An Ghníomhaireacht Tithíochta
The Housing Agency

An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

Examination of innovation/ efficiencies in design of affordable housing

March 2024

Purpose

This report was undertaken by Bucholz McEvoy Architects, on behalf of the Housing Agency and the Department of Housing, Local Government and Heritage, in a collaborative format.

The purpose of the report is to highlight how quality affordable housing can be most effectively delivered by demonstrating innovation and efficiencies in construction and design.

This report serves as a sequel to the Housing Agency report, “Social, Affordable & Co-operative Housing in Europe,” which featured case studies from Switzerland, Austria, France, Germany, the Netherlands and Denmark into innovations in design and construction of social, affordable and co-operative housing in Europe.

This report follows a similar case studies based approach, but with a greater focus on examples in Ireland, through 12 Irish and 4 EU based case studies.

The 12 Irish case studies are situated in Dublin, Galway and Limerick, encompassing small (up to 50 units), medium (50 – 150 units), and larger schemes (150 plus units). There are 4 additional EU case studies from Austria, France and the Netherlands which provide a broader perspective and alternative approaches to innovation and efficiencies in design.

The report explores the case studies through 5 themes - Strategy, Layout, Materials, Delivery and Occupation. A specific project focus is included within each case study which provide insights into key design decisions or processes integral to the project’s development.

As well as the case studies, an additional 15 articles are included which discuss key topics within the current landscape of affordable housing design. The case studies and articles are set out as follows across the 5 themes:

- Strategy (5 case studies/5 articles)
- Layout (4 case studies/2 articles)
- Materials (4 case studies/4 articles)
- Delivery (3 case studies/2 articles)
- Occupation (2 articles)

Lastly, this report outlines two projects that highlight delivery methods and efficiencies for affordable housing through a comparison of Modern Methods of Construction (MMC) on a live sample basis. These two examinations were undertaken by Limerick City and County Council in collaboration with Allies Morrison Architects on Toppins Field medium density Housing Scheme and by Dublin City Council/Land Development Agency (LDA) in collaboration with ALTU Architects on the Cromcastle higher density housing scheme.

CONTENTS

Overview

As a part of Housing for all (Q3 updated Action Plan 2023) this publication concludes case example work undertaken in response to Action 32 *Examination of innovation/efficiencies in design regarding affordable housing types, form and density including publication of case examples both nationally and in other EU Member States.*

Context

This examination of case studies was undertaken by Bucholz McEvoy Architects, on behalf of the Department of Housing, Local Government and Heritage and the Housing Agency, in a collaborative format. As Housing for All has committed to significant investment for affordable housing delivery, it is important to look at how homes can be delivered in the most efficient way, while maximising affordability, quality and value for money through their design and construction. It is intended that this research will compliment on-going sectoral guidance as part of a suite of actions already in progress under Housing for All. The research undertaken was carried out in two parts mainly examining the following:

1. Examination of innovation/efficiencies in design regarding affordable housing types, form and density including publication of case examples both nationally and in other EU Member States on a comparative basis;
2. Pilot examination of two projects (Local Authority led) regarding delivery methods/efficiencies for Affordable Housing and an examination of differing construction options on a live sample basis;

The first part above as outlined in this publication, builds on and extends the existing work undertaken by the Housing Agency in 2020 while producing sector specific comparators of Irish/EU case examples that demonstrate design and scheme innovation, which can inform and be applied in the formation of new schemes/ programmes as applicable going forward.

While the second part, examining two projects on a pilot basis, supports this by providing a complimentary examination of live case examples demonstrating the various opportunities and challenges when considering the construction phase of a scheme. These two examinations consisted of individual and specific work undertaken in the first instance by Limerick City and County Council in collaboration with Allies Morrison Architects on Toppins Field medium density Housing Scheme and secondly by Dublin City Council/Land Development Agency (LDA) in collaboration with ALTU Architects on the Cromcastle higher density housing scheme.

Outcomes

The development of this publication, while showcasing schemes underway, will start to enable further research/examination on the on-going practical implications for the delivery of Affordable and Cost Rental Housing over the lifetime of the National Development Plan where these approaches remain an important stepping stone in further enabling the delivery of this important tenure for the State.

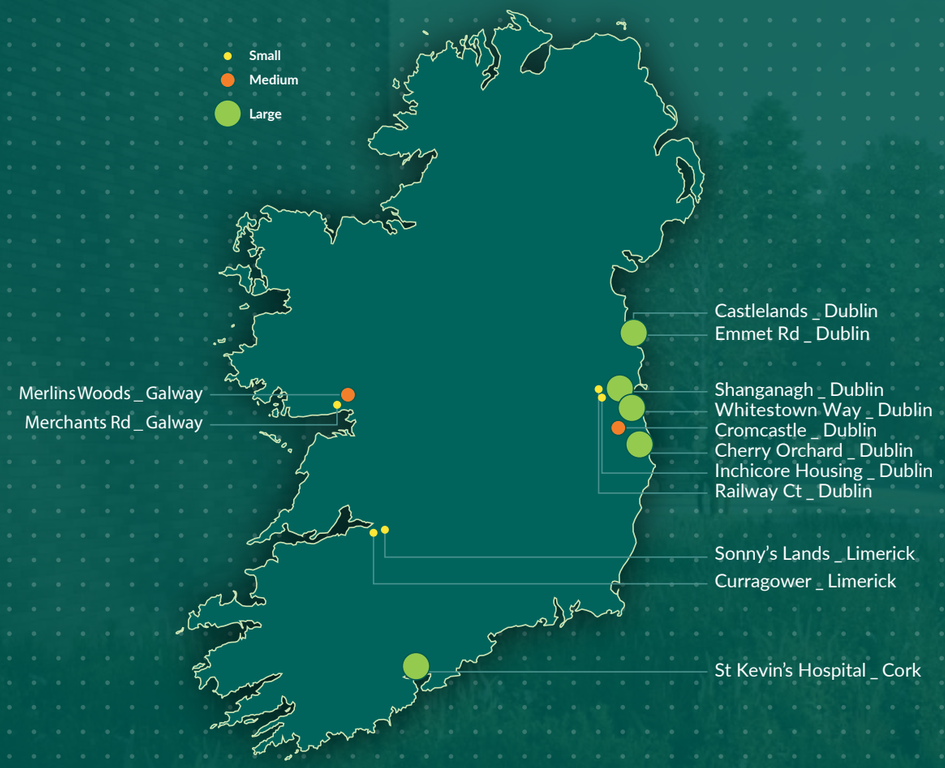
Across the 16 case studies which represent differing locations, housing typologies and approaches, it is important to see how the common threads of design, cost efficiency and delivery challenges have been addressed in terms of developing high quality homes for sustainable communities. On initial review, and as outlined throughout the various stages of each of these projects in development, there are perhaps a recurring set of high level ingredients that have supported good decision making and quality outcomes, which can be summarised as below:

- A Strategic Plan and Design led approach to Housing is critical based on an acute analysis of the local challenges and a tailored response to match; this moves away from the more routine or formulaic approach and creates the added value or Vision factor needed in each case;
- A strong local governance approach or dedicated client Champion is essential, normally supported by a well briefed multi-disciplinary team who understand the planning and design considerations of the place, and whom are informed by community stakeholders;
- Economic or Business case of any project strategy must be comprehensive and examine both the risks and opportunities of schemes over both the medium-long term in terms of viability, cost benefit and management into the future;
- Methodology of implementation must be comprehensive and concise ensuring the deliverability of the various schemes are achievable in both the short and long term particularly for multi-phased larger scale housing strategies;

Finally, we would like to thank all those who contributed to this publication via the case study examples as outlined and the contributions of the bespoke Expert Advisory Group which was set up between the Department of Housing, Local Government and Heritage and the Housing Agency to provide advisory support in the development of the publication at the initial stages.

Martin Colreavy
Dip Arch BArch Sc MSc Urban Design FRIAI
Head of Strategic Delivery and Urban Advisory, Department of Housing, Local Government and Heritage

Any society concerned with housing its citizens will have been thinking about and working on the problem of housing over a long period of time; examples that are drawn from contemporary practice belong to a long history of the development of housing. Despite the need for housing currently faced, that need can be mapped against previous crises in the history of housing in the EU. It is therefore instructive to develop long term strategies about housing in order that we can create a robust housing stock that is of collective value to society. What we are building today, if done well, will still be in use when the next crisis comes, and moreover will be of value to the next generation of new housing in Ireland.



Statement of Intent

This document serves as a sequel to the Housing Agency report, “Social, Affordable & Co-operative Housing in Europe,” which featured 44 housing case studies across 6 EU member states.

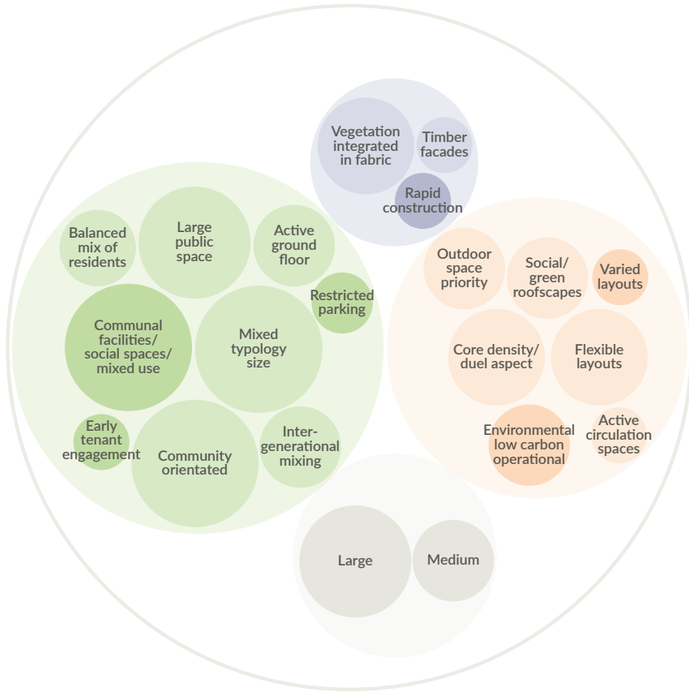
This report identified 15 elements of good housing design gleaned from the case studies, that "**contribute to the creation of successful design and good places to live**".

Our approach to structuring this publication emerged from an analysis and interpretation of the EU case studies presented in the aforementioned report. Acknowledging the contextual relevance of the innovations documented for each country, we categorised the themes to illustrate the distinct priorities and mechanisms unique to each nation as presented in the "Social, Affordable & Co-operative Housing in Europe" report. In our assessment, these differing priorities resulted in a distinct outcome and language of housing design amongst the sample set, it is logical to conclude that in Ireland a set of priorities will emerge, however what they are, and how we establish our priorities for housing is worth reflecting upon.

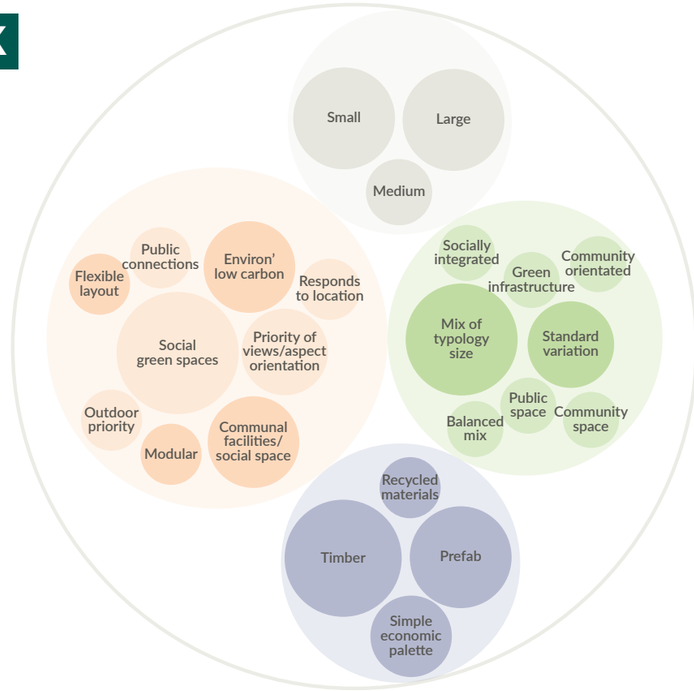
We simplified this study graphically into a series of diagrams. The priority of design themes was streamlined into three main categories: **Strategy - Who?** (pertaining to early design decisions often set at a policy or brief level, **Layout - Where?** (concerned with site-specific layout/massing design decisions at various scales – site, building, and typology and **Materials - How?** (involving design decisions related to building construction and materials).

Elements of good housing design identified by the Housing Agency (2020) report

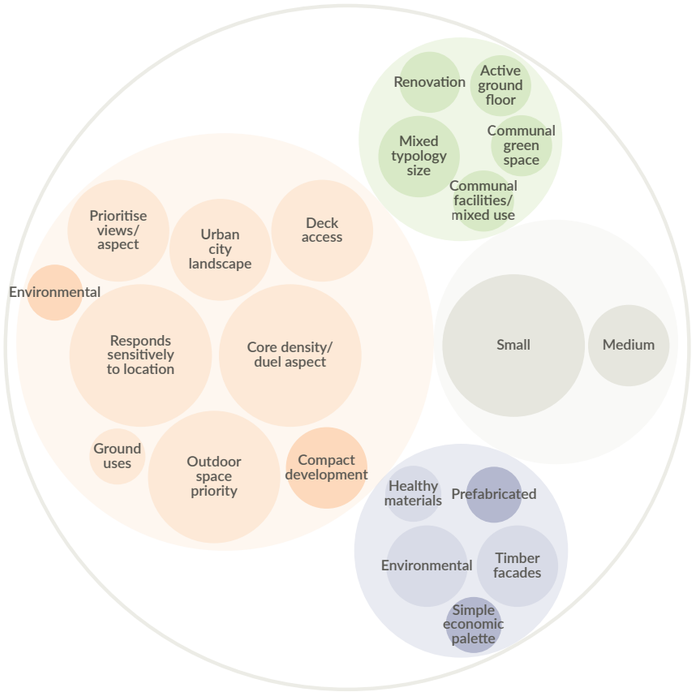
AUSTRIA



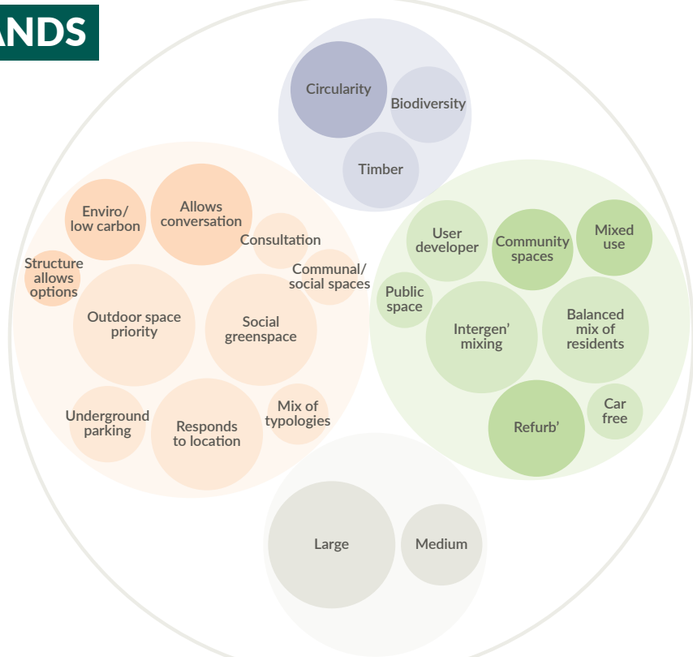
DENMARK



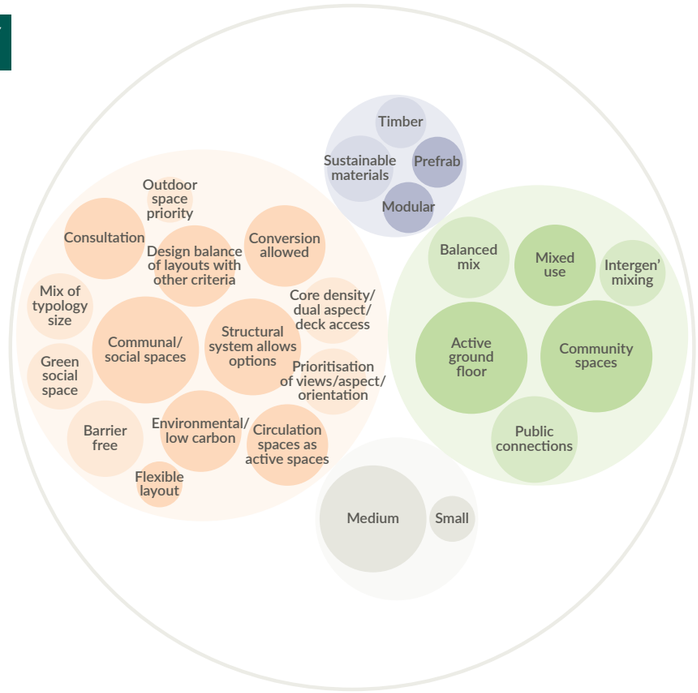
FRANCE



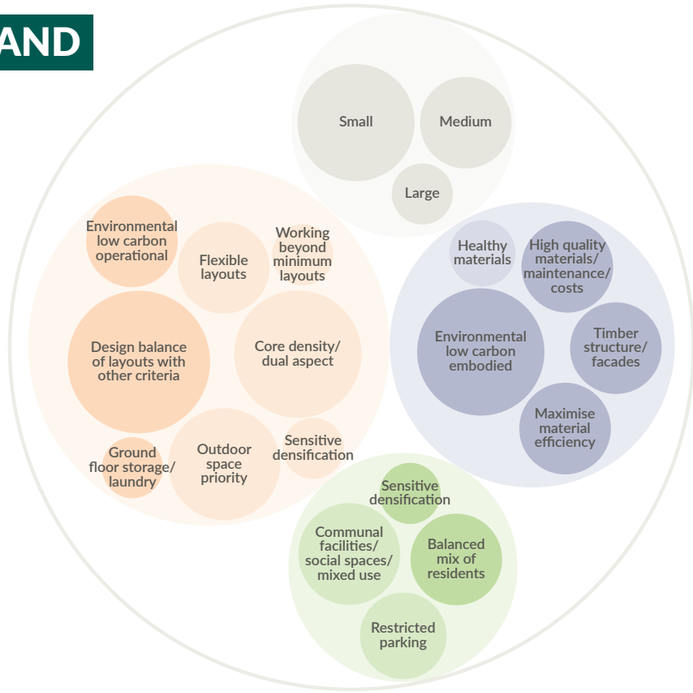
NETHERLANDS



GERMANY



SWITZERLAND



- Strategy
- Layout
- Materials
- Size

We approached the compilation of this report with a fundamental question in mind:

“Where do Ireland’s priorities today lie in delivering cost rental and affordable housing?”

Our housing design approach, akin to any country, is shaped by a myriad of factors. These include but are not limited to history, topography, infrastructure, resources, demographics, societal ideals, policy, finances, regulation, market focus, and skills.

This document explores the current Irish Housing Landscape through 12 case studies situated in Dublin, Galway, Cork, and Limerick, encompassing a range of sizes – small (up to 50 units), medium (50 – 150 units), and larger schemes (150 plus units).

Organised under aforementioned themes of Strategy, Layout, and Materials, the report also introduces two additional categories. The first is Delivery, which delves into innovations in processes aimed at ensuring successful project delivery. The second is Occupation, focusing on aspects related to the building in use.

A distinctive project focus is incorporated within each case study, offering insights into key design decisions or processes integral to the project’s development.

Four additional EU building case studies supplement. These external examples bring valuable perspectives and thought-provoking designs, encouraging readers to reflect on alternative approaches.

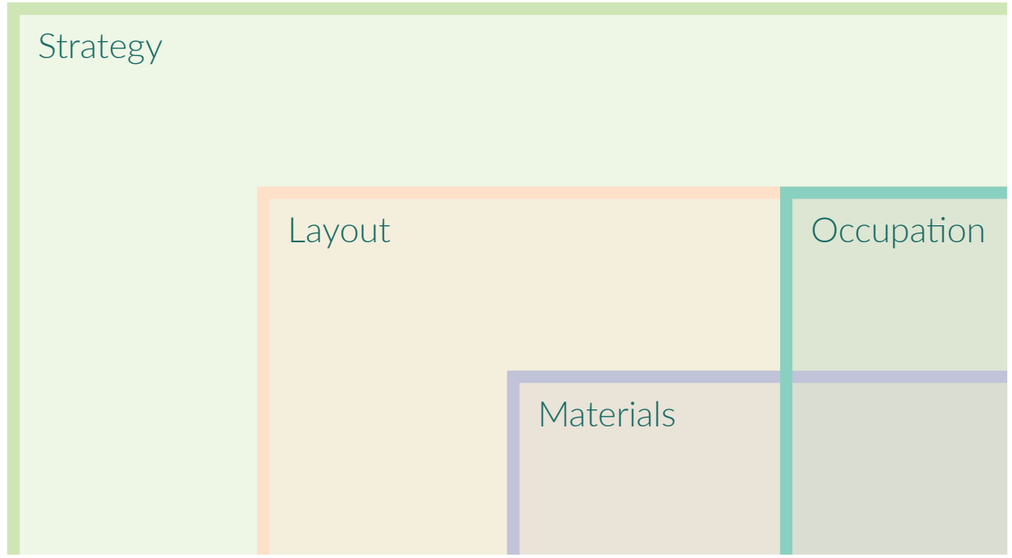
Fifteen forward-looking articles authored by experts in specific specialisms offer insights into critical building design topics discussing the related current landscape, emerging questions, trends and technologies within the realm of housing architecture primarily focused on sustainable building design.

