. The heat pump and calorifier can be a self-contained unit or come as a separate heat pump and calorifier that integrate with one another. Due to the heat pump using tempered exhaust air from the dwelling as its heat source the heat pump can operate at consistently high efficiencies (COPs) over the course of the year resulting in a high seasonal efficiencies (SCOPs). The SCOP for this type of system may be as high as 5.0.

Proposed: Yes (Dual Duct EAHP heat pump proposed. See section 6.2.1.)

6.3.2 Air Source Heat Pump (ASHP)

ASHP's take heat from the air outside and release it inside. The technology works based on a vapor-compression refrigeration cycle. ASHPs supply more energy than they consume, by using this vapour compression cycle to extract heat from their surroundings and release it elsewhere (inside). Heat pump systems can have SCOPs greater than 4 meaning that they will supply 4 times more heat energy than the electricity they consume over the course of a year. Under the DEAP & NEAP assessment methodologies the difference between the primary energy consumed and the primary energy delivered by a heat pump can be considered renewable. An air source heat pump system is one of the most efficient solutions to supply high efficiency heating and DHW and is suitable for this development. ASHPs are proposed for the Duplex Units.

Proposed: Yes (For duplex units.)

6.3.3 Ground Source Heat Pump (GSHP)

Ground source heat pumps use the same principle as air source heat pumps but instead of taking heat from the air they take heat from the ground. This is known as ground heat exchange (GHE) or “geo-exchange”. The primary advantage of ground heat exchange over air heat exchange is that higher annual efficiencies can typically be achieved due to fairly constant moderate temperatures in the ground.

GSHPs have higher capital and because there will be relatively low heating loads due to the high performing building envelopes they are not proposed for this development. The karst ground conditions would also be likely to pose challenges for vertical boreholes which would be required.

Proposed: No

6.3.4 Biomass Heating

Biomass heating works on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water loads. The combustion of biomass could be done in a dedicated biomass boiler or a CHP plant.

The most efficient use of a biomass CHP system would be as a centralised system supplying all of the development and adjacent city blocks which would have a mix of uses. Ideally, the network would have buildings that can operate as substantial “anchor” loads, e.g. hospitals, hotels, universities or industrial sites.

This technology requires substantial space allowance, access for delivery trucks, a buffer vessel and considerable space for fuel storage. The system also requires regular maintenance to remove ash, etc. Additionally, the use of biomass calls for a continuous local supply of suitable fuel to be truly sustainable. Concerns exist over the level of NO_x, SO_x and other particulate emissions from burning biomass, particularly in urban areas.

Proposed: No

6.3.5 Solar Hot Water Collectors (SHWC)

Solar hot water collectors (SHWC) utilise solar radiation to heat water for use in buildings. Solar collectors are typically designed to meet a development's base domestic hot water (DHW) load. They would require extensive pipework to transfer the hot water to each apartment and have more maintenance requirements than PV.

Proposed: No

6.3.6 Photovoltaics (PV)

Photovoltaic (PV) Cell technology involves the conversion of the sun's energy into electricity. This electricity can be used to offset electricity consumption from the grid or it could be used to heat hot water through an electric immersion if electricity demand was low. One of the advantages of PV versus SHWCs is its modularity and scalability; PV systems can be easily scaled up or down based on the energy requirements of the apartment complex. The inclusion of PV is still under consideration by the design team. The assessment is looking at the requirement for PV for Part L compliance, the operational energy and carbon benefits, and the impact on green/ blue roofs.

Proposed: TBC

7 Embodied Carbon

7.1 Background

The building and construction sector are a major contributor to global greenhouse gas emissions. The 2022 Global Status Report for Buildings and Construction reported that the sector accounted for over 34 per cent of energy demand and around 37 per cent of energy and process-related CO₂ emissions in 2021.

To date the construction industry has primarily focused on operational carbon emissions, i.e. emissions from energy consumption in the day-to-day running of a property, via targets in building regulations (Part L) and sustainability assessment rating schemes (LEED, BREEAM, etc.) Until recently, embodied carbon emissions

- emissions associated with raw material extraction, transportation, manufacturing, construction, maintenance, renovation, and end-of-life (e.g. disposal), have been largely ignored. However, as carbon emissions within the built environment have become better understood, the industry has started to transition to Whole Life-Cycle Carbon Assessments. These assessments account for the total carbon emissions associated with the construction and operation of a building, i.e. embodied and operational carbon. The industry is generally adopting the modular structure of EN 15978 which covers a “cradle to grave” scope broken into modules [A–C] over a 60-year life cycle. Figure 16 provides the Life Cycle Assessments Stages.