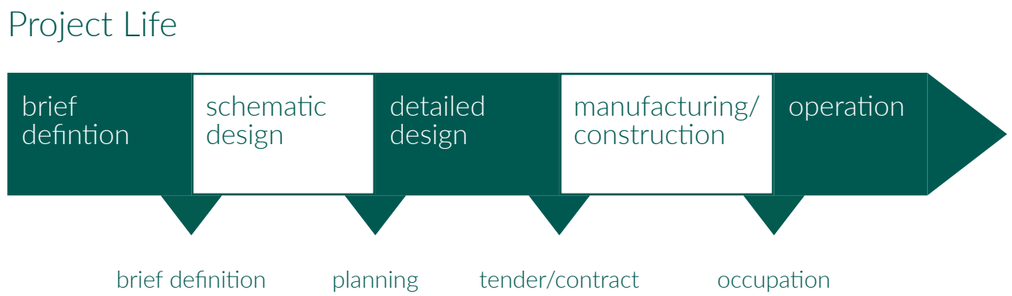
The document intentionally follows a linear structure, which mirrors the typical timeline of a housing project to enhance clarity. However, it’s important to note that any building project is an ongoing exploration, addressing details at various scales within the context of holistic principles.

While we caution against interpreting this structural simplification as a distinct set of themes or problems isolated to a specific project stage we would suggest that by exploring each stage separately it is possible to demonstrate more precisely how they are interlinked, why they are interlinked and what priorities emerge from the whole.

Integrated design hinges on recognizing the complexity of treating diverse and often competing variables or requirements as a cohesive whole. Nevertheless, dissecting and examining each stage separately aids in identifying priorities across a range of projects. Once these priorities are identified, we can ask ourselves: Do we have the right ones? Are they arranged correctly? Do they lead to outcomes that satisfy long-term housing demands? Are they properly balanced? Do they contribute to achieving our CO2 targets? Are they designed to promote health benefits for residents? Are they procured in innovative ways that offer value to the public purse by creating high-value durable assets?

TYPICAL PROJECT TIMELINE





Strategy

- Brief Definition

SITE USES STRATEGY

- Diverse mix of facilities promoting synergies and social cohesion
- Serve local and larger community
- Cultural facilities/Community facilities
- Support local community and or wider public use
- Venues for local enterprise/ business at different scales
- Working facilities (live/ work units, workshops, artist studios)
- Facilities to encourage active uses, day and night
- Support active lifestyles
- Supported living

ENCOURAGING REGENERATION

REFURBISHMENT STRATEGY

- Embodied carbon
- Inventive reuse
- Incentives to refurbish

PUBLIC REALM STRATEGY

- New public realm
- Invite connections/enhance links to adjacent public realm/ green spaces
- Active ground floor

MIX STRATEGY

- Promote mixed tenure
- Promote intergenerational communities

PUBLIC INFRASTRUCTURE STRATEGY

- Parking
- Public transport
- Accessibility
- Energy sharing (between projects)

PROMOTION OF BROWNFIELD DEVELOPMENT

Layout

- Site Layout

HERITAGE STRATEGY

- Informed/Sensitive heritage infill

NATURAL LANDSCAPE STRATEGY

- Use of existing site topography
- Ecology/Habitat
- Natural systems environment
- Biodiversity
- Water Managament - SUDS

URBAN MASSING/HEIGHT STRATEGY

- Where applicable respecting historic context with complementary contemporary massing
- Appropriate development density

SITE ENERGY STRATEGY

- Efficient low-energy site energy strategy
- Allow for potential of positive energy exchange in future
- Site services distribution
- Priority for solutions with low servicing costs
- Consider potential for district heating

UNIVERSAL DESIGN

MOBILITY AND SITE SERVICING STRATEGY

- Optimising and prioritizing the pedestrian and cycle realm
- Accommodating desire lines from public transport with integrated cycle mobility, parking and EV charging
- Strategy to minimise vehicle parking
- Strategy to minimise vehicle parking/vehicle storage in open spaces, in context of proximity to public transport
- Integrate requirements for occasional service & emergency vehicles over shared, managed surfaces

GREEN/BLUE INFRASTRUCTURE

- Accommodating changing water cycles, attenuating & harvesting
- Landscape integrated sustainable drainage (Consider wet and dry conditions - aesthetics, function, maintenance)
- Minimise engineering driven below ground storage solutions

DENSE REGENERATION

- Refurbishment and new build integration

PRIORITY FOR CLIMATE RESPONSIVE PASSIVE DESIGN

- Massing and facade/envelope atuned to sun and wind paths
- Seek to minimise carbon footprint of the development in the choice of materials and energy systems
- Thermal mass/wall build-ups and systems; daylighting; impact of terraces/decks
- Promote efficient low energy solutions to exceed minimum regulatory requirements

RELATIONSHIP TO BOUNDARIES

- Active street edges
- Access/entry
- Entrance thresholds configured to promote safe access for residents
- Boundary treatment

URBAN CONNECTIVITY THROUGH SITE

- Creating a connected and permeable neighbourhood
- Enhance neighbourhood permeability
- Create a coherent network of interlinked routes and meeting places
- Sheltered resting places

PLAYSCAPES

- Indoor and outdoor

Layout
- Block Layout

TYPOLOGY TYPES VARIED

- Support Smart Aging: Offer homes to accommodate changing needs over time/ multi-generational mix
- Support Urban Inclusivity: Offer an accessible inclusive living environment that caters for all ages and abilities
- Provide a mix of home typologies to support a diverse group of residents
- Standardised variation – link to modularisation/ structural system

SHARED SERVICES/FACILITIES

- Provide quality internal and external shared facilities, encouraging social interactions and community cohesion
- Quality internal circulation spaces
- Entrances
- Laundry Facilities: Provide secure access, consider opportunities for enclosed/ protected drying spaces (private or communal)
- Other (kitchen, event space etc)
- Encourage shared responsibility through design

OPEN SPACES STRATEGY

- Offer Inside/outside spaces for community interaction
- Programmed uses, temporary event space/uses (eg: markets)
- Configure spaces to provide passive surveillance
- Relationship to dwellings – influence on energy (buffer spaces)
- Maximise roof scapes

EFFICIENT PLANNING/ STRUCTURAL STRATEGY

- Efficiently planned site massing & home layouts, with repetitive planning layouts: to facilitate prefabrication
- optimizing structural spans
- optimizing service runs/risers

BLOCK DESIGN

- Block depth
- Modularity (costing balance)
- Walkways
- Circulation/socialisation
- Cores efficiency

RETROFIT

- Baseline - establish clear baseline of existing
- Efficiency – inventive use of existing features

PRIVATE/PUBLIC TRANSITIONS

UNIVERSAL DESIGN

- Access and Approach to Buildings
- Wayfinding

Layout
- Unit Layout

EFFECTIVE SPACE PLANNING

- Relationship to adjacent & external spaces
- Fire safety constraints
- Kitchen Layout: Quality; ergonomics
- Bathroom layouts
- Optimise Storage Units – proportions and uses
- Quality of Sleeping Spaces
- Living Spaces: Balancing Efficiency and Qualitative aspects
- Universal design considerations

ADJUSTABLE FLEXIBLE LAYOUTS

- Adaptable within structural strategy/services strategy
- Standardized variation
- Allowing for adaptability of units over time accommodating changing needs of residents
- Location and extent of structural bearing walls within units (soft party wall?)

PRIVATE AMNENITY SPACE

- Standardization
- Shelter
- Private spaces engaging public space

NATURAL DAYLIGHTING STRATEGY

- Optimise the number of dual aspect units with choice of views/aspect
- Optimise qualitative aspects of natural daylighting within units by maximising floor to ceiling heights

VENTILATION/AIR QUALITY

- Optimise natural ventilation: maximizing high ceilings and promoting suitable options for use through all seasons
- Materials to promote Health & Wellness - non-toxic/non-off gassing material options

Materials

- Materials

DURABILITY OF MATERIALS

» Provide robust, low maintenance, long life materials

INDOOR AIR QUALITY

» Materials to promote Health & Wellness - non-toxic/non-off gassing material options

STRUCTURAL SYSTEMS

» Optimise modularity/spans/ depths
» for flexibility & efficiency
» link to embodied carbon
» services integration

STANDARADISED VARIATION

» Simple construction palette that enables variation

RAPID CONSTRUCTION

» Accommodating value in cost plan

MODULAR

SIMPLE ECONOMIC PALETTE

SUSTAINABLE BUILDING MATERIALS

FABRIC FIRST APPROACH

BUILDING ELEMENTS INTEGRATING VEGETATION

EMBODIED CARBON

» What stages are embodied carbon tests useful?
» Relationship to cost
» Minimise waste
» Circularity

LIFECYCLE COSTS

» Durability
» Design for disassembly
» Minimize services

CIRCULARITY

Occupation

- In Use

ADAPTIVE BEHAVIOUR OF OCCUPANTS

UNREGULATED LOADS

LIFECYCLE COSTING – INFLUENCE

MONITORING IN USE

SERVICES REFINEMENT POST OCCUPATION

POST OCCUPANCY EVALUATION

WELLNESS BENEFITS

SOFT LANDINGS

ADAPTATION

EVOLUTION

Case Study Projects

STRATEGY

Case Study 01
St Kevin's Hospital, Cork

Case Study 02
Wohn Projekt, Vienna, Austria

Case Study 03
Inchicore Housing, Dublin

Case Study 04
ZWEI Plus, Vienna, Austria

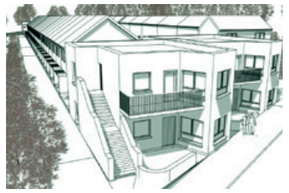
Case Study 05
Merchant's Road, Galway

LAYOUT

Case Study 06
Castlelands, Dublin

Case Study 07
Cherry Orchard Point, Dublin

Case Study 08
The Weir, Whitestown Way, Dublin



Case Study 09
Merlins Woods, Galway

MATERIALS

Case Study 10
Shanganagh, Dublin

Case Study 11
Curragower Corner, Limerick

Case Study 12
Sonny's Lands, Limerick

Case Study 13
Marx Dormoy Apartments, Paris, France

DELIVERY

Case Study 14
Emmet Road, Dublin

Case Study 15
Railway Court, Dublin

Case Study 16
DeFlat Apartments, Netherlands

ZWEI Plus, Austria. ©H-Hurnaus

Strategy

Strategy led decisions early in the project life hold significant importance, embedding and discounting opportunities in the project trajectory. These decisions lay the groundwork for the entire project at the scale of the specific site and the wider community.

The planning framework, facilitated by policy/plans and the client through their brief definition, carries large influence in shaping future project ambitions and decisions. Ideally, both components should be robust, ambitious, and reflective of the values, goals, and narratives of the wider community and country.

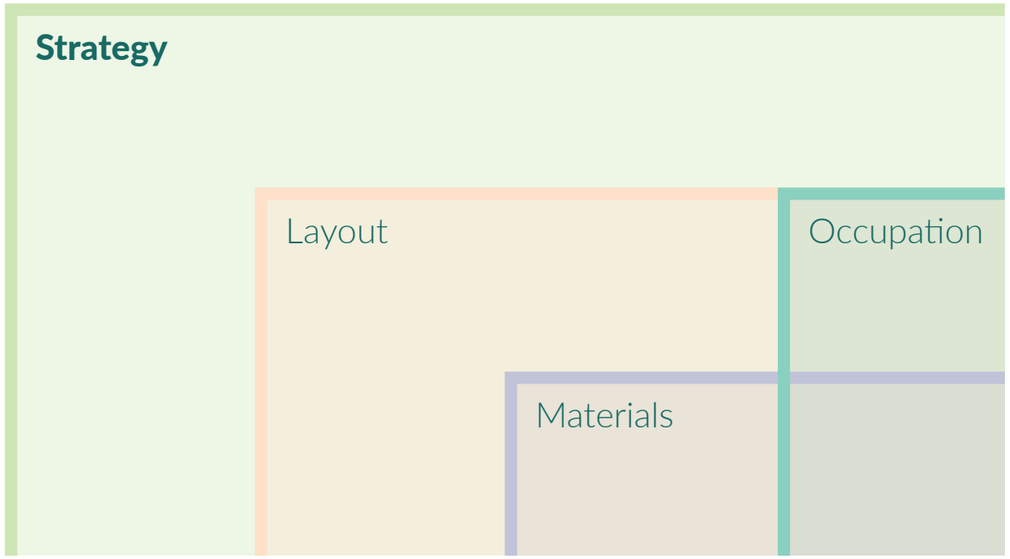
Examples of effective strategies may encompass mechanisms to incorporate community facilities, live-work units, cultural, and mixed-use aspects in projects. Strategies that balance commercial viability with mixed-use considerations and explore value and efficiencies in brief-making through early client engagement are exploratory. Initiatives that enable local community activities, promote clean and affordable energy sources, and facilitate participatory democratic processes in brief-making contribute to holistic and sustainable decision-making.

Considering a long-term perspective for a project's goals, especially regarding social and sustainable objectives, is imperative. The genuine value of these objectives unfolds over time, emphasising the importance of a monetary budget that accommodates this extended view.

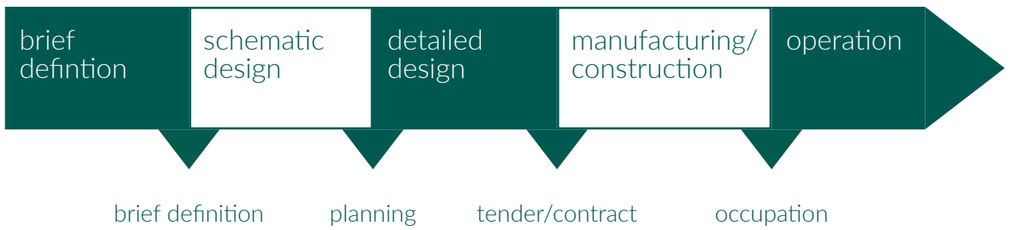
In this section, the aim is to showcase building examples that demonstrate social and sustainable ambition through the reuse of buildings, mixed-use facilities, and strong quality brief making. Austria is turned to for strong examples of strategy decisions that place the community and alternative social models at the heart of the project.

Contributions from AHB Respond provide insights into potential Irish models, emphasising community values in cost rental buildings. Waterford City and County Council effectively utilises existing policies for city centre regeneration, and IGBC speaks to the future landscape of green public building procurement.

TYPICAL PROJECT TIMELINE



Project Life



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PROMOTION OF BROWNFIELD DEVELOPMENT

Shanganagh, Dublin.

Article 01 - How can we create sustainable communities?

Author: Bob Jordan, CEO, The Housing Agency

What are sustainable communities? They are places where people want to live and work, with access to green spaces, cycling infrastructure, jobs and affordable housing. People across income levels and tenure must be able to live in the same areas, staying connected to their roots or creating new ones. Sustainable communities grow while being sensitive to and respecting their heritage and environment.

Planners and policymakers must prioritise housing that is affordable and inclusive, supported by strong public transport and amenities. Residents must be engaged and participate in helping to shape their neighbourhoods. Among social housing tenants this means that good tenant engagement processes are in place.

The Housing Agency has a key role in promoting sustainable communities, by supporting the development of apartments that will be sold to owner occupiers through the Croí Cónaithe (Cities) scheme and those that will be provided at affordable rents through the Secure Tenancy Affordable Rental (STAR) Investment Scheme. The Housing Agency also works with local authorities to revitalise vacant properties through the Croí Cónaithe (Towns) scheme.

In addition, the Housing Agency supports the Cost Rental model, where rent is based on the cost of financing, constructing, managing, and maintaining the property rather than on open market rents. It is a more sustainable model of providing rental housing and there are already many excellent schemes in Ireland. The Housing Agency also supports local authorities with the Local Authority Affordable Purchase Scheme, which assists first-time buyers in areas where there are affordability challenges.

The type of housing that we deliver must reflect changing demographics. Trends in Ireland show that household size is falling, which is likely to continue in line with other developed countries. Social housing waiting lists show that most households are composed of one or two people. This means we need to shift the focus away from traditional three-bedroom semi-detached houses.

Climate mitigation measures and a growing demand for housing will require a change in how we live, with a requirement for greater densities in our towns and cities. While this transition will be challenging, it will improve our quality of life by reducing urban sprawl, commuting times and car dependence. It will also make our neighbourhoods more climate resilient and protect future generations.

01

St Kevin's Hospital, Cork

ARCHITECT NAME:
Reddy Architecture + Urbanism

PROJECT CLIENT:
LDA

LOCATION:
Former St. Kevin's Hospital, Shanakiel, Cork

DWELLING TYPE:
Apartments & Houses

TOTAL NOS:
265

TENURE MIX:
23% Social, 28% Cost Rental, 48% Affordable

TYPE MIX:
46 no. 3 & 4 bed townhouses/108 no. Duplex units (54 no. 2 bed lower units, 36 no. 3 bed upper units & 18 no. 4 bed upper units)/51 no. walk up apartments (1 & 2 beds)/60 no. 1 & 2 bed apartments in the repurposed St Kevins Hospital

SITE SIZE:
4.3 Ha

PLOT RATIO:
0.58

FUNDING TYPE:
LDA funded

DELIVERY TYPE:
Phase 1 - Design and Build

PROJECT STATUS:
On site

SUSTAINABILITY TARGETS:
All buildings to comply with TGD-Part L.

CONTRACT TYPE:
Phase 1 - Design and Build

Description

The St. Kevin's Hospital in Cork, managed by the Land Development Agency, demonstrates innovative approaches to affordable housing design. It distinguishes itself by integrating existing historic structures through adaptive reuse principles, reducing environmental impact and preserving cultural heritage.

This project prioritises multigenerational living, offering a diverse mix of unit types, from one-bedroom apartments to four-bedroom houses, fostering an inclusive community where different housing tenures coexist without segregation. The adaptive reuse of the former chapel into a co-working space further reflects modern lifestyles and promotes community engagement.

Early strategic decisions have influenced the project's character and impact. The efficient space utilisation addresses the site's challenging topography. Preservation of natural features, pedestrian-centric design, and the inclusion of innovative elements like rain gardens not only enhance the project's sustainability but also improve the overall quality of life for residents.

The project targets an efficiency rating and incorporates advanced heating systems, including heat pumps, and provides electric car charging points to minimise the carbon footprint. Efficient lighting, low-flow water rates, and energy-efficient white goods are also utilised.

In terms of materials and construction, the project utilises Building Information Modelling (BIM) from the design stage, streamlining planning, design, and coordination, reducing potential errors and improving construction efficiency. The use of durable and robust materials ensures long-term performance, offering a sustainable and low-maintenance solution.

Rendering, Pedestrian Centric design prioritised.

Project Focus 1:

Strategic Decision: Adaptive Reuse of Existing Buildings

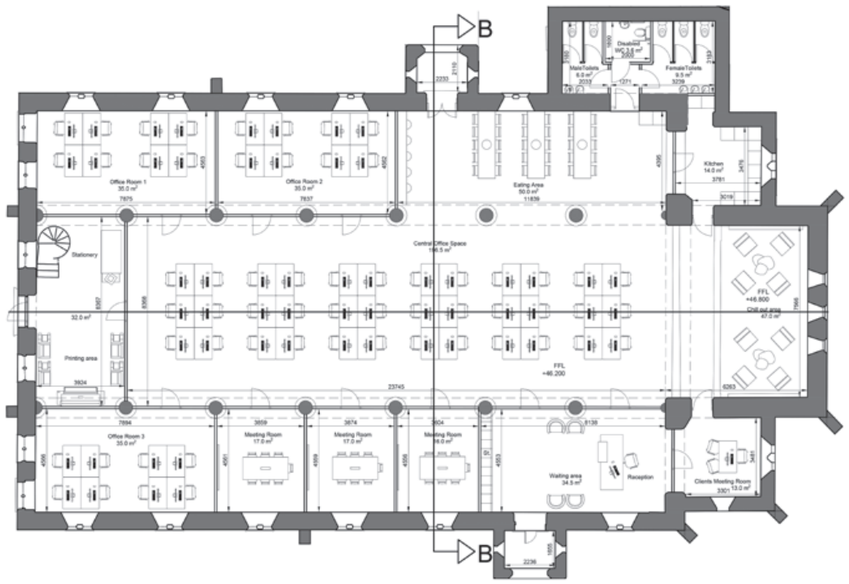
In St Kevin's Hospital in Cork, the adaptive reuse of existing buildings plays a pivotal role in reshaping the site and creating a vibrant, contemporary community. Early strategic decisions were made to integrate the historical structures on the site into the master plan, repurposing them for modern uses while preserving cultural heritage.

For instance, the former St. Kevin's Hospital, a Victorian building is being redeveloped as a contemporary apartment building. The design centered on units that surrounded two central cores containing shared utilities and services, with double-loaded corridors, optimising space efficiency within the building. Additionally, sky bridges were added to provide entrances to the north side of the building, offering residents alternative paths and unique views.

This strategy allows the development to blend the old and the new, maintaining the historic building's identity while creating a modern living space.

A key feature of the adaptive reuse strategy is the creation of a shared working space within the repurposed Chapel. This co-working space caters to changing lifestyles, remote work trends, and will foster a sense of community among residents.

Furthermore, the adaptive reuse strategy had an embodied carbon advantage, as it contributed to the reduction of carbon emissions associated with the construction of new structures. The decision to integrate these existing structures into the new development not only provided unique and characterful spaces but also minimised waste and promoted recycling, in line with circular economy principles.



Plan of repurposed Chapel for use as shared working space.

Project Focus 2:

Strategic Decision: Embracing Challenging Topography

At the core of St. Kevin's Hospital In Cork was a deliberate and strategic decision to fully embrace the site's challenging topography. This early strategy set the stage for a site design that made the most of the natural terrain.

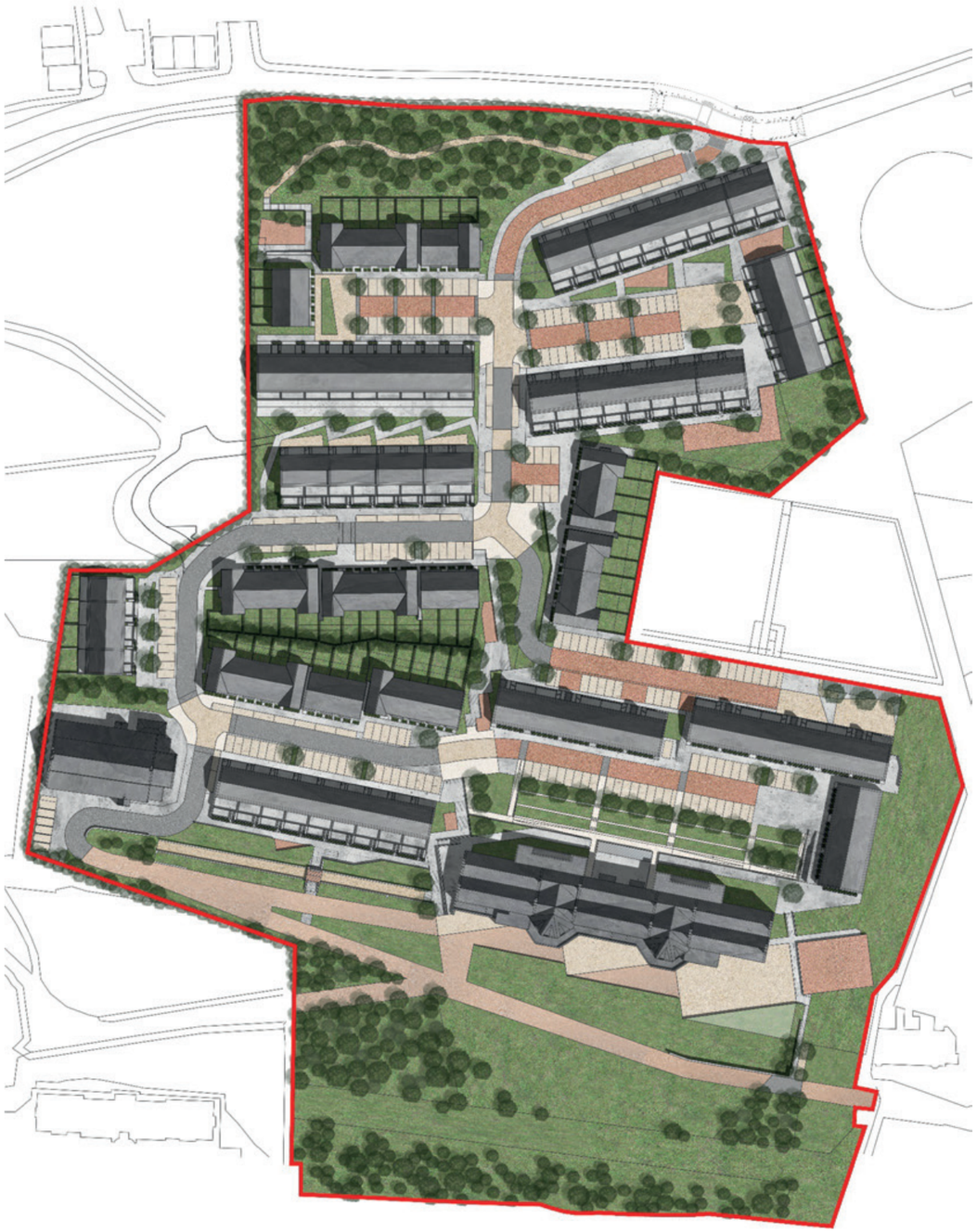
A notable example of this strategy was the thoughtful design of units to effectively leverage varying site levels. The walk-up apartments, situated at the rear of St. Kevin's Hospital, were purposefully set back to ensure sunlight reached the central homezone court. These apartments cleverly utilised the sloping topography to create a split-level arrangement, allowing upper apartments to be accessed from the northern side and lower apartments from the southern side. This choice creates an active frontage on both the front and rear sides of the apartment block.

The development also features two types of duplex units, A and B, with Duplex B designed specifically to navigate the steeply sloping site. Throughout the development, these duplex units are directly accessed from homezones, connected by a landscaped path between blocks, ensuring easy movement. This design not only creates active edges on both sides of the duplex units but also enhances the streetscape and ensures privacy through set-back planters, terraces, and changes in level.

The walk-up apartments, designed to be dual-aspect units, promotes passive overlooking of streets on both sides, reinforcing the sense of community and safety.

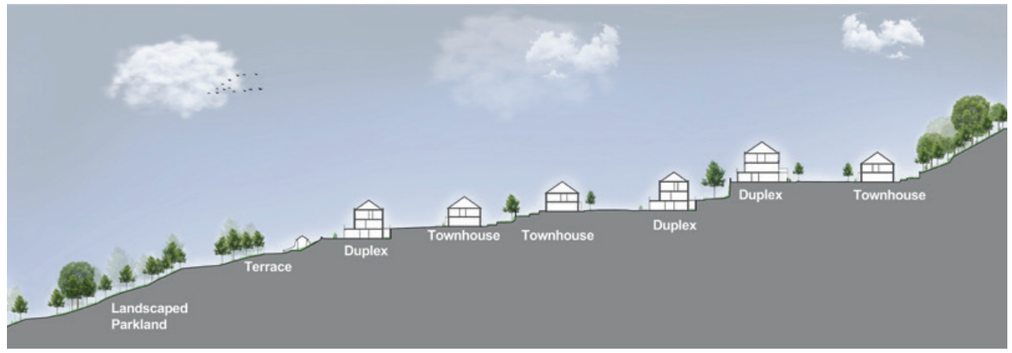
Townhouses in the centre of the site effectively use the change in level to introduce light into the rear of the northern block while preventing direct overlooking of gardens, showcasing another strategic approach. Even when some townhouses are in closer proximity on the western end of the central block, the difference in levels and oblique orientation worked effectively to reduce back-to-back overlooking.

This early strategic decision to embrace the site's topography served as the cornerstone for a site design that skillfully addressed the challenges, providing a practical and efficient layout. The incorporation of features like rain gardens and the pedestrian-centric design strategy further elevated the project's overall sustainability and community-friendliness.



Site plan.

Contextual elevation with repurposed chapel in foreground.



Site sections.

Article 02 - Integrating an Urban Village Placemaking Approach within the Irish Cost Rental model

Author: Respond

Access to quality, affordable housing in Ireland continues to be the key policy issue of major concern. Respond is strongly committed to increasing the national housing stock through direct construction and, as a service provider we are also committed to supporting communities and providing services and supports for those most in need.

Respond were among the first Approved Housing Bodies (AHBs) to deliver Cost Rental homes. Cost Rental is a housing model where the rent charged to tenants is based on the cost of constructing, managing and maintaining the homes. The success of this tenure is crucial in responding to the needs of many households who do not qualify for social housing supports and find it hard to access affordable housing within the private sector. Respond are now scaling up delivery of both social and Cost Rental homes with new large-scale mixed-tenure developments. Located throughout Dublin, they will feature an approximate 50:50 split between Cost Rental and social homes. Future housing schemes may include additional tenures (albeit Respond may not be the provider of those homes), fully integrating communities with a more diverse range of incomes and circumstances.

About Respond

Respond, a construction-led Approved Housing Body and service provider, has been working all around Ireland for over 41 years. Our vision is that every family and individual in Ireland will have high-quality housing as part of a vibrant and caring community. Housing and decent accommodation, in the areas where people want to live, are central to improving people's lives and enhancing the health and well-being of society.

Respond's Urban Village Placemaking Approach

By integrating social and Cost Rental homes, we create diverse, inclusive communities. Respond offer both social and Cost Rental homes as 'lifetime homes' providing tenants a secure and affordable long-term tenancy. This means we have a long-term commitment to tenants, and the wider communities, ensuring our homes and services are sustainable for the future.

Working from an Urban Village Placemaking Approach, these large-scale developments will have Respond staff based on site. The role of the Housing team in Respond is to provide a high level, professional service to all our tenants. We have been working with the Centre for Effective Services (CES), developing a new housing management service for tenants to support vibrant and diverse communities. Our work in these communities will include:

- getting tenants involved and giving them the support they need,
- developing and improving public spaces,
- helping people feel connected to their community and;
- working with local businesses and stakeholder groups.

Respond's Urban Village Placemaking Approach focuses on creating small, integrated neighbourhoods within larger urban areas. These "urban villages" are designed to be pedestrian-friendly, diverse and self-contained, with a mix of residential, commercial and public spaces. The key characteristics include:

HUMAN SCALE:
Designed to be walkable and human-scaled, meaning they are built to a size and scale that feels comfortable for people, rather than for cars or large-scale infrastructure.

MIXED-USE DEVELOPMENT:
These areas typically combine housing, shops, workplaces, parks, and recreational facilities in close proximity. This mix encourages a vibrant street life and reduces the need for long commutes.

COMMUNITY FOCUS:
Public spaces, like squares and parks, are central to the design, encouraging social interaction and community activities.

DIVERSITY AND INCLUSIVITY:
We include different types of homes for different people. This way, everyone can live alongside each other.

SUSTAINABLE DESIGN:
We focus on being eco-friendly. We build energy efficient buildings and green spaces. We encourage walking, cycling and using public transport.

Looking to future generations and the 'Brain Health Village' model

Developing on the Urban Village Placemaking Approach, and in consideration of global and national changing demographics and ways of living and working, we are currently developing a framework for supporting a 'Brain Health Village'. The Brain Health Village is a 'proof of concept' project which aims to show that by providing high quality housing and practising excellent community development (promoting creativity, health and social connectedness) that there are long term benefits for brain health. This underpins our focus to develop our housing and services model to encompass a 'whole life/multi-generational' approach to housing and community and, to effectively understand and respond to what this means for future placemaking.

This innovative project has emerged as a result of a partnership between Respond and the Global Brain Health Institute (Trinity College Dublin (TCD)). The partnership between GBHI and Respond aims to examine our understanding of brain health and how it can be applied to housing design and to the provision and development of sustainable communities. The project is currently within the pilot phase and is being developed with the principles of 'co creation' with the local community and experts in brain health, housing and, community and social services.

Elanora Court, Long Mile Road, Dublin.

02

Wohn Projekt, Vienna, Austria

CLIENT:
Schwarzatal Gemeinnützige Wohnungs- und Siedlungsanlagen-GmbH

PROJECT MANAGEMENT AND CONSTRUCTION SUPPORT:
raum & kommunikation GmbH

ARCHITECTURE AND PLANNING PARTICIPATION:
einszueins architektur

RESIDENTIAL GROUP COMPONENT:
Wohnprojekt Wien – Verein für nachhaltiges Leben

STATICS/BUILDING PHYSICS:
RWT PLUS ZT GmbH

BUILDING TECHNOLOGY:
Woschitz Engineering ZT GmbH

OPEN SPACE PLANNER:
DnD Landschaftsplanung

GENERAL CONTRACTOR:
Swietelsky GmbH

View of development with communal gardens in foreground ©Hertha Hurnaus.

Description

Under the working title “Living with us,” a residential home adjacent to Bednar Park was constructed, comprising 40 residential units, commercial space, and communal rooms. The focal point of the project is the self-managed community, Wohnprojekt Wien, advocating for a sustainable lifestyle in Vienna.

The community comprises 67 adults and 25 children, representing diverse generations, languages, cultures, and professions, embodying a new way of living in the city. The vision extends beyond conventional boundaries, embracing social, ecological, and economic sustainability.

Innovative sustainability measures, including low-energy standards, a photovoltaic system, communal shopping, a neighbourhood vegetable garden, and robust mobility solutions, characterise the project. The inclusive design ensures that communal spaces, events, and commercial ventures contribute to the local neighbourhood’s vitality.

Unit sizes range from 35 m^2 studios to 150 m^2 shared apartments, fostering a high level of individualization within the building envelope.

Common and commercial spaces, including a bike repair workshop and communal kitchens, are managed by residents, creating a vibrant ground floor. Electric vehicles, a weekly market, and communal gardens contribute to community life. There was a participatory design process which extended the brief to include to car sharing, communal gardens, and culminates in the common ownership of the building, promoting active resident participation in all stages of development.

Wohnprojekt Wien achieves near passive house standard and has very low energy consumption. It is connected to the (Vienna wide system of) district heating. Currently 35 children are living in Wohnprojekt Wien.

Project Focus 1:

STRATEGIC DECISION: Community-Driven Development: Participatory Planning, Shared Spaces, and Local Enterprise

The project evolved through a participatory approach from its inception, led by a founding group of 15 members. There was no external mandate or client; instead, the group independently shaped the entire building, encompassing design and programming aspects.

Embracing self-organisation and participation, the project followed a grassroots democratic approach. The process was highly intensive throughout, operating on three levels: collective decisions were made by the entire group for the project, a dedicated working group addressed architectural queries, and individuals had autonomy in deciding the specifics of their own apartments.

The project's building design reflects a commitment to sustainability, individualisation, and community engagement. The architectural design serves both community and individual needs across six residential floors. A central staircase and air spaces facilitate spontaneous communication, while a flexible floor plan allows for diverse living arrangements. The heart of the project lies in common areas on the ground floor and basement, including a communal kitchen, children's playroom, flex rooms, and workshops.

The self-managed car sharing and the large bicycle room on the ground floor, with a workshop and cargo bikes, enable sustainable mobility. A solidarity fund, supported by the group, aids those in social need and cushions cases of hardship in the community. Workshops, lectures, festivals, and sports activities in the event room and courtyard, which can be rented externally, create a unifying effect in the surrounding area. "The Salon am Park", run by eight residents, and other commercial spaces on the ground and first floor contribute to the "Grätzel" infrastructure, enliven the ground floor area, and enable living and working to be combined in one house.

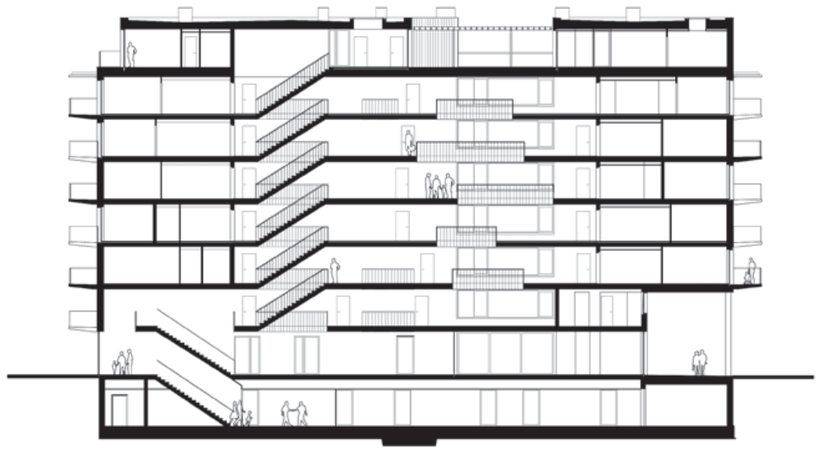
The rooftop, a shared space, features a sauna, library, guest rooms, and a roof garden, offering a peaceful retreat. This diverse range of space relieves the burden on individual living space, which can be more compact, and offers space for active neighbourhoods and interacting communities.

Presently, the self-organised tenants' group follows sociocratic principles, prioritising collaborative decision-making over traditional voting in the day-to-day operations of the building. The community's collective goal is to live sustainably and collaboratively within the city.

Financially, the funding structure relies on membership and asset pooling to ensure enduringly low housing costs. Residents, committed to long-term investment, actively engage in financial management and maintain a 10% liquidity fund for building maintenance.

Additionally, residents contribute to a fund supporting social care, with two housing units serving as a refuge for those in need. The advantage of a comparatively large co-housing organisation lies in its capacity to sustain a funding structure that smaller groups might find challenging to implement.

Axonometric view.



Cross section.

Top floor plan - apartments/roof access.

Typical floor plan - apartments.

Ground floor plan - entrance/community facilities.

Lower level floor plan - community facilities.
Floor Plans

View of shared common space for residents. ©Hertha Hurnaus

03

Inchicore Housing, Dublin

ARCHITECT NAME:
OBFA Architects

PROJECT CLIENT:
CVHA, DCC, Alone, HSE

LOCATION:
St. Michael's Estate, Inchicore, Dublin 8

DWELLING TYPE:
Apartments, with shared external amenity spaces

TOTAL NOS:
52 No. apartments

TENURE MIX:
Housing with Supports – managed by Circle Voluntary Housing Association (CVHA)

TYPE MIX:
16 x 2-bed apartments and 36 x 1.5 bed apartments. Communal facilities at ground floor level to include a multi-purpose room, additional ancillary spaces and a publicly accessible tea room

SITE SIZE:
4655 sq m

PLOT RATIO:
0.58

FUNDING TYPE:
Capital Assistance Scheme (CAS)

DELIVERY TYPE:
CWMF

PROJECT STATUS:
Stage 4 Construction

SUSTAINABILITY TARGETS:
nZEB, Design Manual for Quality Housing Jan 2022, with wider context aligned to EU's Bristol Accord on Sustainable Communities in Europe (2005)

CONTRACT TYPE:
CWMF

Description

Inchicore Housing, comprising of 52 units is a demonstrator Elderly Housing with Supports Scheme at St. Michael's Estate, Inchicore. It stands as Ireland's inaugural citizen-led elderly housing initiative, developed for Circle Voluntary Housing Association in collaboration with Dublin City Council, Alone & The Health Service Executive (HSE). The project is informed by best practice studies for 3rd Age housing.

Situated on the periphery of Inchicore village, the scheme maximises green spaces through private and shared outdoor courtyards. The central concept is to establish a village atmosphere oriented around courtyards, offering varying degrees of privacy. The entrance is public, allowing residents and the community to access the space, meet visitors, utilise support rooms, and contribute to the public realm's future expansion along Emmet Road.

Strategically positioned, communal areas aim to foster visual and physical connections to the surrounding environment, encouraging interaction between residents and the broader community. Prioritising natural light, these spaces offer views of the new public realm while connecting with the historic Richmond Barracks and St. Michael's Estate.

Communal areas serve various functions, acting as a central hub for residents, fostering social interaction, and nurturing a strong sense of community. They encourage residents to connect with each other and engage with the local community, providing a base for vital support services and staff to operate effectively. An integral part of this design is the inclusion of a publicly accessible tea room, promoting interaction with the local community.

A strategy for pedestrian and vehicular access was also required for safety and security management as this area of Inchicore develops and expands. The project's scale is significant in terms of adjacent buildings - Thornton Heights, Connolly Avenue, and Richmond Barracks, considering the future masterplan and development of Emmet Road.

Rendering of proposed development in context, with Richmond Barracks to the left of the view.
©OBFA Architects

Site layout plan. ©OBFA Architects

East elevation. ©OBFA Architects

West elevation. ©OBFA Architects

Project Focus 1:

STRATEGIC DECISION: Innovative Partnership Model: Shaping Design through Shared Knowledge and Occupant Consultation

Carefully selected after years of community input, the site's history is rich and purposeful. Originally part of the historic Richmond Barracks complex dating back to 1810, it was later donated to Dublin Corporation, the predecessor to Dublin City Council.

In 1969, the site's mission was to address inner-city overcrowding, leading to the design of high-rise residential accommodation. However, by the 1970s, high unemployment created challenges, and residents expressed their affection for the location but dissatisfaction with the housing.

Responding to community desires, a new scheme emerged, emphasising ample, low-rise accommodations within shared outdoor courtyard spaces, making efficient use of the area. Innovative partnerships played a pivotal role in shaping the project's strategic design, uniting the city through Dublin City Council, Approved Housing Bodies via Circle Housing Voluntary Association, and involving the Health and Wellbeing Strategy managed by HSE. Specific 3rd Age housing needs were addressed through Alone.

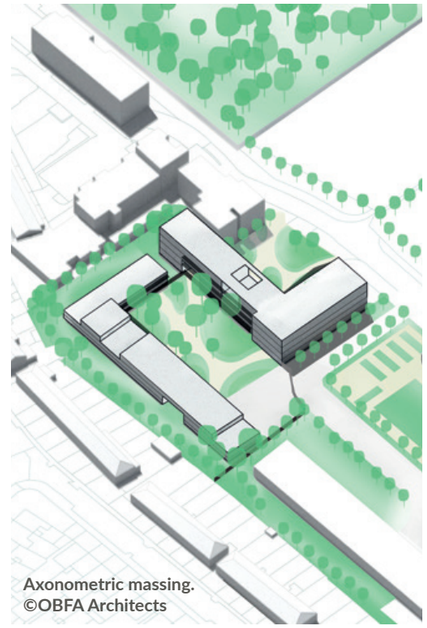
The partnership model, the first of its kind in Ireland, combines the skill sets of the client group, Local Authority planning strategy, historical local knowledge through Dublin City Council, health strategy through the HSE (also serving as an adjacent neighbour on the site), Alone's experience with the complex and changing needs of 3rd Age, alongside Circle Voluntary Housing's direct tenant liaison for the scheme.