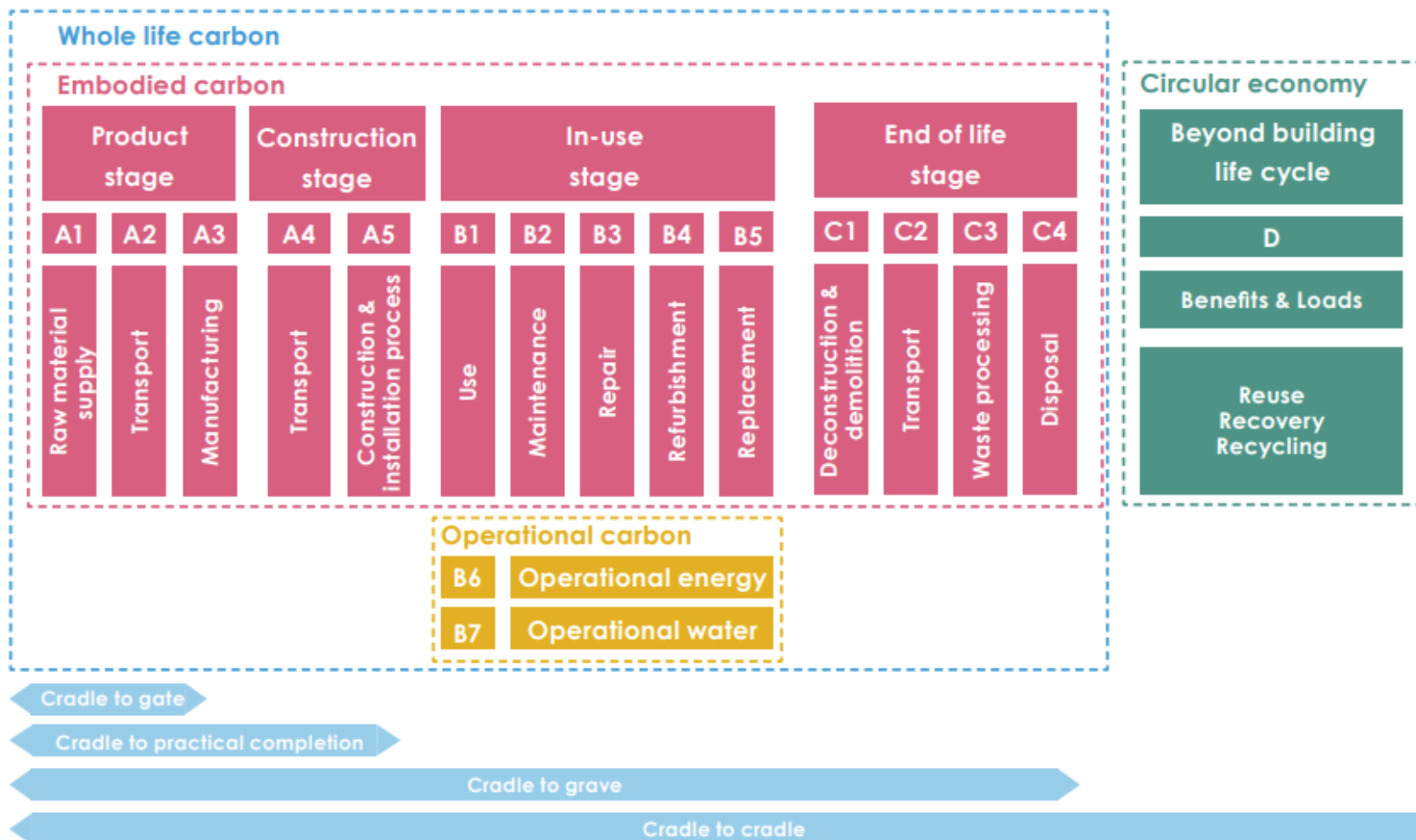


Figure 16: EN 15978:2011 Life Cycle Assessment Stages (Image Courtesy (LETI, 2020))

7.2 Benchmarks

There are currently no specific regulatory targets for embodied carbon in Ireland. London Energy Transition Institute (LETI) and Royal Institute of British Architects (RIBA) have worked with the Greater London Authority, IStructE and the UKGBC to align embodied carbon targets for the UK built environment. These aligned targets have recently also been adopted by the Royal Institute of the Architects of Ireland (RIAI) in their 2030 Climate Challenge and are widely used across industry as 'best practice' benchmarking. These targets have been used, in part, as the basis of the analysis. The scope included in the LETI / RIBA and RIAI Targets aligns

with RICS Guidance on Life-cycle assessment including materials representing 95% of total costs as listed in the projects BOQ. (This includes site works.) Figure 17 provides the target metrics for domestic/residential buildings. Figure 18 provides a typical split for embodied carbon for medium and large scale housing per LCA stage(s). Figure 19 provides a typical split of embodied carbon per building element type. Figure 19 also shows the LETI embodied carbon target of $<500\text{kgCO}_2/\text{m}^2$.

RIBA 2030 Climate Challenge target metrics for domestic / residential

RIBA Sustainable Outcome Metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets	Notes
Operational Energy  kWh/m ² /y	120 kWh/m ² /y	< 60 kWh/m ² /y	< 35 kWh/m ² /y	Targets based on GIA. Figures include regulated & unregulated energy consumption irrespective of source (grid/renewables). BAU based on median all electric across housing typologies in CIBSE benchmarking tool. 1. Use a 'Fabric First' approach 2. Minimise energy demand. Use efficient services and low carbon heat 3. Maximise onsite renewables
Embodied Carbon  kgCO ₂ e/m ²	1200 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	< 625 kgCO ₂ e/m ²	Use RICS Whole Life Carbon (modules A1-A5, B1-B5, C1-C4 incl sequestration). Analysis should include minimum of 95% of cost, include substructure, superstructure, finishes, fixed FF&E, building services and associated refrigerant leakage. 1. Whole Life Carbon Analysis 2. Use circular economy strategies 3. Minimise offsetting & use as last resort. Use accredited, verifiable schemes (see checklist). BAU aligned with LETI band E; 2025 target aligned with LETI band C and 2030 target aligned with LETI band B.
Potable Water Use  Litres/person/day	125 l/p/day (Building Regulations England and Wales)	< 95 l/p/day	< 75 l/p/day	CIBSE Guide G.