Drawing inspiration from international best standards and exemplar partnership models in the UK, the design consultation process, while extensive, contributes to a significantly improved long-term design. This model ensured that the supports required for quality elderly housing were identified and contracted before the design stages began.

OBFA Architects explored site layouts, respecting the local context and the site's historic significance. Open courtyards with minimal massing ensure residents can enjoy the westerly light. The neighbouring 1940s housing structures, all two-storey, were also considered, along with access and egress pathways designed to encourage residents to utilise the HSE garden space.

Extensive consultation with residents informed unit layouts and supporting spaces. The consultations shaped the brief, aiming to create adaptable designs that cater to changing needs as occupants age. The project's goal is to provide independence, privacy, and shared spaces for communal activities and socialisation.

Guided by the partnership groups, the consultation process resulted in a tailored brief for units and supporting spaces, addressing directly the sociability, family, hobbies, and physical requirements of the residents. This ensures that the apartments remain flexible, accommodating evolving physical and mental needs as residents age.



Axonometric massing. ©OBFA Architects

Article 03 - Urban Vacancy - Policy and Mechanisms

Author: David Quinn, Waterford City and County Council

Waterford City and County Council (WCCC) received a €9M allocation under the Urban Regeneration Fund (URDF) Call 3 to tackle long-term vacancy and dereliction. Announced in January 2023 Call 3 supports key objectives in Housing for All and Town Centre First in specifically addresses long term vacancy and dereliction across URDF eligible cities and town. Within County Waterford the URDF centres are Waterford City, Dungarvan and Tramore.

Distinct from previous URDF calls, the third-round acts as a dedicated revolving fund within each local authority designed to address the financial barrier and risk faced by local authorities in seeking to address long-term vacant and derelict properties in URDF centres. The fund will be replenished from the proceeds of sale allowing a local authority to establish a rolling programme to tackle long-term vacancy and dereliction without a requirement for borrowing and the associated financial risk.

It is envisaged that Call 3 will act as a broader tool for the activation of long term vacant and derelict buildings which would not be appropriate or suitable for social housing schemes. It will focus on tackling properties which are either not on the market for sale or to which the market has not responded to in an act to prevent unnecessary interventions and mitigate against any risk of adding to property price inflation.

The allocation of funding received by WCCC followed a comprehensive submission to the Department of Housing, Local Government and Heritage (the Department) where 132 derelict and long-term vacant sites/properties were identified for potential inclusion in the scheme. Of the 132 properties identified WCCC were initially given approval from the Department to pursue 77 properties in 2023 and an additional 53 in 2024.

The first action taken by WCCC in relation to URDF Call 3 was to set up a dedicated whole of local government team to administer the fund. This team provided for a planned, systematic and proactive approach to bringing vacant and derelict properties back into active use primarily for residential purposes across Waterford's URDF Centres. The team is comprised of staff from the Planning, Property Management, Housing, Economic Development and Finance Departments. Vacancy and dereliction not only affect housing supply but also vibrancy and vitality and the ability of people to live in our cities, towns and villages.

The Government's Compulsory Purchase Order (CPO) Activation Programme was launched in conjunction with URDF Call 3 to tackle long term vacancy and dereliction. WCCCs targets for 2023/2024 Activation Programme was 75 – properties to enter the programme and to commence 40 – CPOs.

To deliver on Call 3 and the above CPO targets the team firstly attempted to identify the owners of the approved 77 properties. If the owner could be identified the team proactively worked with them to see if the property could be brought back into active use in a collaborative manner. The team communicated and highlighted the numerous supports available to property owners in bringing derelict and long-term properties back into active use – some examples of these supports are The Vacant Property Refurbishment Grant/Croí Cónaithe (Towns) Fund - which offers up to €70K to renovate a vacant property, SEAI Energy Refurbishment Grants and Built Heritage Grants. A leaflet was produced which summarised all grants and schemes on offer and gave contact details of key personnel within the Council who were responsible for administering those programmes.

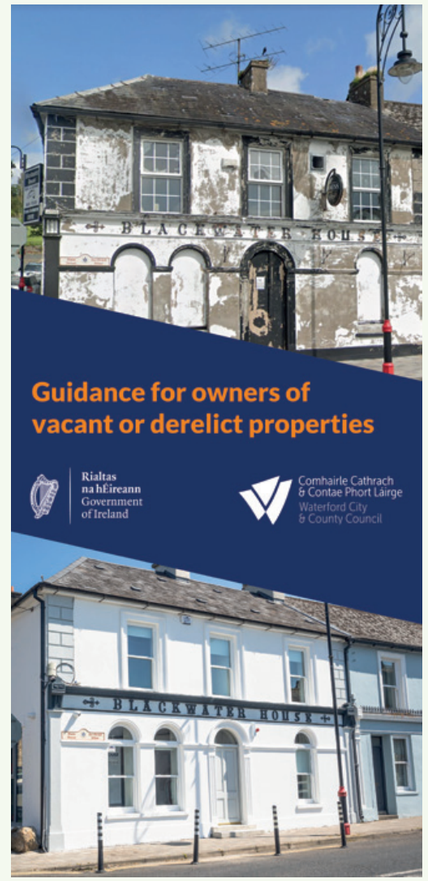
1. An obstacle that was identified for property owners with regards to selling these properties back on the public market was lack of title, multiple ownership and prolonged probate. The CPA process allows the Local Authority to clean title, offer compensation (market value) getting these properties back on the market for sale and back into active use.

From the initial 77 approved properties, 53 properties have been activated through collaboration or through market forces. The team have commenced the Compulsory Purchase Acquisitions (CPA) of the remaining 21 properties using the Derelict Sites Act 1990, (the Act) as amended, with the desire to place them back on the market for private sale.

One of the main obstacles to achieving success under URDF Call 3 programme is that Local Authorities are only funded for properties that have been pre-approved by the Department. This narrows the goal posts in terms of delivering on objectives of both the URDF Call 3 and CPO Activation Programmes. It also reduces the potential impact on delivering meaningful change to our key urban centres by bringing derelict and long-term properties back into active use. A more flexible approach could be applied in this instance. If a property is derelict, long term vacant (+2 years), on a local authority's derelict sites register and within a 10 min walking distance of the city/ town centre than it could automatically be approved for URDF Call 3 funding.

Currently the carrot and stick approach is working in relation to tackling dereliction and long-term vacancy. The threat of properties being compulsory acquired or levied at 7% of market value under the Act, coupled with the plethora of government grants available for bringing properties back into active use – primarily the Vacant Property Refurbishment Grant – is already delivering results in Waterford. The market is actively taking care of an increasing number of long term vacant and derelict properties. Auctioneers state that they are listing more of these types of properties on their books for sale with demand high and several properties going for more than asking price.

Ultimately the URDF Call 3 fund will help restore and transform the urban heart of many of our communities. It will provide more homes for people in sustainable locations, allowing them to live close to local services, amenities and employment. Making use of our existing buildings in a more efficient way makes clear environmental sense. The fund will complement the already excellent work currently being undertaken by WCCC's Housing Departments in delivering social housing in city/town centres. It will assist in creating balanced communities in our city and town centres by delivering much needed private housing.



04

ZWEI Plus, Vienna, Austria

SITE AREA:
5.780 m²

BUILT AREA:
2.885 m²

GROSS FLOOR AREA:
15.033 m²

FAR:
2,60

NET RENTABLE SPACE:
9.963 m²

UNITS:
128 + Wohngemeinschaft

AVERAGE UNIT SIZE:
77,84 m²

PARTNERS IN CHARGE, TRACTS 1&4:
Christian Aulinger, Mark Gilbert

COMPETITION:
Matthias Brandmaier, Joao Francisco Carolino

EXECUTION:
Matthias Brandmaier (Projektleitung);
Joao Francisco Carolino, Ricardo Oliveira, Thomas Pouilie, Michael König

PROJECT PARTNER:
einszueins Architektur (Plannnig and Execution, Tracts 2&3)

DEVELOPER:
ARWAG/ÖVW

View of courtyard space. ©H-Hurnaus

Description

ZWEI+plus secured first place in a 2014 open competition for its innovative intergenerational living approach. The submission featured carefully designed floorplans and a unique Cost Rental concept, with a focus on promoting harmony in multi-generational households.

Completed in 2018, the project is situated on the fringes of Vienna's "Norwegian Quarter" in the 22nd District, aligning with the city's mid-rise residential ward developed in the 1990s. The urban setting, marked by streets named after Norwegian cities, places the project at the T-shaped junction of Bergengasse and Stavangergasse, with Osloplatz square to the west and a lush park and Aspern Cemetery fields to the east.

Responding to the urban context and program requirements, the project features four offset, L-shaped structures forming interconnected courtyards. This arrangement provides a sense of closure in the existing street grid, defining the neighbourhood's edge. The courtyard's structure transitions between the city, buildings, and park, generating semi-private zones between the individual structures.

The four-building organisation allowed the two architects – "trans_city" and "einszueins" – to each plan one building for the project's two non-profit developers.

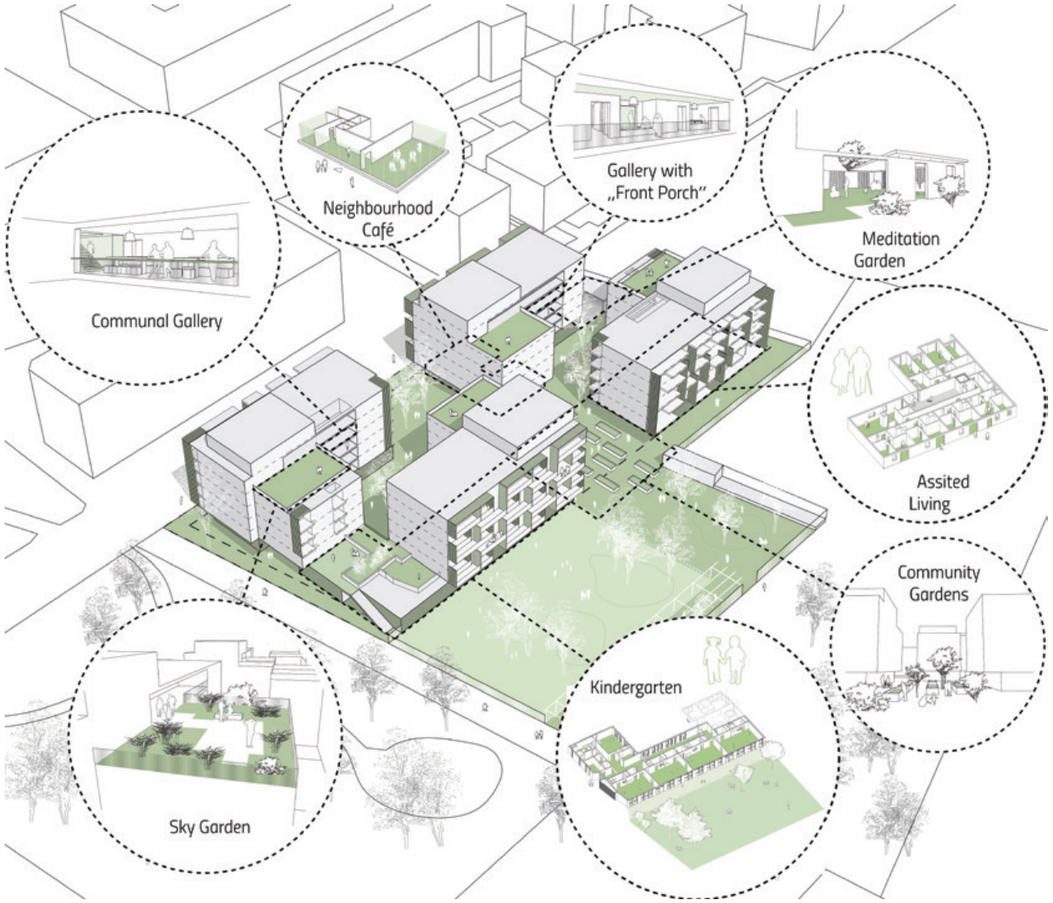
Facilitating intergenerational social networking, the project incorporates numerous community spaces distributed across the six floors. Ground-floor courtyards host a kindergarten, assisted elderly living units, a laundromat with a children's playroom, a community café, and a covered meditation garden. House entrances for each building open onto these semi-private green zones, creating a lively, socially active network of exterior spaces.

This interactive quality extends into the project's upper stories, with circulation organized into open, courtyard-facing galleries. Front-to-back apartments with front-porch-like verandas open onto these galleries, creating places to meet and chat. While the interior-oriented courts are both intimate and socially active, the outward-facing building fronts, furnished with well-sheltered private balconies, offer expansive views of the attractive surroundings.
The idea is that each of the estate's 128 apartments should connect to the community yet also possess a private side that quietly communes with its surroundings.

Aligned with Vienna's construction norms of the era, the buildings were made using semi-prefabricated concrete walls and floors. The facades were well-insulated and covered in two-tone stucco. Distinctive wooden details on balconies and ground floors contribute to the overall aesthetic, while a metallic-glazed finish on finely planed wood surfaces adds a warm and distinctive tactile quality to the architecture.

Site plan.

Sheltered private balconies on outer street facades. ©H-Hurnaus



Axonometric diagram with locations of community facilities provided in the development.

Project Focus 1:

STRATEGIC DECISION: Intergenerational Living Model

In Vienna, intergenerational living has changed dramatically in the last 100 years. The large, multigenerational houses of the late 19th century accommodated extended families under one roof. Mid-20th century houses embedded nuclear families into tightly knit neighbourhoods, in which familial generations could still live closely together. Contemporary housing, however, must contend with the 21st century's great diversity of household forms. In addition to this, it has also become increasingly difficult to find affordable accommodations near friends, trusted neighbours, or family relations. The current challenges of today's housing market make functioning intergenerational relationships ever more difficult to build and maintain.

What the city sought were fresh solutions for the theme; aside from a kindergarten with four classrooms, the competition brief was quite open. Project partners trans_city and ZWEI+plus developed a concept, which the city selected for the Stavangergasse site in Vienna's 22nd District. This proposal rested on three programmatic pillars.

The central innovation was to rent two separate units to a "tandem" of cooperating, intergenerational households. A tandem could be familial, for example: two independently living households of parents and children. Or an "elective affinity," in which two single parents with dependent children live in adjacent units. The idea is that the different generations can live in one estate – close enough for mutual support, but far enough apart for privacy.

Secondly, the project featured a diverse range of unit floor plans catering to various household sizes, accommodating both large and small families, couples, and singles with residences tailored to their specific needs. While most are self-contained apartments for separate households; others, so-called "all-smart" units, house different households within one flexible dwelling. Thus, two single parents can each have their own quarters, while sharing a more spacious living-dining room. Or a family can live together while having a separately accessible studio unit for an elderly parent. Workshops with architects, social consultants and tandems helped ensure an ideal fit in the choice of apartments.

Thirdly, the social consultants provided settlement management and an active programming for the estate's communal spaces. A cooperation between the kindergarten and the assisted-living centre brought children together with seniors; the social consultants also organised clubs and activities for the community café that also reached out to the adjacent neighbourhood. These and other endeavours helped form and solidify intergenerational networks, both within and among the tandems.


©H-Hurnaus

TYPICAL FLOOR 1:200

1 stairs & corridor
2 gallery
3 apartment
4 private „front porch"

Upper level floor plan.

INTERGENERATIONAL LIVING

1 guest apartment
2 rubbish
3 bicycles
4 meditation garden
5 ventilation garage
6 entry hall & stairs
7 foyer
8 community room
9 kitchen
10 office room
11 caretaker appartment
12 carriages & prams
13 passage
14 childrens playroom
15 laundry room

KINDERGARTEN

16 vestibule
17 foyer
18 garderobe
19 hall
20 classroom
21 toilettes
22 storage
23 activity space
24 director
25 personell
26 kitchen
27 carriages & prams
28 playground

Ground floor plan, with key to community facilities.

Sheltered Communal Entrance. ©H-Hurnaus

Community Room for Residents. ©H-Hurnaus

Article 04 - Green Public Procurement

Author: Irish Green Building Council

Green public procurement of homes is different to procurement of products such as stationery or uniforms. The onus is largely on the procurer and the design team rather than the contractor, because green performance of homes must be specified from very early in the design. Designing in sustainability is complex given the way each home interacts uniquely with everything from land use, resource use and material use to biodiversity.

The EU level(s) initiative now provides a common European framework for measuring a limited group of core sustainability indicators for buildings. It can be used in procurement from early concept design right through to building operation. It provides a standardised means of measurement, but no targets. Housing bodies should also be aware of the EU Taxonomy, a classification system for environmentally sustainable economic activities and investments, because funders such as the European Investment Bank may insist on compliance. Added to this are national requirements such as Climate Action Plan targets, plus compliance with building regulations.

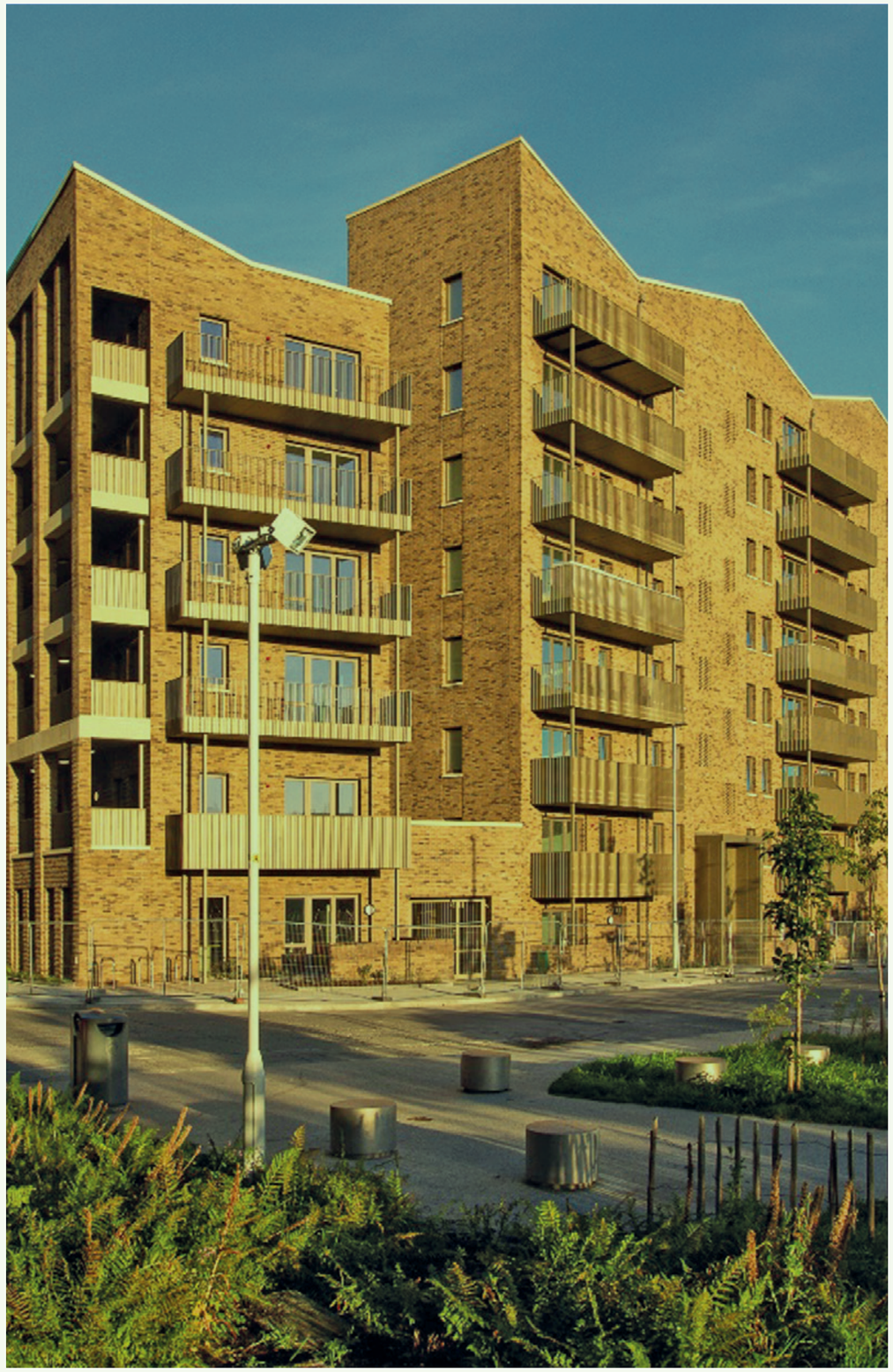
Rather than try to apply Level(s), the EU Taxonomy and national policy in isolation, many Local Authorities and public bodies now integrate Home Performance Index (HPI) certification into their housing schemes from an early stage, as HPI has already integrated and adapted these frameworks for the Irish context. HPI provides clear benchmarks and targets, simplifying the process of applying green procurement for new housing. The design team and contractor are given a common framework and goal to work towards, from early in the design through to the end of construction. One example of a development recently certified to the Home Performance Index is Bonham Court in the Liberties, built for Dublin City Council.