Figure 17: LETI/RIBA/RIAI 2025 and 2030 embodied carbon targets for office buildings

Embodied carbon

Focus on reducing embodied carbon for the largest uses:

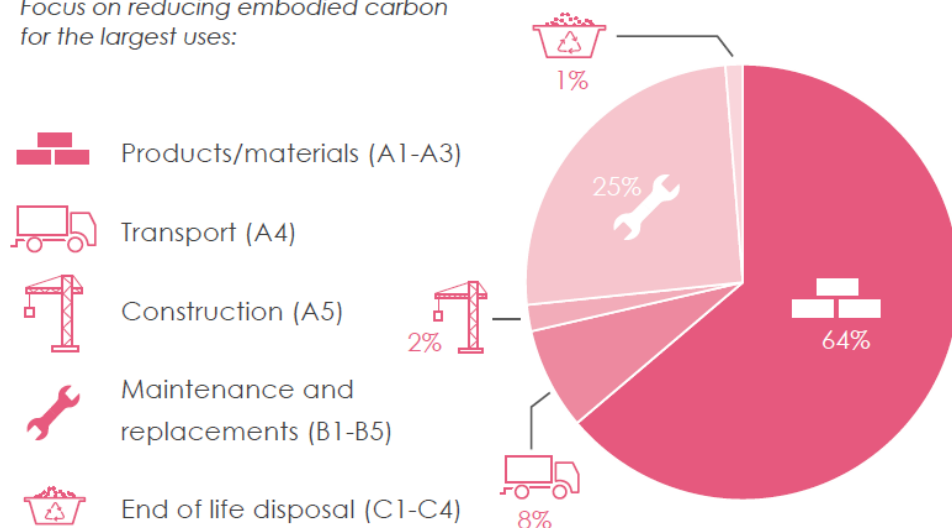


Figure 18: Embodied Carbon average split for medium and large scale housing per lifecycle analysis stage (LETI, 2020)

Average split of embodied carbon per building element:

46% - Superstructure

21% - Substructure

16% - Internal finishes

13% - Façade

4% - MEP

Reduce embodied carbon by 40% or to:

<500
kgCO₂/m²

Area in GIA

Figure 19: : Embodied Carbon average split for medium and large scale housing per Building Element Category (LETI, 2020)

7.3 Proposed Targets & Analysis

As part of the energy and carbon reduction strategies used in the design of this development, embodied carbon targets have been set. A baseline target of $625\text{kgCO}_2/\text{m}^2$ has been set in line with the 'RIBA 2030 Climate Challenge' target for 2030. A second aspirational target of $500\text{kgCO}_2/\text{m}^2$ has been set in line with the LETI targets from their 'Climate Emergency Design Guide' (2020).

As part of the overall embodied carbon reduction strategy, the design is targeting that at least 30% of the cement will be replaced by Ground Granulated Blast Furnace Slag (GGBS)⁴. This target may be increased as more detailed analysis of the structure and project programme is completed. The primary issue with using increased amounts of GGBS is that it increases the concrete curing time considerably thus affecting the project programme. Concrete with 50% GGBS replacement will take about 4 times as long to reach the 100% strength of concrete with no replacement which reaches its maximum strength after about 7 days. The project will also target 90% recycled steel.

Embodied carbon analysis will be performed as the design progresses. Based on the preliminary analysis the final target figures will be refined. Final figures can only be confirmed when a full bill of quantities (BOQ) with details on material specifications is provided.

⁴ GGBS is a by-product of iron and steel making processes. It is dried and ground in to a white powder which can be used to replace anywhere between 30% and 80% of the cement in concrete. Portland cement produces approximately $913\text{ kgCO}_2\text{e} / \text{tonne}$ of cement, whereas GGBS only produces around $67\text{ kgCO}_2\text{e} / \text{tonne}$ of GGBS.

8 Waste Management

The *Cork City Development Plan 2022 – 2028* is guided by the National Planning Framework along with several other national and regional plans, including the current regional waste management plan and the Waste Action Plan for a Circular Economy. At all stages the proposed development will embrace the Circular Economy approach in relation to waste management from construction through to the operation of the buildings. This section will provide an overview of the waste management strategy. However, the 'Construction Resource and Waste Management Plan (CRWMP)' report created by DOSA and the Operational Waste Management Plan (OWMP) created by AWN should be referenced for more a more detailed description of waste management.

The Construction Resource and Waste Management Plan (by DOSA) provides information to ensure that the management of construction waste is undertaken in accordance with all relevant legislation and best practice standards (as set out in Section 2 of the document). The principal aim of the plan is to ensure efficient use of material resources, reduce waste at source and reduce the quantity of waste that requires final off-site disposal to landfill in accordance with the waste hierarchy. A secondary aim is to facilitate the transition to a more circular economy thereby minimising the need for new inputs of virgin materials and energy, while reducing environmental pressures linked to resource extraction, emissions and waste management.



Figure 20: The Waste Hierarchy⁵

Waste prevention will be prioritised through:

- Design efficiency: standardised material dimensions, modular components, reduction of offcuts),
- Just-in-time procurement: avoiding degradation, over-ordering, and site clutter.
- Optimised excavation volumes: cut/fill balancing, minimising export of soil.

In accordance with good practice, excavated soils will be reused onsite where feasible, including for boundary treatment and landscaping purposes, if suitable. Any surplus soils will be disposed of offsite in accordance with all relevant waste

⁵ <https://ec.europa.eu/environment/green-growth/waste-prevention-and-management>

management legislation and best practice requirements Reuse of pallets, timber offcuts, formwork (where safe and untreated).

The demolition works involve the soft stripping, removal of any potential hazardous materials and demolition of the superstructure together with substructures and the processing and disposal of the demolition arisings from the site. The arisings from the demolition works are to be disposed of by the contractor in accordance with the requirements of the CRWMP. The Contractors Method Statement shall describe how they intend to separate the nonconcrete materials from the concrete structure at the demolition site.

Site layout will include a clearly demarcated Waste Storage Area (WSA) with labelled skips for:

- Concrete & masonry
- Timber
- Metals
- Plastics
- Cardboard & paper
- Soils (hazardous & non-hazardous stored separately)
- Mixed residual C&D waste
- WEEE & chemical/hazardous waste

Segregation maximises recycling yields, reduces disposal costs, and ensures compliance with LoW/EWC coding requirements.

The project will prioritise low carbon materials including:

- Concrete mixes incorporating **GGBS** or other cement replacements.
- Recycled aggregates.
- FSC/PEFC-certified timber.
- Locally sourced materials to reduce transport emissions.

There will be a focus on energy efficient construction. The site will incorporate efficient site lighting and aim to reduce idling of machinery. Alternatives to diesel plant such as electric alternatives will be prioritised where possible.

The strategy for waste management in the demolition and construction phases are in line with the requirements of the 'Best Practice Guidelines for the Preparation of Resource Management Plans for Construction & Demolition Projects' prepared by the Environmental Protection Agency (EPA).

In accordance with the OWMP, wastes should be segregated into the waste types identified in the plan to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

There are two (2 no.) shared WSAs for the apartment blocks which are both located internally on the lower ground floor level of the blocks. The duplex units will have individual WSAs allocated for the storage of their waste and it will be the duty of the residents within the duplex units to bring the bins out for each collection. Facilities management will supply all residents that utilise the shared WSAs with a document that shall clearly state the methods of source waste segregation, storage, reuse and recycling initiatives that shall apply within the development.

Residents will be required to segregate their waste into the following main waste categories within their own units:

- Organic waste,
- Dry mixed recyclables (DMR),
- Glass, and
- Mixed non-recyclables (MNR).

The waste receptacle requirements have been established for the WSAs in the OWMP. It is envisaged that all waste will be collected on a weekly basis.

The OWMP presents a waste strategy that addresses all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the development. Implementation of the OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *NWMPCE*. Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *Cork City Development Plan 2022 – 2028* and *CCC Waste Bye-Laws*.

The implementation of the mitigation measures proposed in the CRWMP during demolition and construction stages will ensure that a high rate of reuse, recovery and recycling is achieved. No residual effects are therefore anticipated from either the construction phase or operational phase.

Please reference the following reports which accompany this planning application for further information:

- *Operational Waste Management Plan (AWN)*
- *Construction Resource and Waste Management Plan (DOSA)*

9 Noise & Air Pollution

This section will provide an overview of how noise and air pollution will be managed across all stages of development from construction through to operation of the buildings. (For more detailed information on these elements please refer to the reports referenced at the end of this chapter.)

9.1 Noise & Vibration

A detailed noise and vibration assessment has been conducted by CLV Consulting Ltd. In order to provide as robust assessment as possible, both inward and outward impact assessments were carried out in respect of the proposed development. Noise monitoring was carried out to quantify the ambient noise level environment both at the development and at the nearest noise sensitive receptors in the vicinity of the development in order to provide a baseline for these assessments. A series of measures to effectively manage noise and vibration have been proposed. These include:.

9.1.1 Demolition/Construction Phase Noise

Construction activities are expected to impart significant impacts on noise sensitive receptors when carried out in close proximities with receptors such as those that will be immediately adjacent to the proposed development to the north. However, these noise impacts will only occur when construction works are being carried out on the development buildings located in close proximity to these receptors. Once the buildings in these areas are constructed, construction phase noise emission levels will decrease significantly due to shielding from the other constructed buildings and significantly increased distances from these receptors. However, it is still recommended that when construction activities are carried out in their vicinity that they be managed / coordinated with local residents in order to minimise potential noise impact as far as practicable.