Knowing that evidence will be reviewed by a third party means less likelihood of slippage, and the need for clear processes to achieve certification. One example of an indicator that might otherwise be overlooked is water efficiency. Even where specified, water efficient taps and showers are often substituted at construction stage for less efficient ones, simply by omission. This can have a significant impact on energy use over a home's lifetime. Having a clear reason (i.e. HPI certification) for the specification of water efficient taps ensures they are installed. It also means that less understood issues such as biodiversity are considered, and it can help to pick up on issues with building regulations compliance too, such as the need for compliant commissioning certificates – and separately, validation certificates – for every ventilation system (as required by Part F of the building regulations).

For green public procurement, getting the design stage right makes it much easier to deliver homes that perform to the environmental standards specified. But it is still essential to encourage contractors and subcontractors to minimise the carbon footprint of their processes. The Dutch CO2 Performance ladder has long been used by Dutch government agencies to encourage contractors to measure and tackle their CO2 emissions. This is now available in Ireland and was recently included in a Transport Infrastructure Ireland tender. It rewards the contractor at tender stage for committing to pick a level on the performance ladder, and then certifying to achieve this during the contract.

Picture right: View of Bonham Court. Image by City Architects.

(Bonham Court by Dublin City Council was recently certified to the Home Performance Index.)



05

Merchant's Road, Galway

ARCHITECT NAME:
Hall McKnight Architects

PROJECT CLIENT:
Galway City Council

LOCATION:
17-20 Merchants Road Lower, Galway

DWELLING TYPE:
Apartments

TOTAL NOS:
12 No. apartments

TENURE MIX:
Social

TYPE MIX:
5_1B, 4_2B 3p, 3_2B 4p

SITE SIZE:
0.048 Ha

PLOT RATIO:
2.66:1

FUNDING TYPE:
Dep of Housing, Local Gov & Heritage

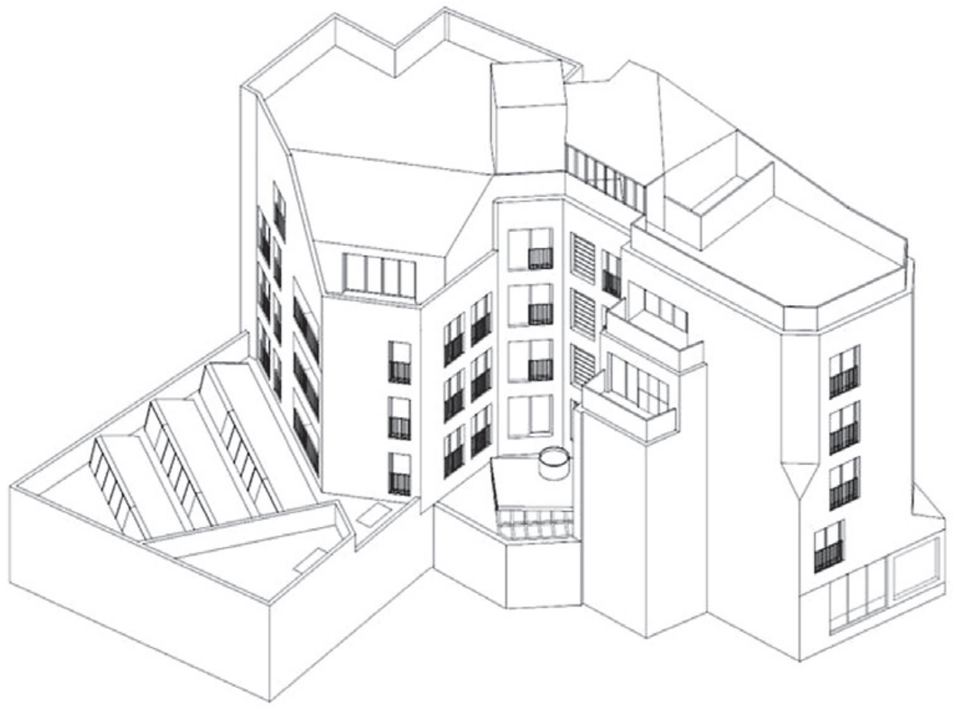
DELIVERY TYPE:
CWMF

PROJECT STATUS:
Planning Application, ABP, Feb 2022

SUSTAINABILITY TARGETS:
NZEB and Part L

CONTRACT TYPE:
Public Works Contract for Minor Building

Site location plan, in context.



Axonometric drawing, building form developed in response to context.

Description

The Merchant's Road Project, commissioned by Galway City Council, addresses a challenging brief that combines a cultural facility with high design requirements, emphasising an active ground floor and a rooftop garden to foster community engagement.

Situated on a constrained urban site, the project faced massing challenges. The site's location, within the city centre's mediaeval core, necessitated a design-led approach that harmonises with the surrounding context. The design strategy responds to the site and neighbouring buildings, with two taller blocks anchoring the street and a lower single-storey block at the rear to provide light to the cultural venue while limiting overshadowing on neighbouring structures.

The design approach maximises the number of residential apartments while addressing issues of overshadowing and privacy. The folded layout ensures optimal light, access to ventilation, and a balanced unit mix for scheme viability.

The building layout prioritises open-plan units and incorporates sprinklers to meet fire safety standards.

A ground-level sheltered courtyard, responding to the need for outdoor spaces in light of the COVID-19 pandemic, enhances the project's appeal.

A unique design feature is the universally accessible rooftop terrace, designed in a "sawtooth" pattern to maximise daylight and improve living spaces' quality.

The project utilises electric-only heating systems and air-to-water heat pumps, aligning with energy efficiency standards. The use of recycled steel and environmentally friendly materials further contributes to the project's environmental responsibility.

The project demonstrates an integrated approach of delivery by sharing funding streams between the cultural facilities and social housing. This reduces financial constraints and ultimately lowers costs.

Project Focus 1:

STRATEGIC DECISION: Brief Definition and Funding

The Merchants Road Project demonstrates how a well-defined brief by the client can drive innovation and quality in housing projects.

Galway City Council set forth an ambitious strategy-level brief for this development. The brief aimed at creating a mixed-use building, featuring a cultural centre on the ground floor and social apartment units on the upper floors. Quality design and innovation were given the highest priority, as specified in the tender documents.

The importance of an active ground floor was emphasised in the brief, which also called for the inclusion of a café associated with the cultural centre. A particularly innovative aspect of the brief was the requirement for a shared rooftop garden, addressing the constraints of the tight urban infill site and the need for communal amenity space.

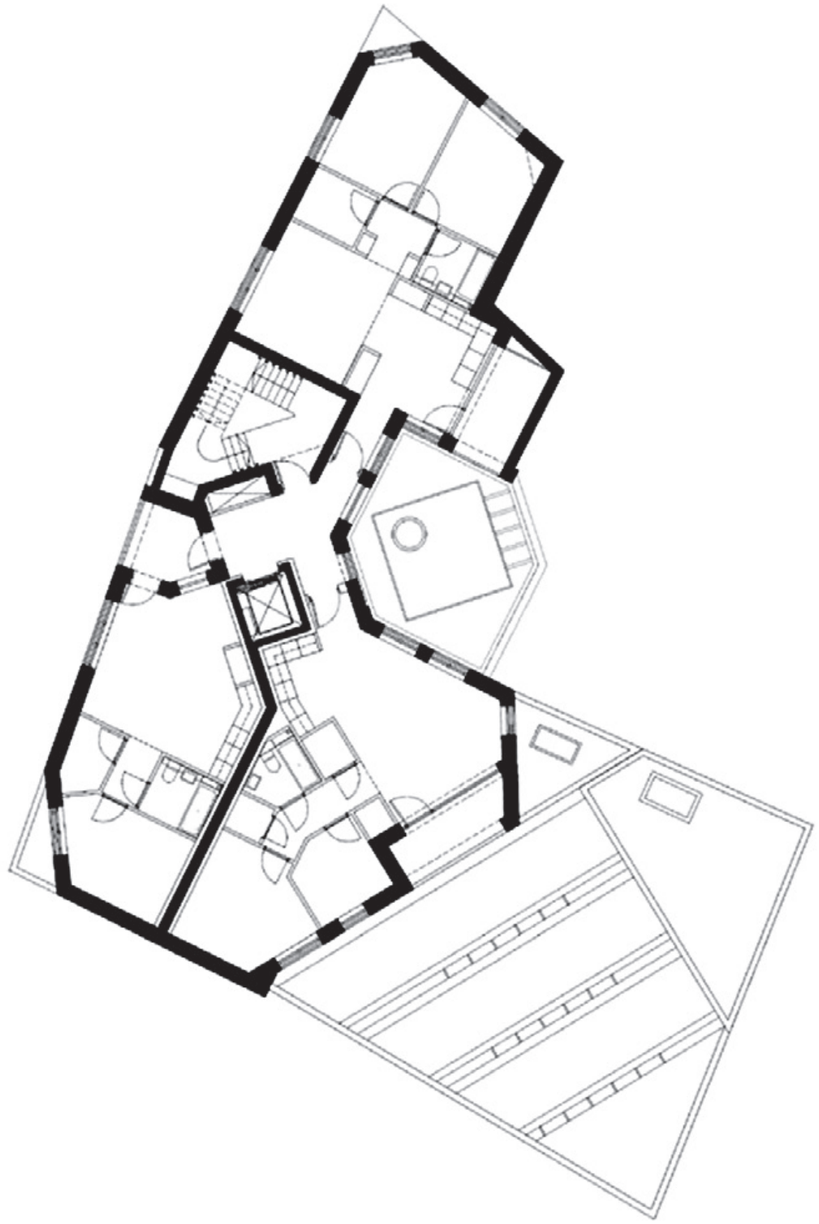
The project brief was integrated into a larger vision called the 'Cultural Cluster,' as conceived by GCC. This strategy aimed to connect cultural institutions within this area of Galway City, enhancing the project's broader significance.

Additionally, the ground floor Cultural Venue, Café, and the social housing units above had separate funding streams for delivery. This approach allowed for finer finishes and attention to detail on the Ground Floor façade, using high-quality stone cladding and curtain walling. Balancing aesthetics and economics, a more cost-effective material palette was chosen for the upper levels, which fall under the constraints of Unit Ceiling Costs defined by Government Funding.

The integration of mixed-use elements in the project brief enhanced its viability, making efficient use of ground floor space and further contributing to the 'Cultural Cluster.' The café and cultural venue were designed and constructed as shell and core, including basic servicing as part of the overall construction project.

The project's innovative funding strategy reduced the development's overall cost, alleviating pressure on the Unit Ceiling Costs set by the Department of Housing, Local Government, and Heritage (DHLGH).

Elevation in urban context.



Floor plan.

Article 05 - Urban Water Management: A Case Study of Copenhagen's Cloudburst Formula

Author: Neil Goring, Senior Water and Climate Expert in Integrated Design, Ramboll, Copenhagen

The impact of climate change is now an undeniable global crisis. Copenhagen, Denmark, faced this reality on July 2nd, 2011, when an unprecedented cloudburst released 150mm of rain in a few hours, submerging parts of the city under a meter of water. This event was a wake-up call, with subsequent storms striking in August 2011 and again in 2014, and sea levels expected to rise one meter by 2110, threatening the city's low-lying infrastructure.

The innovative Copenhagen Cloudburst Formula encapsulated in a six-step process paves the way for integrating Blue-Green Solutions into urban redevelopment. The first step was to define the boundary for these plans by matching it to the natural watersheds in and around Copenhagen. Water does not respect our build boundaries, but it does respect the terrain.

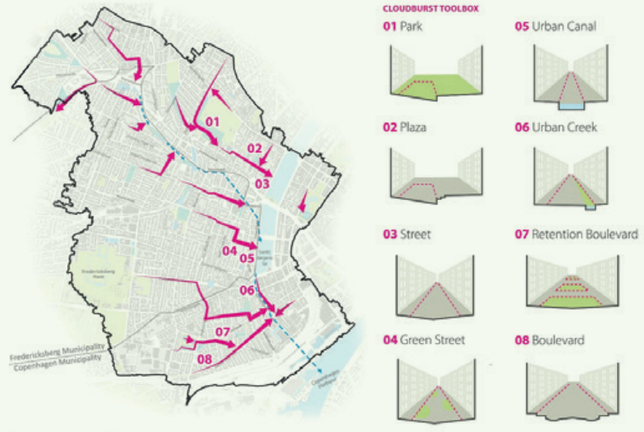
NATURE-BASED APPROACH

Legacy drainage systems are increasingly impractical, hampered by a labyrinth of underground utilities and ill-equipped for extreme weather patterns. For pipe solutions to handle a cloudburst event, they would need to be big enough to drive a car through and still would remain unused the other 99% of the time – not an investment any city wants to make. Copenhagen decided a new city-wide approach was needed, a nature-based one, and responded with the Cloudburst Concretization Masterplans, adopting a pioneering methodology that intertwines conventional drainage with Blue-Green infrastructure.

A BLUE-GREEN MASTERPLAN

Copenhagen ended up with 8 watershed project areas called Cloudburst Concretization Masterplans, the first of which was Lådegårds-Åen, a central and flood-prone catchment area of 10 km^2. Techniques like retrofitting surfaces ensure that interventions are not only functional but visually and socially interactive, making flood protection a catalyst for integrated planning and sustainable urban development.

A key aspect of this Blue-Green Masterplan involved lowering the water level of one of the Copenhagen Lakes, providing substantial flood storage while enhancing lakeside access and integrating reduced sized conventional piping. This hybrid approach merges infrastructural efficiency with environmental aesthetics.



CLIENT:
Municipality of Copenhagen, Municipality of Frederiksberg, HOFOR (water utility).

LOCATION:
Copenhagen, Denmark.

PROJECT AREA:
10km^2

PROJECT STATUS:
Delivered (Planning) with 350+ projects identified over the next 20-50 years.

Each line drawn on the masterplan represents a future project, with over 350 projects identified in the Lådegårds-Åen area alone, but the point is not build this right away. Now when the City of Copenhagen decides a strip of road needs new asphalt, the drainage pipes needs replacing along a boulevard, or a dilapidated park needs an uplift, they can refer to the Cloudburst Masterplan and ensure they build back better – so at some point in the future they will have a city resilient towards flooding.

MORE THAN JUST INFRASTRUCTURE

A key success factor in rolling out the Cloudburst Concretization Masterplans was through workshops bringing people together and getting them working towards the same goal. Workshops created enthusiasm for these strategies and permeated local governance, galvanising cooperation among governmental bodies, water utilities, developers, and residents. The Copenhagen Formula's emphasis on public-private partnerships lays the groundwork for embedding adaptable, resilient landscapes into the city's fabric. This workshop-based approach extended to public engagement that transform technical hydrology into accessible, collaborative city planning, concurrently educating and soliciting input from citizens.

Beyond mere stormwater control, the strategic flood masterplan seizes the opportunity to protect Copenhagen while enhancing its urban spaces, benefiting public health, culture, social interaction, and economic stability.

Financial analysis buttresses the case for Blue-Green approaches: they are nearly twice as cost-effective as conventional methods when considering the broader economic impact of flooding, insurance savings, and property value enhancements. New York City, inspired by the Copenhagen Cloudburst Formula, commissioned their very own. One outcome of that was a business case report that showed for every $1 invested in blue-green infrastructure, $2 is returned.

Aspirations of blue-green infrastructure extend to marrying the ecological with the urban - nature seamlessly coexisting with recreational and functional city components. As urbanisation continues to increase, so do societal risks such as urban heat, biodiversity loss and air pollution. Copenhagen's nature-based approach stands as an inspiration for municipalities worldwide to not only confront the cloudburst challenge, but also other urban challenges, weaving innovation into their urban tapestry.

Layout

Our Layout section delves into the primary design development stages where the project takes shape, aligning with the established project ambitions. Clear project definition, values, and design concepts assist the design team in navigating standards, design policy, guidance, and regulations to meet collective goals. Informed decisions at this stage should not only reflect the immediate goals but also accommodate future design without hindrance.

At the site level, a well crafted design concept captures the broader vision, offering clarity and a framework that shapes a distinct sense of place. This concept guides decision-making, controls the project's relationship with its local context, and influences interactions within the housing community. Balancing efficiency drivers like density and plot ratio/site coverage with considerations such as appropriate massing, urban design, placemaking, and local context is crucial.

Sustainable and social ambitions at the site level may encompass priorities such as ecology/green infrastructure, outdoor connections, optimised movement systems, minimised parking, promotion of active lifestyles, open space prioritisation, and a comprehensive energy strategy. Early promotion of passive design principles enhances long-term project resilience by reducing reliance on active systems.

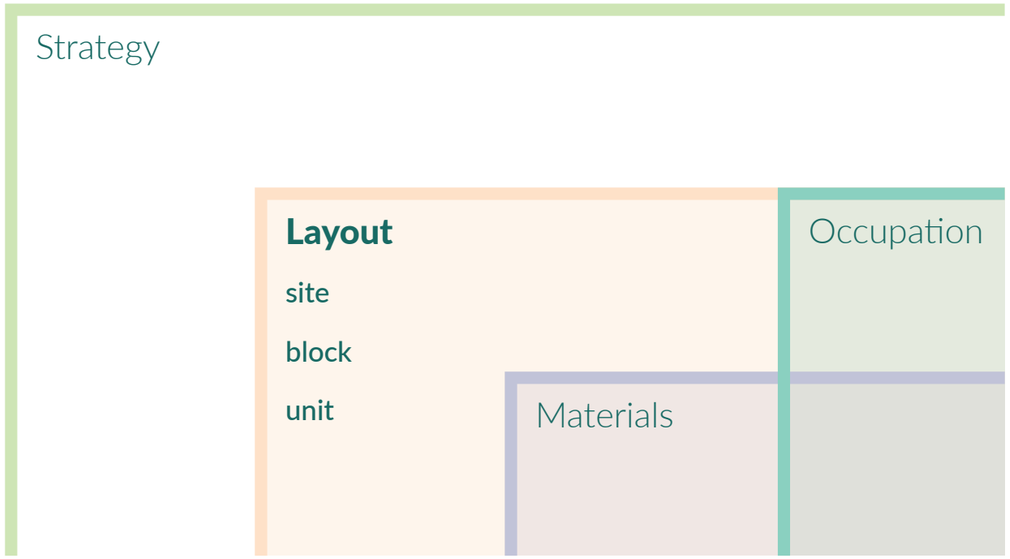
Moving to the block and unit level, considerations extend to area efficiencies, tenure/unit mix, typology diversity, circulation, shared uses, unit layout efficiencies, space planning design, and modularity. Ambitions may include future flexibility, adaptability, diverse tenure, universal accessibility, and considerations for live/work units. Establishing reasonable structural limits at a block level is key for development flexibility in later stages, maximising efficient material use, exploring low carbon material options, and potential prefabrication. The complexity of mechanical systems is increasing, requiring robust optimisation during the design stages for better performance throughout the building's use.

At the core of any proposal should be the aspiration to provide future tenants with a high-quality environment, offering a simple, functional, and joyful backdrop to their daily lives, ultimately promoting wellbeing.

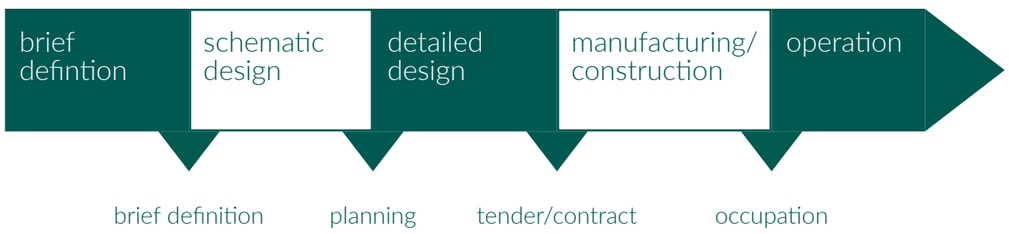
Value metrics during this stage should reflect project ambitions, avoiding a narrow focus that might limit future potential, value, and efficiencies. For instance, avoiding a singular approach to net area-driven efficiencies only that could hinder modularity and repeatability, potentially limiting prefabrication or MMC in later stages.

In this section, the presentation focuses on building examples that demonstrate ambitions in balancing typology design with challenging sites and prioritising open space for well-being. Specialised articles delve into sustainable mobility strategies, and inspiration is drawn from Denmark, highlighting an approach to sustainable landscape design, including innovations in blue and green infrastructure.

TYPICAL PROJECT TIMELINE



Project Life



Layout
- Site Layout

HERITAGE STRATEGY

» Informed/Sensitive heritage infill

NATURAL LANDSCAPE STRATEGY

» Use of existing site topography
» Ecology/Habitat
» Natural systems environment
» Biodiversity
» Water Managament - SUDS

URBAN MASSING/HEIGHT STRATEGY

» Where applicable respecting historic context with complementary contemporary massing
» Appropriate development density

SITE ENERGY STRATEGY

» Efficient low-energy site energy strategy
» Allow for potential of positive energy exchange in future
» Site services distribution
» Priority for solutions with low servicing costs
» Consider potential for district heating

UNIVERSAL DESIGN

MOBILITY AND SITE SERVICING STRATEGY

» Optimising and prioritizing the pedestrian and cycle realm
» Accommodating desire lines from public transport with integrated cycle mobility, parking and EV charging
» Strategy to minimise vehicle parking
» Strategy to minimise vehicle parking/vehicle storage in open spaces, in context of proximity to public transport
» Integrate requirements for occasional service & emergency vehicles over shared, managed surfaces

GREEN/BLUE INFRASTRUCTURE

» Accommodating changing water cycles, attenuating & harvesting
» Landscape integrated sustainable drainage (Consider wet and dry conditions - aesthetics, function, maintenance)
» Minimise engineering driven below ground storage solutions

DENSE REGENERATION

» Refurbishment and new build integration

PRIORITY FOR CLIMATE RESPONSIVE PASSIVE DESIGN

» Massing and facade/envelope atuned to sun and wind paths
» Seek to minimise carbon footprint of the development in the choice of materials and energy systems
» Thermal mass/wall build-ups and systems; daylighting; impact of terraces/decks
» Promote efficient low energy solutions to exceed minimum regulatory requirements

RELATIONSHIP TO BOUNDARIES

» Active street edges
» Access/entry
» Entrance thresholds configured to promote safe access for residents
» Boundary treatment

URBAN CONNECTIVITY THROUGH SITE

» Creating a connected and permeable neighbourhood
» Enhance neighbourhood permeability
» Create a coherent network of interlinked routes and meeting places
» Sheltered resting places

PLAYSCAPES

» Indoor and outdoor

Layout
- Block Layout

TYPOLOGY TYPES VARIED

- Support Smart Aging: Offer homes to accommodate changing needs over time/ multi-generational mix
- Support Urban Inclusivity: Offer an accessible inclusive living environment that caters for all ages and abilities
- Provide a mix of home typologies to support a diverse group of residents
- Standardised variation – link to modularisation/ structural system

SHARED SERVICES/FACILITIES

- Provide quality internal and external shared facilities, encouraging social interactions and community cohesion
- Quality internal circulation spaces
- Entrances
- Laundry Facilities: Provide secure access, consider opportunities for enclosed/ protected drying spaces (private or communal)
- Other (kitchen, event space etc)
- Encourage shared responsibility through design

OPEN SPACES STRATEGY

- Offer Inside/outside spaces for community interaction
- Programmed uses, temporary event space/uses (eg: markets)
- Configure spaces to provide passive surveillance
- Relationship to dwellings – influence on energy (buffer spaces)
- Maximise roof scapes

EFFICIENT PLANNING/ STRUCTURAL STRATEGY

- Efficiently planned site massing & home layouts, with repetitive planning layouts: to facilitate prefabrication
- optimizing structural spans
- optimizing service runs/risers

BLOCK DESIGN

- Block depth
- Modularity (costing balance)
- Walkways
- Circulation/socialisation
- Cores efficiency

RETROFIT

- Baseline - establish clear baseline of existing
- Efficiency – inventive use of existing features

PRIVATE/PUBLIC TRANSITIONS

UNIVERSAL DESIGN

- Access and Approach to Buildings
- Wayfinding

Layout
- Unit Layout

EFFECTIVE SPACE PLANNING

- Relationship to adjacent & external spaces
- Fire safety constraints
- Kitchen Layout: Quality; ergonomics
- Bathroom layouts
- Optimise Storage Units – proportions and uses
- Quality of Sleeping Spaces
- Living Spaces: Balancing Efficiency and Qualitative aspects
- Universal design considerations

ADJUSTABLE FLEXIBLE LAYOUTS

- Adaptable within structural strategy/services strategy
- Standardized variation
- Allowing for adaptability of units over time accommodating changing needs of residents
- Location and extent of structural bearing walls within units (soft party wall?)

PRIVATE AMNENITY SPACE

- Standardization
- Shelter
- Private spaces engaging public space

NATURAL DAYLIGHTING STRATEGY

- Optimise the number of dual aspect units with choice of views/aspect
- Optimise qualitative aspects of natural daylighting within units by maximising floor to ceiling heights

VENTILATION/AIR QUALITY

- Optimise natural ventilation: maximizing high ceilings and promoting suitable options for use through all seasons
- Materials to promote Health & Wellness - non-toxic/non-off gassing material options

06

Castlelands, Dublin

ARCHITECT NAME:
Metropolitan Workshop

PROJECT CLIENT:
LDA

LOCATION:
Balbriggan, Co. Dublin

DWELLING TYPE:
Houses, Apartments

TOTAL NOS:
817 homes (mix of houses and apartments)

TENURE MIX:
42% Affordable, 20% Social, 38% Cost Rental

TYPE MIX:
162(1B), 250(2B), 381(3B), 24(4B)

SITE SIZE:
25,33 Ha

PLOT RATIO:
0.42

FUNDING TYPE:
LDA Funded

DELIVERY TYPE:
TBC

PROJECT STATUS:
Stage 2C

SUSTAINABILITY TARGETS:
HPI

CONTRACT TYPE:
TBC

Description

Castlelands, developed by the Land Development Agency (LDA) in Balbriggan, Co. Dublin, offers 817 residential units, comprising various housing types such as houses, walk-up apartments, duplexes, and standard apartments. This diversity caters to different housing needs and encourages a mixed community of residents.

The project's strategic density distribution places more densely populated areas in proximity to Balbriggan's town centre and public transport hubs, enhancing accessibility and offering convenience to residents.

Making the most of the site's topography, Castlelands incorporates a local park that extends from the west, encompassing the zoned open space within the site. This structure creates pockets of land for development set within the green landscape, providing direct access to open space while ensuring passive surveillance and overlooking of that area.

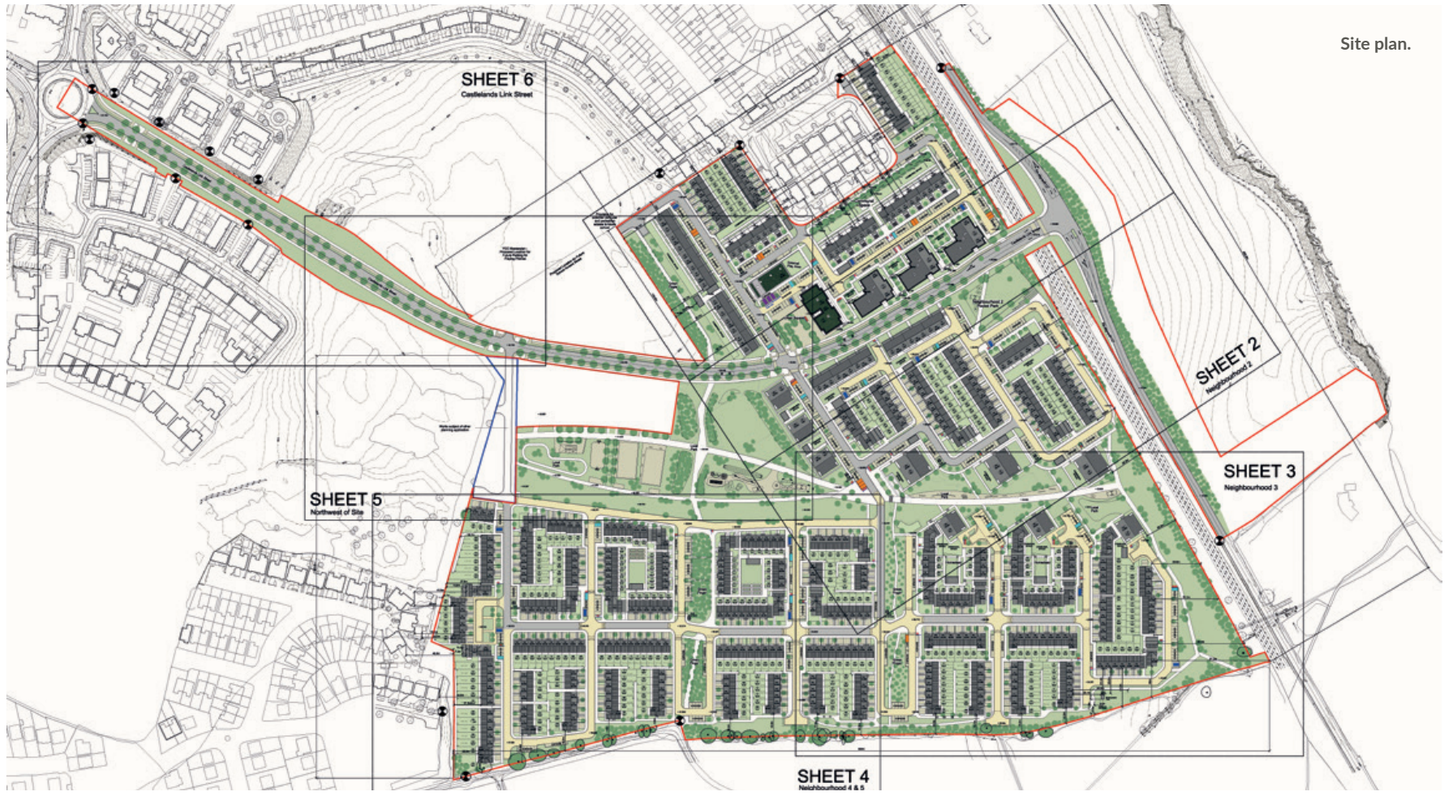
These development pockets follow the contour lines, creating terraces that lead toward the sea. The layout defines five easily identifiable neighbourhoods, framed by surrounding landscapes, local park edges, and the Castlelands Link Street.

Community amenities like a crèche, retail spaces, and provisions for a school, swimming pool, and park pavilion are thoughtfully placed to encourage social cohesion and accessibility.

The site layout prioritises density and encourages pedestrian and cyclist accessibility, featuring green infrastructure for an attractive, eco-friendly environment.

The building design, introduces innovative typologies, including shared gardens and low-rise mid-density walk-up apartments. These promote neighbourly interactions and offer adaptable landscaped spaces, fostering a close-knit and engaged community.

Materials such as render, brick, and varying roofscapes are chosen to harmonise with the architectural heritage of the surrounding area.



Site plan.

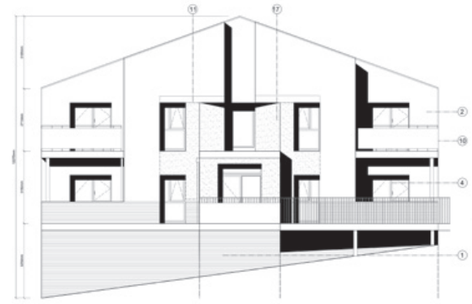
Rendering of residential development within climate resilient landscaped setting.

Rendering of residential development, adaptable external shared spaces for community.

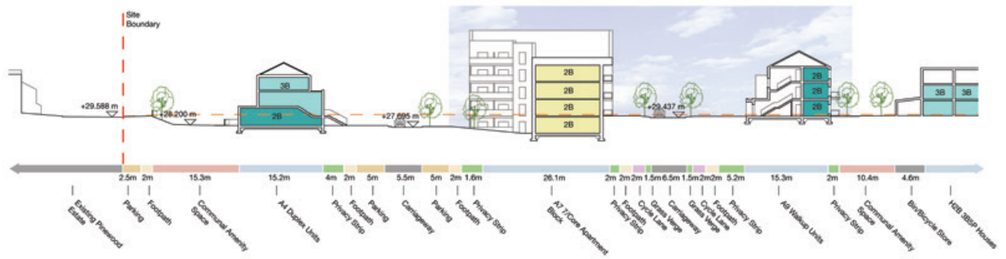
Ground floor plan.

First floor plan.

Elevation.



Elevation.



Site section strategy with layers of private and communal spaces.

Project Focus 1:

LAYOUT DECISION: Communal Open Space-Homesteads

A number of the blocks in neighbourhood 3, 4 and 5 have been designed with semi-private communal spaces, surrounded by clusters of varied housing types. This "Homestead" layout aims to promote a new type of suburban development that are efficient in form and which promotes neighbourliness.

Every home will have a small, private rear garden which opens on to a larger shared communal space that is designed to engender community and promote chance encounters with neighbours.

The communal space will only be accessible by those residents whose homes surround the space. They are not publicly accessible. Private back gardens with low hedges or fences open onto the communal green space offering a safe environment with a valuable shared social amenity.

The landscape proposals encourage interaction and cohesion through a mixed use space which is designed with the potential for residents to take ownership and (in time) adapt portions to suit themselves e.g. play spaces, community allotments and raised, accessible vegetable or flower beds. As the barrier between private and shared space is softened, these spaces will create opportunities for shared recreation and interaction promoting well being and connectedness, which can be especially valuable to older and more vulnerable residents. They have been designed with affordable cost rental homes in mind where social interaction is related to tenure longevity. The aim is to develop community life by reducing tenure churn.

Proposed typical Homestead configuration.

Traditional back-to-back arrangement compliant with development plan standards based on same layout as Homestead diagram to left.

Concept Sketch: every resident on the block has access to the secure shared central space.

Concept Sketch: view of central shared space.

Article 06 - Mobility Strategy Innovation

Author: Alan Connolly, Engineer, Systra (Director)

The transport accessibility of a development is vital to its long-term success. A residential scheme, well connected to amenities by good transport links, is an attractive place to live.

Over the past few decades there has been a shift in what constitutes good transport links. Cars were previously central to plans and our streets were designed to accommodate them. However, population growth has meant car travel is now difficult due to urban congestion; Ireland's historical city streets could not keep up with demand. The realisation of our societal need to address climate change has also dawned. And so nowadays, there is a premium placed on living near to high quality public transport links or close to amenity, translating as Transit Oriented Development or 15-minute neighbourhoods. This is evidenced the world over through higher property prices in places that provide one, or even better, both.

In developing our cities, towns, villages, neighbourhoods, and dwellings we should keep people's need for travel in mind. Why we travel and how we travel are equally important in developing transport solutions. A planning and design approach should:

- create an environment where sustainable travel becomes the preferred method of movement for people and goods
- create an attractive place for people to live, work and meet through a 'people first' design approach, promoting opportunities for safe and attractive ways of travelling by active modes
- maximise benefit of sustainable transport opportunities available

At site selection stage we should understand if sustainable travel can be embedded into the scheme. All possible modes of transport should be considered from the outset. Proposals should be coordinated within a design team, and discussed with stakeholders, to ensure the right supports are in place to cater for people's travel needs; this could be related to physical infrastructure such as cycleways or safe and secure bicycle parking, technology such as car sharing apps, up-to-date information such as public transport timetables, or in some cases shared vehicles for use by residents and occupiers.

With the rise of the sharing economy and a more digitally focused society, new residential schemes present opportunities to incorporate the concept of Mobility as a Service (MaaS), where the deployment of new technology can be used to personalise and enhance the experience of travellers – for example using Car Clubs with a dedicated vehicle fleet can help reduce car ownership rates and promote sustainable travel behaviours. Similarly, in the context of developing a low carbon economy, there are opportunities for the development of Electric Vehicle and Electric Bike infrastructure and services.

Recognising the opportunity to improve someone's travel choice, by design, can make a small but important difference in their day to day lives.

ZWEI Plus, Vienna. ©H-Hurnaus

07

Cherry Orchard Point, Dublin

ARCHITECT NAME:
van Dijk Architects & Conroy Crowe Kelly Architects

PROJECT CLIENT:
The Land Development Agency

LOCATION:
Park West Avenue, Cherry Orchard, Dublin 10.

DWELLING TYPE:
Apartments

TOTAL NOS:
708 (Phase 1) approx. 1,100 units overall

TENURE MIX:
Phase 1: Cost Rental 547Nr 77%, Social 161 Nr 23%

SITE SIZE:
Phase 1 - 6.27HA (13.1HA overall lands)

PLOT RATIO:
1.4:1

SITE COVERAGE:
33.2%

NET DENSITY:
145 units per hectare

FUNDING TYPE:
LDA Funded

DELIVERY TYPE:
TBC

PROJECT STATUS:
Planning Stage (Part X application)

SUSTAINABILITY TARGETS:
HPI silver

CONTRACT TYPE:
TBC

Description

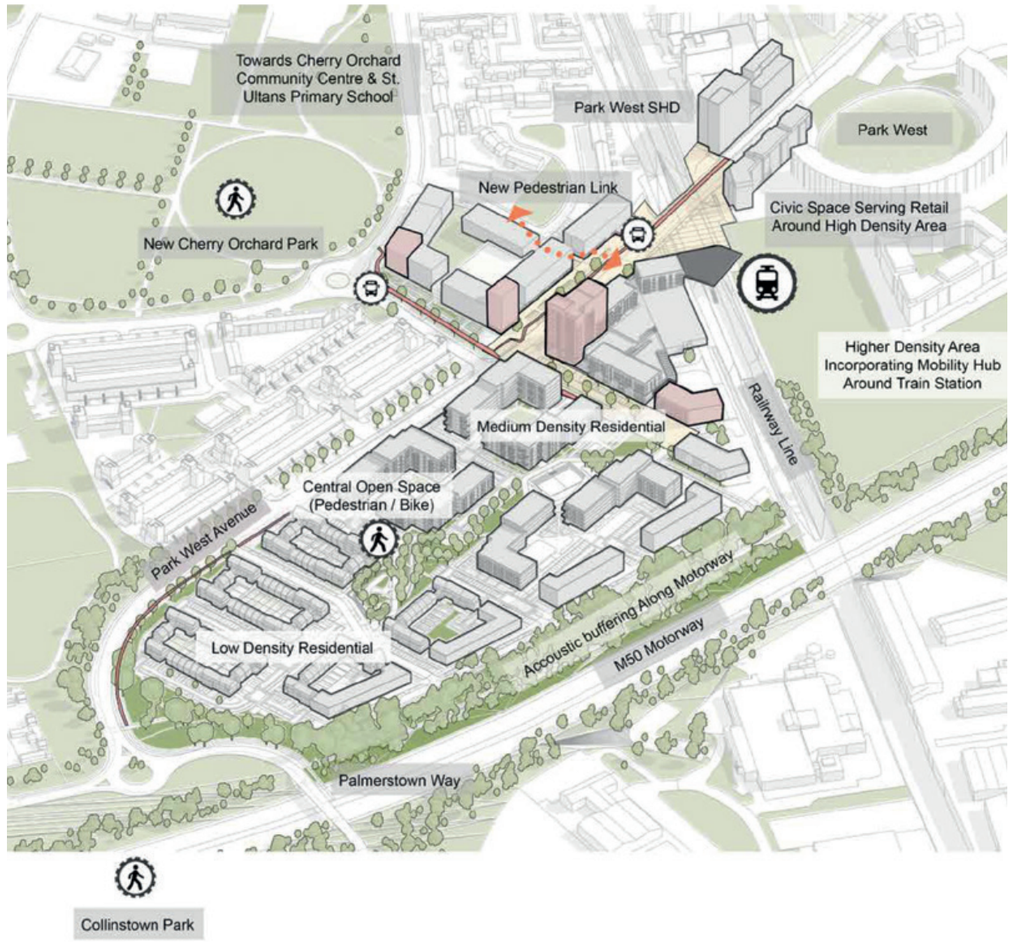
Cherry Orchard Point is a residential lead mixed-use development project managed by The Land Development Agency (LDA) in partnership with Dublin City Council (DCC). The development lands are located in Cherry Orchard, Dublin 10. The LDA is committed to providing affordable housing while adhering to the design standards set by the Park West Cherry Orchard Local Area Plan (LAP) 2019.

The project includes a diverse range of social and cost rental units, integrating essential amenities such as retail spaces, a crèche, and both indoor and outdoor community facilities. Furthermore, Cherry Orchard Point supports the development of future bus and rail infrastructure, aiming to create a well-connected and accessible living environment for residents.

The site layout prioritises pedestrian and cyclist well-being. It redesigns Park West Avenue as a vibrant “main street,” providing a safe path away from traffic. The development enhances connections between the new and existing communities through green pedestrian and cycle corridors.

The design minimises car visibility and emphasises a people-centric approach. Biodiversity and native planting contribute to the natural environment.

Urban blocks within Cherry Orchard Point are designed to optimise efficiency and inclusivity. These blocks feature a mix of social and cost rental units, ensuring a balanced and diversified community. The project streamlines service runs and aims for straightforward unit-to-unit fire and acoustic compliance, ultimately reducing construction costs.



Site layout, Axonometric.

Project Focus 1:

LAYOUT DECISION: Optimisation with Infrastructure

A review of the Local Area Plan (LAP) revealed the potential for a more efficient road layout, shifting the focus from car-centric streets to pedestrian and cycle routes. This design decision not only enhances the project's overall appeal, but also improves its sustainability.

Careful consideration has been given to urban block dimensions. By reducing the number of urban blocks specified in the LAP, the layout achieves better net-to-gross ratios, increases daylight penetration, ensures an appropriate percentage of dual-aspect units, and maintains a cost-efficient design.

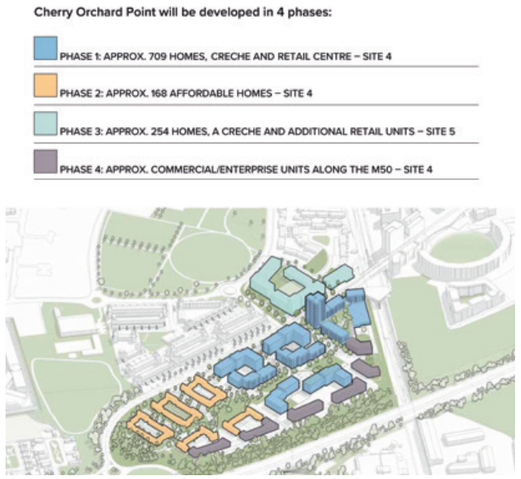
Phasing is closely aligned with infrastructure development, ensuring that significant costs match the project's progress. This approach allows for budget control during the early phases and streamlines the delivery of access and services without requiring enabling infrastructure through later phases.