Limiting the hours of noisy operations and implementation of appropriate noise control measures detailed in the Noise & Vibration Impact Assessment will also serve to minimise noise impact as far as practicable in this instance. Although there are not predicted to be any significant noise impacts in respect of construction activity noise emissions, best practice noise control measures should still be employed. In this instance, reference is made to '*BS5228: Noise control on construction and open sites*'. This document provides detailed guidance on the control of noise from demolition and construction activities.

The following measures are recommended to minimise the potential for disturbance due to noise emissions from the proposed development. Proper application of these measures should reduce noise emissions less than those predicted in this report:

- Establishing channels of communication between the contractor / developer, Local Authority and residents.
- Appointment of a site representative responsible for matters relating to noise.
- Provision of 2.4m high perimeter hoarding around the site boundary.
- Selection of plant with low inherent potential for generation of noise.
- Erection of barriers as necessary around items such as generators or compressors.
- Placement of noisy plant as far away from sensitive properties as permitted by site constraints.
- Avoiding unnecessary revving of engines and switch off idling engines / equipment when not in use.
- Restricting construction activities to daytime periods only.
- Use of acoustic enclosure for high noise impact activities, such as breaking;

- Turning off / powering down plant when not in use;
- Turning off HGVs when not in use;
- Reduction in drop heights of incoming materials;
- Appointing project liaison officer to communicate with locals regarding noise works, their duration and organising construction phase noise monitoring;
- Strict controls on construction hours to prevent noise works occurring early morning or into the evening period; and,
- Inclusion of response procedure within the CEMP to noise complaints and breaches.

The Contractor will ensure these measures required to control noise emissions will be in place and all workers on the site are kept aware of them through on-site toolbox talks.

In advance of construction phase commencement, the appointed contractor will also submit a CEMP to the Council for approval. Reference should be made to BS 5228 which provides detailed guidance on the control of noise from demolition and construction activities.

It is also recommended that when construction activities are carried out in the vicinity of the future residential dwellings to the north, that they be managed / coordinated with local residents in order to minimise potential noise impact as far as practicable.

In addition to limiting construction to daytime periods only and providing the 2.4m high perimeter hoarding around the construction site boundary, the scheme contractor should also adopt the following measures / policies during construction to ensure that construction noise emissions from the development are minimised as far as practicable:

- ✓ limiting the hours during which site activities likely to create high levels of noise are carried out;
- ✓ establishing channels of communication between the contractor, local authority and residents;
- ✓ appointing a site representative (Noise Liaison Officer) responsible for matters relating to noise;
- ✓ ensuring all site access roads are kept as even as possible so as to mitigate the potential for noise emissions from lorries and other construction vehicles;
- ✓ monitoring typical levels of noise during critical periods and at sensitive locations (at representative locations along the perimeter of the development only).
- ✓ selection of plant with low inherent potential for generation of noise;
- ✓ siting of noisy plant as far away from dwellings as permitted by site constraints.
- ✓ continual monitoring of noise and vibration at the adjacent residential buildings to the south during the excavation, demolition, piling and main construction phases.

9.1.2 Operational Phase Noise

9.1.2.1 Building Services Plant

The predicted noise levels associated with building services are within the 45 / 50dB LAeq,T night time / daytime criteria at all nearby residential receptors.

9.1.2.2 Vehicular Traffic on New Internal Roads

The predicted noise levels associated with vehicular traffic on the new internal roads within the development are within the 45 / 50dB LAeq,T night time / daytime criteria at all nearby residential receptors

9.1.2.3 Additional Vehicular Traffic on Public Roads

The predicted noise levels associated with additional vehicular traffic on public roads are negligible.

9.1.3 Vibration

The predicted vibration emission associated with both the construction and operational phases of the proposed development are expected to be negligible

9.2 Air Quality

9.2.1 Demolition/Construction Phase

Construction works will be carried out in such a way as to limit the emissions to air of pollutants particularly dust and fine particles (PM10)), employing Best Practicable Means. The site will be managed in accordance with the C RWMP to minimise the potential effects on air quality from construction. Monitoring will be undertaken throughout the construction period to enable proactive management of dust and PM10 levels. Wind speed and direction will be included in the monitoring.

Dust will be generated mainly from earthworks activities at the early stage of the project and to a lesser extent from new construction and traffic movements. The closest human receptors are:

- The residential properties to the south of the site.
- The retail property to the west of the site

Measures will be put in place to minimise the impact of dust generated from the works with reference to best practice guidance such as the Control of Dust from Construction and Demolition Activities document. These measures will include:

- During periods of dry weather, the site access routes will be kept damp to minimise dust generation from construction traffic.

- Street sweepers will be employed to ensure the adjacent R 608 is maintained free of dust.
- Establishing a 10 km/hr speed limit for vehicles on site.
- Minimisation of extent of working areas at any one time.
- Netting and/or hard surface hoarding around the perimeter of the site will minimise dust migration from the site at low levels.
- Stockpiling of imported materials will be limited to the volumes required to practically meet the construction schedule.
- Excavated materials will be removed from site as soon as possible to minimise potential for stockpiles to create windblown dust; and
- Daily inspections by the main contractor will be carried out to identify potential sources of dust generation along with implementation measures to remove causes where found.