To minimise the need for retaining structures, the project pays careful attention to the finished road and building levels along with drainage infrastructure routes to minimise the requirement for filling and retaining structures.

Hard landscaping is strategically placed near entrances, key urban areas, and high-traffic zones. Soft landscaping is thoughtfully integrated to help establish the site quickly and provide residents with direct access to nature, enhancing their living experience.

A biodiversity corridor combines pedestrian and cycle routes with high-quality planting and Sustainable Urban Drainage Systems (SuDS), offering connectivity without excessive planting costs. The site's innovative SuDS design features a compensatory flood storage system in the form of a semi-wild wetland area at Cherry Orchard Point Park's southern edge. This approach reduces construction and embedded carbon costs while enhancing the project's sustainability.

By incorporating swales and bio-retention zones along a central pedestrian and cycle green route and within pocket parks, shared surface areas and internal access routes have been created to significantly reduce the need for underground surface water drainage.



Phasing strategy diagram.

Site plan.

08

The Weir, Whitestown Way, Dublin

ARCHITECT NAME:
Seán Harrington Architects

PROJECT CLIENT:
Clúid Housing Association

LOCATION:
Whitestown Way, Tallaght, Dublin 24

DWELLING TYPE:
Apartments

TOTAL NOS:
81 dwellings

TENURE MIX:
Older Person's Housing

TYPE MIX:
63 x 1-beds and 18 x 2-beds

SITE SIZE:
0.6749 ha

PLOT RATIO:
0.96

FUNDING TYPE:
Housing Finance Agency Loan/Private Finance

DELIVERY TYPE:
Traditional procurement

PROJECT STATUS:
Substantial Completion anticipated April 2024

SUSTAINABILITY TARGETS:
NZEB

CONTRACT TYPE:
GCCC PW-CF1

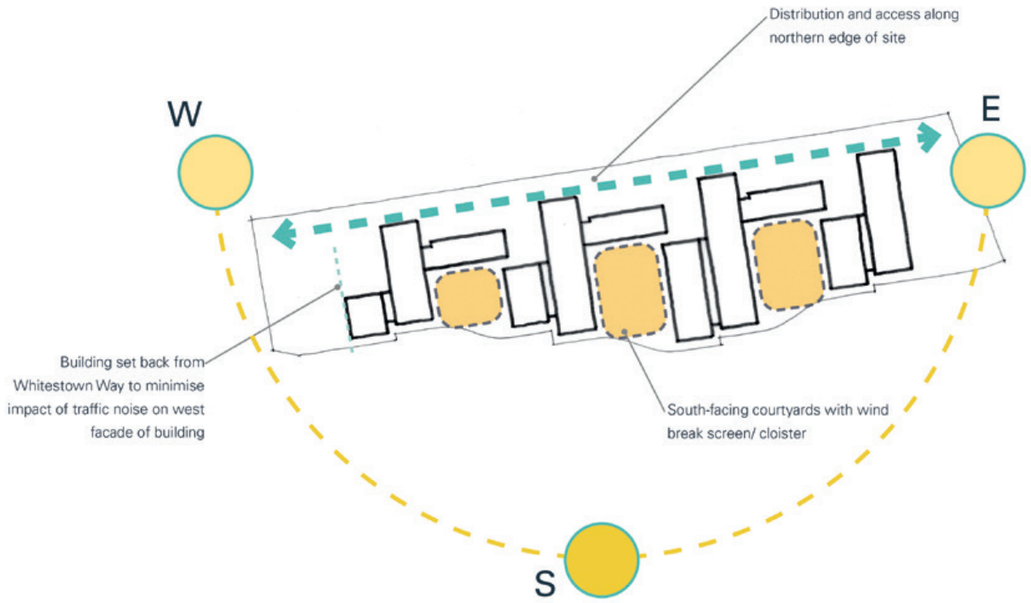
Description

The proposed housing development targeting the elderly aims to provides 81 apartments designed as sheltered housing, with a primary focus on 1-bedroom units, complemented by a small percentage of 2-bedroom configurations. The design follows the principles of the Universal Design Guidelines to accommodate a diverse range of needs within the elderly community.

Aerial view. ©Seán Harrington Architects

Located on a substantial brownfield site at the north-western corner of Seán Walsh Park in Tallaght, the development strategically maximises its southerly aspect, offering panoramic views over the park and towards the Dublin mountains. Functioning as a mediator between medium-density developments to the northwest and traditional residential structures to the south and east, the site provides a unique opportunity for creating a residential community within walking distance of Tallaght town center and the LUAS.

In terms of energy efficiency, the building structure is designed to minimise the ratio of external wall to floor area, and a centralised air-to-water heat pump system caters to the heating and hot water needs. Solar PV panels on the roofs contribute to sustainable energy generation, aligning with modern environmental standards.



Design strategy diagram: courtyard orientation. ©Seán Harrington Architects

Site plan. ©Seán Harrington Architects

Project Focus 1:

SHELTERED HOUSING DESIGN; Engaging with landscape

The design approach is centred on creating a high-quality living environment for elderly residents while enhancing the overall social, environmental, and visual quality of the area. To discourage anti-social behaviour, the layout is carefully planned, ensuring dwellings overlook all access ways and public areas.

Ensuring the safety and security of elderly residents is a priority, achieved through a carefully crafted hierarchy of privacy thresholds. The majority of apartments boast dual-aspect orientations, providing ample access to natural light and views, contributing to the overall well-being of the residents.

The site layout strategy revolves around the creation of south-facing courtyards, serving as open spaces and communal environments that seamlessly connect the development to the adjacent park. The building, organised into clusters of apartments, fosters a sense of community within smaller groups, promoting connectivity across the development.

The resident's courtyards play a pivotal role in the design, offering well-proportioned and usable spaces that encourage active use by the elderly. These courtyards are treated as extensions to internal spaces, providing a choice of sun and shade, seasonal interest, and areas for shared activities. The integration of these external spaces aligns with the design's goal of creating a holistic and inviting facility for elderly residents, setting a potential benchmark for similar developments.

The design team worked closely with CLANN, the dedicated age-friendly housing body operated by Clúid Housing Association. CLANN representatives, with knowledge and experience of older person's housing, were involved at all key stages of design development.

In addition to the design strategies outlined above, the client also invested in state-of-the-art technology to maximise the potential for independent living. This approach represents a significant shift towards preventative strategies, facilitating a more proactive and independent lifestyle.

SHA collaborated closely with CLANN to refine the design of the external spaces, resulting in three distinct courtyards each serving a specific theme and purpose.

In Garden 1, a serene and conversational shared space is situated directly adjacent to the communal living room, featuring a water feature to enhance its ambiance. Garden 2 is designed as an active space, offering a flexible recreation surface complemented by smaller zones dedicated to fitness equipment and outdoor seating. Garden 3 is allocated for gardening and planting, providing a tranquil environment with a mix of fruit trees and raised beds. The space has the flexibility to evolve in collaboration with the residents. Storage pavilions in all three gardens serve both practical and aesthetic purposes, acting as focal points. Garden 3 includes a larger serviced store to support group participation. These garden spaces are augmented by enhanced landscape areas between the development and the Whitestown Stream to the south. Apart from enhancing the overall landscape, this park location contributes hydrological benefits to the scheme and serves as the starting point for the Dublin Mountains Way walking trail.

South elevation, to courtyards.
©Seán Harrington Architects

09

Merlins Woods, Galway

ARCHITECT NAME:
Galway City Council Architects Section

PROJECT CLIENT:
Galway City Council

LOCATION:
Merlin Woods, Galway City

DWELLING TYPE:
Houses/apartments/duplexes

TOTAL NOS:
103 (85 affordable/18 social)

TENURE MIX:
affordable and social

TYPE MIX:
79% houses and 21% apartments/duplexes of this 78% of the total units are 2 bed, 14% are 3 bed and 4% are 1 bed and 4 bed each

SITE SIZE:
Overall 2.94 ha. Developable 2.71ha

PLOT RATIO:
0.35:1

FUNDING TYPE:
SHIP/AFH

DELIVERY TYPE:
TBC

PROJECT STATUS:
Pre-tender

SUSTAINABILITY TARGETS:
NZEB and Part L

CONTRACT TYPE:
TBC

Description

The Merlin Woods Affordable & Social Housing development is part of a larger master plan, located west of Coillte Mhuirlinne and accessible through an existing estate. Embracing the site's features, it offers a picturesque southern vista overlooking Merlin Woods. Housing units strategically face this view, creating a visual connection with the landscape and a spacious green area linking the project to the woods.

Site plan.

Responding to the need for affordable and social housing in Galway City, the development includes a mix of one to four bed units with various designs suitable for lifetime use. This encompasses standard, wheelchair-friendly, live-work, aged-friendly, and homes with home offices. The design considers the surrounding context, facilitating linkages with local facilities with the aim of creating a high-quality, sustainable living environment.

Pedestrian spaces are integrated throughout the scheme to cater to all ages and users, promoting diverse interaction and usage across the site. The project aims to highlight the existing natural landscape, incorporating a planting scheme tied to biodiversity.

Structured around four components—affordable housing, social housing, live/work units, and a crèche—the majority of the project consists of affordable housing in terraced layouts following the land contours. Social housing apartments are integrated into the terraces and distributed throughout. The units feature traditional materiality and form, with south-facing units incorporating porch seating areas to encourage community interaction. Live/work units and the crèche, situated on the curved street at the development entrance, form a focal point for the community with a large plaza area.

Project Focus 1:

LAYOUT DECISION: Informed Site Layout

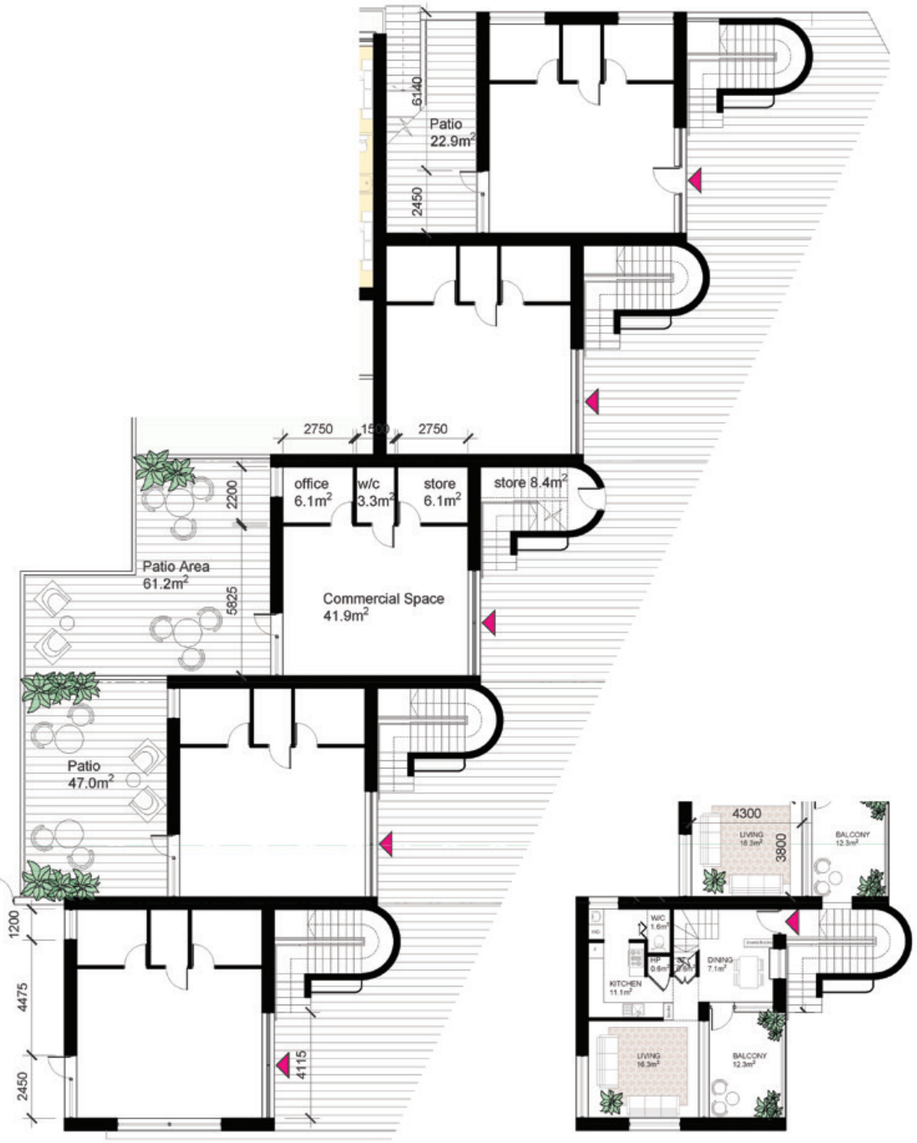
The proposed site layout of the Merlin Woods project is influenced by several aspirations, including intergenerational community living, delivering cost-effective affordable housing, a permeable site layout linked to the surroundings, maintaining existing biodiversity, and the integration of live/work units. The overall density achievable was also limited by the steep nature and geometry of the site, particularly the narrowing to the south. All these factors informed the site layout design.

The project maximises the use of the site's unique topography by strategically designing housing units that follow the contours of the land. This approach not only preserves the natural landscape but also ensures that the streets are level, simplifying access and foundational work. The project departs from the typical estate typology, which usually features a central green space and rear gardens facing the site boundary. This allows existing natural hedgerows and stone walls to remain, maintaining biodiversity and providing a cost-effective boundary treatment. This approach also allows for future site permeability offering possible connections from the main curved street which locates the live/work units and a crèche to neighbouring plots. Smaller connections were integrated for future permeability and local access.

The most efficiently constructed homes (affordable) were designed as traditional two-story (plus attic conversion potential) dwellings in terraces along the contours of the site. At the end of these terraces, the more expensive construction was placed, which became social housing units to meet the needs of a more diverse brief. Social housing units included wheelchair-accessible homes, embracing various unit types for different age profiles, and providing passive surveillance through street-facing designs.

Five live/work units were introduced, featuring flexible three-story spaces that facilitate working from home, with an adjoining plaza for community use. The crèche, required by the Development Plan, was placed at the entrance of the development, featuring circular windows that echo the live/work units' circular design. This facility boasts a minimum capacity for 20 children, an outdoor play area, and dedicated staff parking spaces.

The proposal aims to integrate the existing natural landscape as a prominent feature. The planting scheme is intricately linked to biodiversity, focusing on plants that attract pollinator species, providing benefits to their habitats. The selection of proposed plants aligns with the All Ireland Pollinator Plan, serving as a guiding palette. Furthermore, the project emphasises the use of native species trees to enhance the environment for birds and other wildlife, supporting their foraging and nesting activities within these plantings.



Ground floor plan, live/work units, commercial space.

Typical upper floor plan, live/work units, living space.

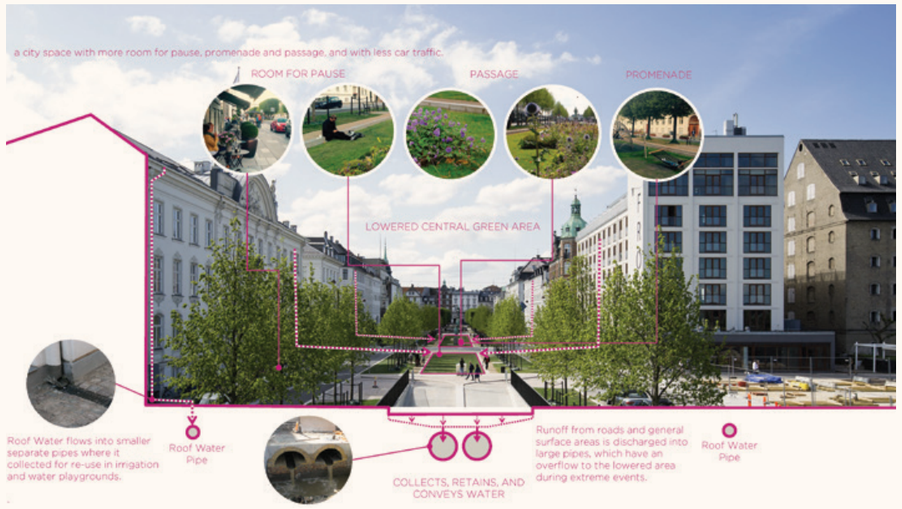
Site section.

Article 07 - Blue-Green Infrastructure (BGI) – Site Scale: From Best Practice to Next Practice

Author: Neil Goring, Senior Water and Climate Expert in Integrated Design, Ramboll, Copenhagen

Cities are dynamic hubs that must evolve to meet the changing needs of their inhabitants and environment. Traditional urban renewal often reacts to crises, like urban flooding, exposing the fragility of these areas. While it is beneficial to consider established best practices, a future-focused vision is essential for creating long-term value. Anticipating how a site will function in decades to come, we can proactively design spaces that respond to both the nuances of modern life and the pressing challenges of climate change.

Project: "Sankt Annæ Plads", Rambolls.



Climate change, with its immediate and tangible threat of flooding, works as a catalyst that propels us toward innovative urban development. Blue-green infrastructure (BGI) is an essential element in shaping resilient urban landscapes. It involves a systems-thinking approach, integrating natural elements into the urban matrix to bolster community resilience against contemporary climate challenges and future demands.

FLOOD-RESPONSIVE DESIGN AND SUSTAINABILITY

Central to BGI's success are Sustainable Urban Drainage Systems (SUDS), which function best as part of a holistic urban ecosystem. By strategically interweaving rain gardens, permeable surfaces, and natural water retention within public spaces, these systems transition from isolated infrastructure to integral components of urban landscapes, serving as both aesthetic enhancements and functional defenses against extreme weather.

BGI is not just beautification; it's integral to urban resilience. Properly integrated BGI not only facilitates social activities but also addresses critical urban challenges, such as biodiversity loss, poor air quality, and the urban heat island effect.

Project: "Carlsberg Byen", Rambolls.
Credit: "Niels Nielsen, Carlsberg Byen PS.

HARMONISING INFRASTRUCTURE

As urban density increases, future city planning must mitigate associated challenges. Instead of segregating infrastructure - roads, parks, utilities - BGI encourages a synergistic approach. For instance, incorporating water management into road design can making soft mobility more attractive, leading to increased pedestrian and cycling spaces, thus reducing the overall need for paved roadways.

A comprehensive blue-green approach enables urban designers and planners to convert site-specific issues into broad-spectrum opportunities. By emphasising ecological functionality, community engagement, and flexibility, BGI emerges as a sustainable development model, ensuring that cities remain vibrant and livable for future generations.

BENEFITS FOR NATURE

- **Biodiversity:** BGI supports and conserves local ecosystems, fostering regional flora and fauna. It can revitalise under-utilised green spaces in industrial zones, creating thriving habitats.
- **Water Management:** Strategic water collection areas control runoff, providing purification and storage.
- **Cooling:** Green spaces absorb and retain water, slowing evaporation. Coupled with shade from trees, they effectively reduce the heat island effect.
- **Air Quality:** Urban vegetation serves as a natural air filter, capturing dust, and fine particles, improving overall air quality.

BENEFITS FOR SOCIETY

- **Health:** Access to nature promotes well-being, offering restorative effects and fostering a healthy lifestyle.
- **Education:** Regular interaction with urban nature invigorates learning and broadens environmental awareness.
- **Social Interaction:** Green spaces encourage communal activities, enhancing individual well-being and fostering social bonds.
- **Safety:** Living in climate-resilient areas provides a sense of security.

In summary, rather than being reactive, urban redevelopment must embrace a visionary approach, considering both the current state and the future potential of our cities. Blue-green infrastructure is a key strategy, leveraging the very tangible risk of flooding with a nature-based approach to create cities that are not only more liveable but also resilient in the face of changing climates. By focusing on integrated, holistic designs that bring nature into the urban fold, we can ensure that our cities continue to thrive while protecting both the environment and the well-being of their residents.

Materials

Marx Dormoy Apartments, Paris.

In this section, we delve into how a building is constructed, exploring systems and materials at a more detailed level. This phase unfolds during the detailed design stages but its success has a direct relationship to the earlier design stages where the dimensional constraints of the design have been firmly established. The breadth of optioneering available at this stage is directly related to the flexibility and tolerance allowed in the initial design.