There will also be some exhaust emissions generated from use of excavators, HGVs and vibrating rollers during the demolition and construction phase. These impacts will be temporary in duration and are not considered likely to give rise to significant air quality impacts following the implementation of the following measures:

- All machinery will be suitably maintained to ensure that emissions of engine- generated pollutants shall be kept to a minimum in accordance with Measures Against the Emission of Gaseous and Particulate Pollutants from Internal Combustion Engines to be Installed in Non-Road Mobile Machinery (2002/88/EC) and Emissions of Pollutants from Diesel Engines (2005/21/EC)
- Vehicles will not be left unnecessarily idling on the site and trucks removing demolition waste from the site will turn off engines during loading.
- Pre-start checks on all machinery will be conducted on a daily basis prior to commencement of activities.
- Low emission fuels will be used insofar as possible; and

- Mains power will be used for small plant and equipment, where possible, in preference to generators.

More details are presented in the Construction & Environmental Management Plan (CEMP) that forms part of the Planning Application.

9.2.2 Operational Phase

Given the proposed use for this development, there are no direct sources of dust or other emissions that could give rise to nuisance or contravene any air quality standards. The project will have negligible impact on dust and NO₂ emissions once the project is completed.

Please reference the following reports which accompany this planning application for further information:

- *Noise & Vibration (by CLV)*
- *Construction & Environmental Management Plan (CEMP)*

10 Conclusion

This report demonstrates how the design of the proposed scheme positively responds to the impact of climate change through mitigation and adaption measures.

Location, Siting & Layout

The proposed development demonstrates a strong alignment with climate-responsive, compact urban growth principles through the regeneration of a highly accessible brownfield site within Ballincollig. The design integrates sensitively with surrounding residential areas by stepping building heights and improving street activation and passive surveillance. The layout prioritises pedestrian movement, permeability, and public realm quality, supporting low-carbon mobility through excellent access to bus services, cycle routes, and local amenities within a 15-minute walking catchment. Daylight, solar gain, micro-climate, and topography have all informed the site layout, ensuring optimal environmental performance and long-term resilience.

Sustainable Drainage Systems (SuDS)

A comprehensive SuDS-led drainage strategy has been integrated throughout the development, replacing an almost entirely impermeable brownfield site with a multi-layered system of natural and engineered water-management features. Permeable paving, bio-retention areas, rain gardens, SuDS-enabled tree pits, green/blue roofs, and attenuation systems collectively reduce runoff, improve water quality, and enhance biodiversity. Systems are designed to manage extreme rainfall, maintain greenfield runoff rates, and incorporate climate-change allowances, ensuring robust performance over the long term. The design responds to geotechnical and groundwater risk assessments and aligns fully with SuDS principles of water quantity, water quality, amenity, and biodiversity.

Green Roofs & Green Infrastructure

The proposed development employs a comprehensive green-infrastructure framework that transforms a low-value ecological landscape into an interconnected network of biodiverse planting, green roofs, tree pits, and open spaces. Green/blue roofs improve stormwater retention, enhance building thermal performance, and create habitat for pollinators and invertebrates. Public open spaces have been designed to maximise ecological connectivity, respond to micro-climatic opportunities, and promote both active and passive recreation. Native planting, wildflower meadows, and eco-gardens deliver measurable biodiversity gain and contribute to carbon sequestration, urban cooling, and overall climate resilience.

Energy & Carbon

Energy use is reduced through a strong emphasis on passive design, including high-performance building fabric, very low air permeability targets, optimised solar gain, high daylighting levels, and minimised thermal bridging. The development utilises decentralised exhaust-air heat pumps (EAHPs) for apartments and split ASHP systems for duplexes, providing efficient, low-carbon heating, hot water, and ventilation without the need for fossil fuels or complex centralised plant. Whole-life carbon reduction is supported through embodied-carbon targets, including significant GGBS substitution in concrete and high recycled steel content. The energy strategy continues to be refined through on-going building performance modelling, including Part L compliance and BER modelling, dynamic thermal modelling, daylight and sunlight analysis, and embodied-carbon analysis.

Waste Management

A circular-economy approach underpins all waste-management strategies from demolition through construction and operation. The Construction Resource & Waste Management Plan (CRWMP) ensures soil reuse where feasible, segregation

of all construction waste streams, and minimisation of landfill disposal through reuse, recycling, and recovery. Operational waste management is enabled through well-designed Waste Storage Areas, resident education, and strict segregation systems for organic waste, recyclables, glass, and residual waste. The approach aligns with the Waste Action Plan for a Circular Economy and Cork City Council's waste objectives, ensuring continued compliance and high recycling performance throughout the lifetime of the development.

Noise & Vibration

Noise and vibration impacts have been thoroughly assessed and will be managed throughout demolition, construction, and operation. During construction, a suite of mitigation measures—including restricted working hours, perimeter hoarding, low-noise plant selection, barriers around high-noise equipment, and continuous monitoring—will ensure that noise levels remain within acceptable limits. Operational noise assessments confirm that plant noise and traffic generated by the development will remain below established criteria. Engagement with residents,

appointment of a noise liaison officer, and adherence to BS 5228 will ensure robust control of noise impacts. Vibration during both construction and operation is predicted to be negligible.

Air Quality

Air-quality impacts during construction will be effectively controlled through a Dust Management Plan incorporating best-practice mitigation measures such as damping, speed controls, stockpile management, wheel washing, and minimisation of exposed surfaces. Emissions from plant and vehicles will be minimised through the use of well-maintained machinery, reduced idling, and preference for mains power. Monitoring of dust and PM10 will ensure proactive management. In operation, the development introduces no significant sources of air pollution, and changes in traffic volumes should have a negligible effect on NO₂ or particulate levels. Overall, both construction and operational phases will maintain compliance with relevant air-quality standards

Appendix A Example Mechanical Schematics

modulair green
comfort

MVHR Ventilation

	Description
A	Modul-AIR Hot Water Tank
B	Modul-AIR Heat Pump
C	Green Comfort Module
D	Tundish
E	Potable Expansion Vessel
F	Robokit
G	Opentherm thermostat
H	Filling Loop
I	Inlet Control Group
J	Hot Outlet
K	Balanced Cold Outlet
L	Mains/Boosted Cold Inlet
M	DIRTMAGPLUS® (AAV, Filter, Strainer, Fill&Flush)

Modul-AIR ALL-E
& Green Comfort Module

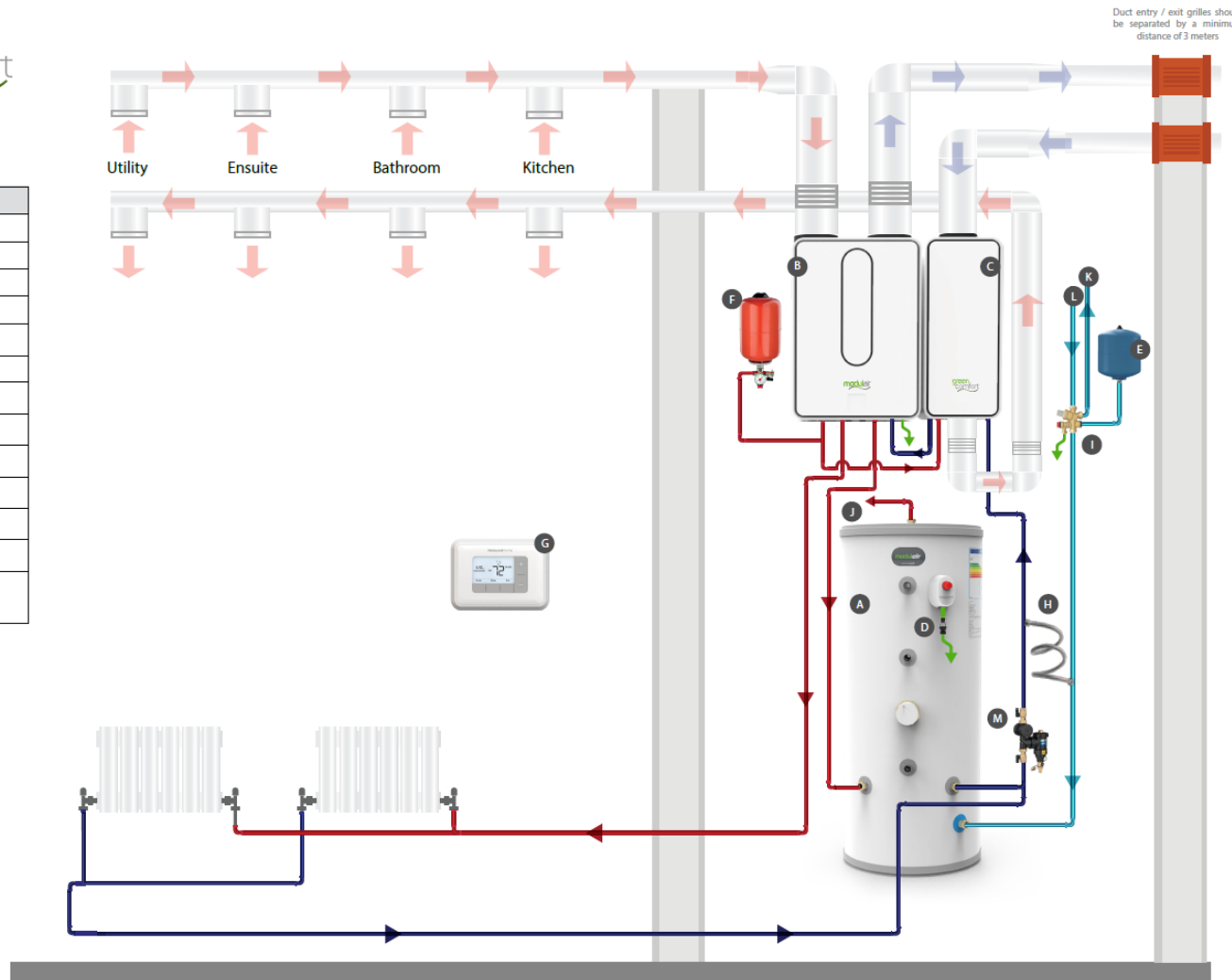


Figure 21: Example Schematic for Dual Duct Heat Pump System (Schematic Courtesy of Joule.ie)

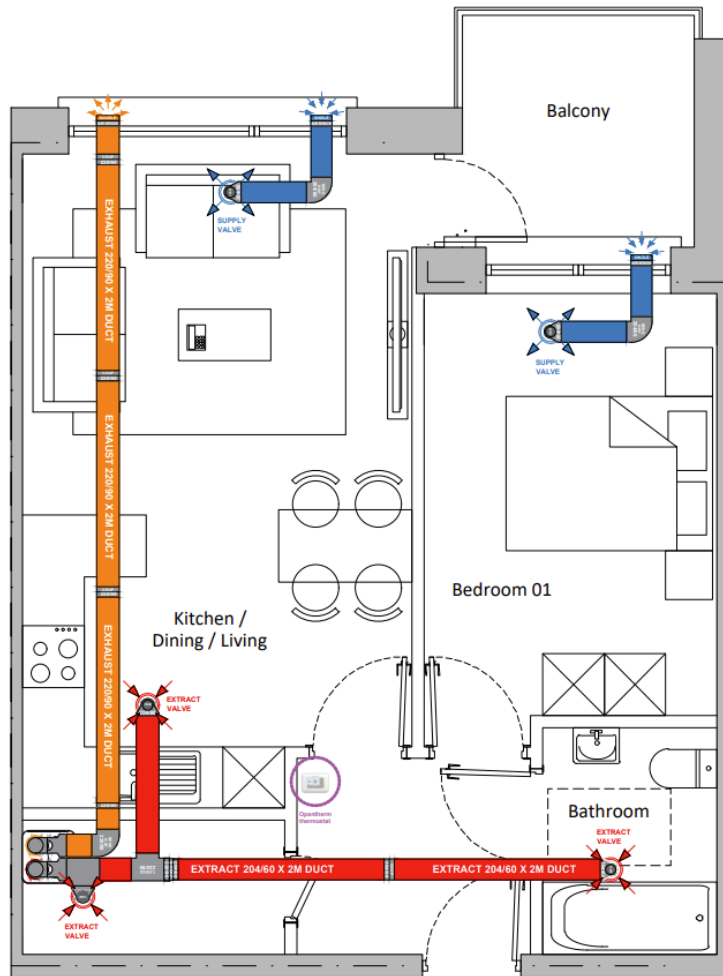


Figure 22: Example of Exhaust Air Heat Pump system duct layout with MEV only (no heat recovery ventilation.) (Unit layout is for illustration purposes only. It does not represent any unit type in the development. Diagram courtesy of Joule.ie)

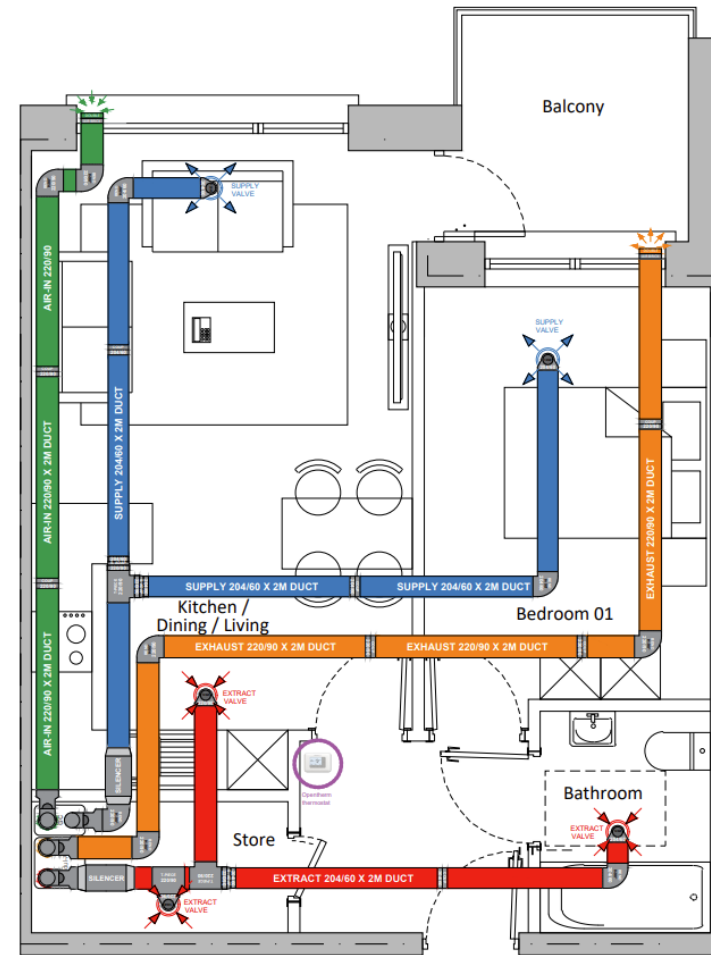


Figure 23: Example of Exhaust Air Heat Pump system duct layout with MVHR. (Unit layout is for illustration purposes only. It does not represent any unit type in the development. Diagram courtesy of Joule.ie)

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