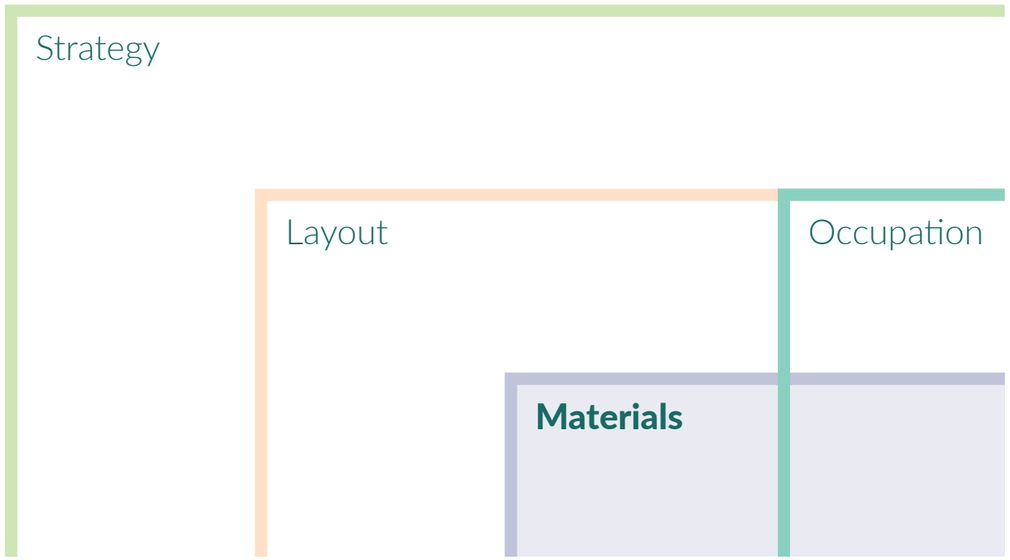
Material and construction innovation encompasses a spectrum of considerations. This includes approaches to structural efficiencies, services optimisation, prefabrication, and opportunities for Modern Methods of Construction (MMC). Exploring construction systems, such as facades and cladding, healthy materials, and low embodied carbon materials, should represent a key focus. Ambitious goals should prioritise a shift towards a circular attitude to material use, incorporating design for disassembly principles. Embracing the ethos of 'do more with less,' - thoughtful design becomes paramount, promoting the principle of simplifying solutions.

Early engagement with the design team and manufacturers becomes pivotal to maximise prefabrication options and specialist system knowledge. Where prefabrication is to be leveraged an extended design stage should be expected along with an integrated design team approach to design and coordinate the works in advance of the construction period.

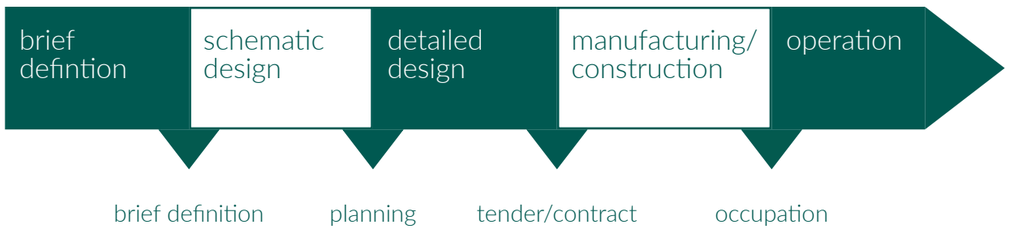
Traditional costing methods often fall short in quantifying the value of efficiencies like prefabrication, durability, future servicing costs, and healthy materials. It's crucial that any optioneering process reflects the holistic goals of a project, avoiding narrow thinking.

In this section, the critical importance of materials and construction methods in shaping the overall success of a project is underscored showcasing building examples that demonstrate sustainability ambitions with low-energy design and the delivery of projects through prefabrication. Turning to France provides a strong project example where bio-sourced materials were utilised. Contributions from Dr. Marie Goggins and IGBC discuss healthy indoor air quality and circularity. Merritt Bucholz and Oliver Kinnane contribute insights into innovations in materials through the topics of timber prefabrication and low embodied carbon design.

TYPICAL PROJECT TIMELINE



Project Life



Materials
- Materials

DURABILITY OF MATERIALS

» Provide robust, low maintenance, long life materials

INDOOR AIR QUALITY

» Materials to promote Health & Wellness - non-toxic/non-off gassing material options

STRUCTURAL SYSTEMS

» Optimise modularity/spans/ depths
» for flexibility & efficiency
» link to embodied carbon
» services integration

STANDARADISED VARIATION

» Simple construction palette that enables variation

RAPID CONSTRUCTION

» Accommodating value in cost plan

MODULAR

SIMPLE ECONOMIC PALETTE

SUSTAINABLE BUILDING MATERIALS

FABRIC FIRST APPROACH

BUILDING ELEMENTS INTEGRATING VEGETATION

EMBODIED CARBON

» What stages are embodied carbon tests useful?
» Relationship to cost
» Minimise waste
» Circularity

LIFECYCLE COSTS

» Durability
» Design for disassembly
» Minimize services

CIRCULARITY

Article 08 - Embodied Carbon, Housing

Author: Oliver Kinnane, Ph.D. M.Arch. B.E., Head of School; UCD Architecture, Planning and Environmental Policy

The materials used in the construction of our houses are melted, fired, heated and dried when processed from their raw form. To reach the high temperatures required for their processing fossil fuels are burned and carbon is released. When we build lots of houses, lots of carbon is released. Globally it's estimated that up to 2 billion homes will be built by end of century.

In Ireland we need to build many. Ireland's National Development Plan (NDP) proposes 400,000 new homes by 2030 to meet Ireland's expected population growth. Other estimates are closer to 50,000 per year while research from the Housing Commission recently put the number at 62,000 homes a year to meet demand.

The addition of this scale of housing, if built, will result in considerable embodied emissions. Our recent national accounting research[1,2] has highlighted that any carbon reductions achieved via operational efficiency gains deriving from high performance retrofit or new build, will be cancelled out and surpassed by embodied carbon emissions related to the construction of the homes outlined in the Housing for All/ NDP. In this scenario, by 2030, embodied carbon would exceed operational carbon and account for a greater share of the residential sector's whole life carbon.

Low carbon design alternatives are required to avoid this. Low carbon materials are one option for a low carbon design, but the gains are not always what might be expected. In the LCA of residential properties, using the common method of benchmarking promoted by the IGBC through the Indicate project, the reduction in upfront carbon for timber frame relative to masonry construction might amount to ~20-25% saving in embodied carbon. Considerable research into alternative steel and concrete processes and constituents is ongoing and the long term potential for significant reductions in embodied carbon are large but these technologies remain in at a nascent stage and widespread global uptake will be slow.

Another key strategy for low carbon design involves the minimisation of material usage either through optimisation of the building design or through waste reduction. Modern Methods of Construction are a range of systems and methods proposed as a means of achieving sustainability in construction. MMC, primarily through prefabrication and offsite production, is claimed to enhance product quality, construction efficiency, and environmental sustainability and reduce waste and cost. MMC offers an estimated 50% reduction in onsite construction times. Prefabrication has been shown to reduce up to 90% of waste compared to traditional onsite construction[3]. However, a recent study from the University of Cambridge[4] highlights that waste reduction has minimal impact on the overall embodied carbon given the total emissions attributed to waste during construction using concrete and steel sections are relatively small.

Much discourse is focused on the reuse of our existing buildings. Imaginative but sensible design proposals for the adaptation of obsolete or unfashionable office buildings to residential accommodations abound. Fabric retrofit has a fraction of the embodied carbon of new build, however in cases where new heat pump systems and photovoltaics are added, the embodied carbon of retrofit can approach 25-40% of new build[5]. Residential vacancy rates in some of Ireland's towns are greater than 30% and considerable embodied carbon savings are possible by retrofitting this instead of building new. Our research estimates that activation and retrofit of even 50% of the vacant stock could reduce embodied carbon estimates of the Housing for All strategy by 20%.

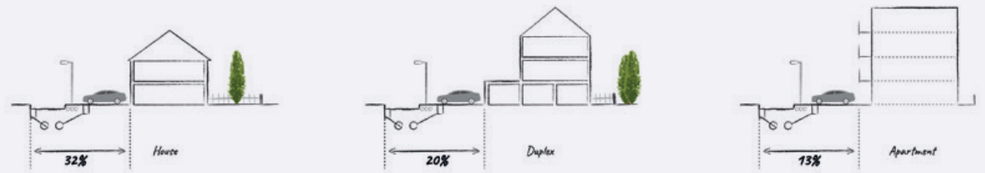
Inevitably new development will be required to cover demand. Our recent research, captured in the Viable Homes: guidelines for planners[6] highlights the negative carbon impact of low-density greenfield development. The external areas and infrastructure associated with low density development can add up to 30% additional embodied carbon to each development.

The embodied carbon addition of external areas and infrastructure for duplexes (20%) and apartments (13%) is markedly less.

Greater attention should be paid to what goes in the ground to service the type of low-density residential development common on the edges of our cities and towns. Irish water systems constitute considerably sized precast concrete structures. A typical (polypropylene) attenuation tank in a typical development might account for an additional 4% embodied carbon over and above that of the dwelling.

In summary, when we evaluate embodied carbon, it is not just the materials that we use to build with that matter but also what type of, and how many, buildings we build in any given area that matters. Higher density stacked dwellings are more efficient in their use of infrastructure and this provides savings in emissions from embodied carbon.

Nationally, concurrent to the highly ambitious national effort to reduce operational emissions from the residential sector through retrofit, the construction of considerable housing is planned in the short time horizon to 2030. Embodied carbon related emissions will remain large on the national emissions profile until we design compact urban developments with efficient, low impact materials, methods and systems.



Percentage of embodied carbon due to roads and infrastructure by home type[6].

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10

Shanganagh, Dublin

ARCHITECT NAME:
ABK Architects

PROJECT CLIENT:
LDA + Dun Laoghaire Rathdown C.Council

LOCATION:
Shankill, Co. Dublin

DWELLING TYPE:
apartments and houses

TOTAL NOS:
597

TENURE MIX:
34% Social, 51% Cost Rental, Affordable 15%

TYPE MIX:
29 Studio; 167_1B, 300_2B, 99_3B, 2_4B

SITE SIZE:
8.58 Ha

PLOT RATIO:
0.69:1

FUNDING TYPE:
LDA funded

DELIVERY TYPE:
Design and Build

PROJECT STATUS:
Construction

SUSTAINABILITY TARGETS:
Passive House & NZEB

CONTRACT TYPE:
Public Works Contract for Building Works designed by Contractor

Rendering, aerial view.

Description

The Shanganagh Castle Estate, situated in Shankill, Co. Dublin, is a collaborative initiative between the Land Development Agency and Dun Laoghaire Rathdown County Council. It includes 597 residential units, comprising Affordable Sale, Cost Rental, and Social housing, to meet diverse housing needs within the community.

The project places a strong emphasis on sustainability, aligning with the rigorous standards of Passive House and Nearly Zero Energy Building (NZEB). Adhering to these standards ensures high energy efficiency.

The historical significance of the site, originally part of the Shanganagh Castle Demesne, is honoured through the master plan. It integrates the existing historical landscape features with modern built and landscaped zones, in alignment with the goals of the Local Area Plan. This creates connectivity to the greater Woodbrook-Shanganagh Area and includes pedestrian and cycle routes, enhancing accessibility.

Optimising public transport, the project leverages the proximity of the proposed DART station and the planned BusConnects corridor, promoting healthier and more sustainable commuting options.

The project fosters a sense of community through well-planned amenities, communal spaces, and shared facilities. A central ‘Square’ acts as a hub for community life, offering diverse amenities such as a shop, café, cinema room, gym, residential lounges, co-working spaces, a community art gallery, function room, and business pods. These facilities create an active social nucleus, encouraging residents to connect and engage.

The development addresses evolving needs of the residents, offering support for working from home through the provision of business pods and co-working units.

The project provides a range of apartment unit types, from studios to four-bedroom options, catering to various family sizes and preferences. Open-plan layouts incorporating universal design principles offer flexibility, enabling residents to configure their living spaces to suit their needs.

Site plan.

Project Focus 1:

INFORMED TENDER; Detailed Design

The Shanganagh Castle Estate Project was procured under the Public Works Contract for Building Works designed by the Contractor.

During the detailed design stage, the design team completed several steps to maximise the project's appeal to competing bidders during the tender process while aiming to maintain the high aspirations of the design. Extensive procurement options were assessed during the Detailed Design Stage, considering a range of possibilities, including the project's delivery through large contracts, individual houses, or several smaller projects.

Early-stage decisions were made to support the construction process, including the addition of a temporary construction entrance during the Planning Stage to enhance work scheduling and phased occupation. A comprehensive construction programme with numerous options was drafted during the detailed design stage to inform tender documentation, project delivery, and phasing.

During the Design & Build Tender process, a detailed specimen design was created for an apartment block, typical house types, and the crèche.

This involved developing detailed information for structural and civil engineering, mechanical and electrical services, and landscape elements. Furthermore, a comprehensive set of "Additional Information" was produced to define quality standards and instil confidence in project delivery. While the 'Additional Information' wasn't part of the Works Requirements for the contract, it provided tendering contractors with the assurance needed for pricing and buildability.

The design was developed to allow flexibility for Contractor Design. For example, the tendered concrete frame with steel framing infill was substituted by the Design and Build contractor for precast concrete 2D panels for the superstructure frame elements, which includes walls, slabs, columns, beams, and stairs.

To ensure effective stakeholder engagement, a Communications Matrix and Trackers were established as part of the construction delivery. The contractor has also set up a structured engagement process with DLRCC and the local community, ensuring that local residents, businesses, and representatives stay informed of site progress.

Project Focus 2:

PASSIVE HOUSE; Detailed Design

The Passive House approach was embraced for this project, with a primary focus on a 'fabric first' strategy to attain high levels of air tightness and superior U-value performance, surpassing current Building Regulation standards. This energy-efficient design significantly reduces space heating requirements, resulting in lower operational costs and decreased energy consumption.

To ensure form efficiencies, multiple iterations of Cost Plans were carried out to fine-tune apartment block layouts, unit types, and circulation for optimal efficiency, with a specific focus on Gross External Area (GEA) to Façade ratio.

To provide heating and hot water throughout the development, District Heating is employed. This system utilises Air Source Heat pumps in conjunction with back-up Gas Boilers located in the Energy Centre. The heat is distributed via an underground piping network, ensuring low-temperature flow and return, which minimises heat loss. Each apartment is equipped with a Heat Interface Unit and heat metering.

Within each apartment, a standardised cupboard houses the primary M&E equipment. A Mechanical Ventilation Heat Recovery (MVHR) unit located in the dedicated M&E Cupboard facilitates ventilation. For heating, each unit features a Heater Battery connected to the centrally generated heat system pipes. This setup delivers Passive House heating through the ventilation air, and towel radiators are installed in the bathrooms. Ducting arrangements are optimised for efficient heat distribution, and specified storage cupboards within larger units can serve as airing cupboards.

The Energy Consultant was a key member of the design team. Passive House Planning Package models were produced for each building to determine the thermal envelope and mechanical building services.

Thermal modelling was carried out on a large number of details during detailed design. This entailed a number of iterations of construction details to ensure compliance of the design. These models were provided as Additional Information.

A Passive House, Building Regulations, Airtightness and Thermal Bridging document was produced by the Energy Consultant at Tender Stage to set out the Works Requirements and ensure clarity on performance requirements.

A Contractor Training Presentation took place mid-tender, covering a broad scope of the tender information. A significant portion of the presentation focused on Passive House in order to provide the tendering contractors with an understanding of the requirements. The precast concrete structure provides an excellent airtightness line reducing the need for membranes & taping and thus simplifies the QA process. Early air-tightness testing on site has been utilised to verify the design.

The Energy Consultant was novated from the Client Team to the D&B Contractor to ensure consistency of approach and Passive House experience was maintained on the project.

Early in the project, Wired Score was consulted to enhance digital connectivity, reinforcing the environmental strategy. To ensure an energy-efficient design, an 'Energy Efficient Design' report was generated at various project stages. Additionally, an IS399: Energy Efficient Design audit was conducted during the initial design phase to ensure seamless integration of energy-efficient considerations. An analysis of the building's life cycle was initiated from the project's outset, evaluating materials, structure, and services to select durable, low-maintenance options.

Facade bay study.

Facade axonometric study, detail design.

Article 09 - Timber in Housing

Author: Merritt Bucholz, Bucholz McEvoy Architects

The use of timber in housing makes sense. People understand wood in an intuitive, non-technical way; it is associated with clear long-term health benefits, and is faster and less expensive to build with if we consider the long-term climate impacts of concrete-based construction systems.

Given the density of development in Ireland and the relatively low-rise composition of cities in Ireland timber construction fits well within the lexicon of materials with tremendous potential to speed the delivery and enhance the quality of Ireland's housing stock. As a material timber can be used for structure, floors, window frames, walls, external cladding, and insulation. In all of the ways in which mass timber construction supports delivery, quality, and project economics, cost-rental and affordable housing is particularly well suited to be designed to optimise the unique properties of mass-timber construction. The diverse range of elements and components it can deliver, its warmth as a natural material, its low carbon, its prefabrication, combine to make timber and ideal material for housing.

Mass timber construction is particularly high quality due to the fact that it is almost entirely prefabricated in a factory, and that it is simultaneously a finish and a structure. These aspects derive from the quality of a material that is primarily worked in a factory as against a material that is primarily worked on a building site. With careful planning, the proportion of construction time of a building off site, in a controlled environment like a factory is increased, while time on the building site, where there is greater risk from weather and construction related damage is decreased. Mass timber construction, as a primary structure is almost always automatically a finish. With careful design and planning the need for plasterboard linings and other finishes can be greatly reduced. The combined efficiency of construction and double jobbing as structure and finish can result in safer building sites, and higher quality finished buildings that are largely undecorated internally.

Current challenges, primarily concerned with the Irish Building Regulations Part B (Fire), are perhaps one of the easier to solve aspects slowing the development of mass-timber construction in Ireland; we in Ireland are well positioned to benefit from work completed internationally in adjusting building regulations to mass timber construction.

The development of the mass timber supply chain is constraining the speed by which it can be adopted as a common approach to construction; things such as the global availability of wood to build from and the process of transforming that wood for construction as it makes its way from the forest to the site, are developing at a global scale. Ireland does not currently have forests that are capable of delivering the quantum of timber required in the form required, nor does it have the technologies needed to transform the timber from forest to building site such as CLT and Glue-Lamination factories. However Ireland has a very well developed joinery trade; the formwork industry which is almost entirely timber-based, and fine joinery for window frames, cabinetry and doors are outstanding examples of timber-based manufacturing supported by strong trade skills that can be employed in the delivery of mass timber based projects. Given that our largest cities are all located near ports, this would seem an ideal and inexpensive way to move mass timber into Ireland.

The spans of mass timber and sizes of spaces that it produces naturally and effortlessly are inherently domestic, however these sizes need to be taken into account when we consider the efficiencies of construction at scale, and provision needs to be made within the regulatory frameworks that are specifically calibrated to mass-timber construction. This approach has been taken in other countries where the specific benefits of mass timber are recognized as being inherently different from other forms of construction and allowances have been made within the statutory frameworks to ensure that these benefits are captured.

Installation of CLT core. ©Bucholz McEvoy Architects

11

Curragower Corner, Limerick

ARCHITECT NAME:
LCCC Affordable Housing team (design team lead) in partnership with the Housing Agency

PROJECT CLIENT:
Limerick City and County Council

LOCATION:
Clancy Strand, Limerick City

DWELLING TYPE:
Apartments

TOTAL NOS:
7 No. apartments

TENURE MIX:
1 community facility unit fronting public space with residential units above

TYPE MIX:
5_1B(1 UD), 2_2B

SITE SIZE:
0.11 Ha

DENSITY:
64 uph

FUNDING TYPE:
Affordable Housing fund

DELIVERY TYPE:
EOI Developer led post planning

PROJECT STATUS:
Preplanning design

SUSTAINABILITY TARGETS:
Min A2

CONTRACT TYPE:
Developer led and financed, LCCC administer AHF subsidy

Rendering of proposal with promenade and river in foreground.

Description

Curragower Corner, an infill apartment scheme in Clancy Strand, Limerick City, developed by Limerick City and County Council in collaboration with the Housing Agency.

Activating the ground floor along the riverfront transforms a former road space and carpark into a public plaza. Residents benefit from a roof terrace, and sustainable features like solar cells and a Sustainable Urban Drainage System (SUDs) chain contribute to the project's environmental responsibility.

Engagement with local neighbours in the design of communal garden spaces and a new public square underscores a commitment to community involvement and sustainable practices throughout the project's lifecycle. The area is closely associated with the construction of the indigenous wooden boat of the Shannon Estuary, a distinctive flat-bottomed boat locally known as a 'Gandelow,' capable of navigating the adjacent Curragower falls. The design and identity of the new public space are intended to be influenced by this heritage, incorporating an installation that pays homage to the history of the area.

Addressing challenges on a tight city center site with various restrictions and stakeholders, the site layout maintains façade lines and introduces a closing corner volume.

This strategic approach balances density considerations with the sensitivity of the riverfront location. The main parapet height is set to the eaves of the neighbouring context, while a retracted penthouse level pulls back from the main façade line, to sensitively reduce scale at eye level.

The building block layout incorporates a single core providing access to three units, featuring mirrored 1-bed layouts. Each apartment boasts a river view, and the open-plan living and kitchen spaces extend to a balcony terrace overlooking the Shannon. This design highlights innovation in both building block and unit typology.

Exploring the potential for Light Gauge Steel construction, or a hybrid with CLT construction, with a presumed off-site manufacturing approach, the project aims to be marketed to developers post-planning without a predefined building system. This allows flexibility for developers to decide and detail the design, leveraging their expertise within Modern Methods of Construction (MMC).

12

Sonny's Lands, Limerick

ARCHITECT NAME:
LCCC Affordable Housing team

PROJECT CLIENT:
Limerick City and County Council

LOCATION:
Athlunkard Street, Limerick.

DWELLING TYPE:
Apartments

TOTAL NOS:
21 No. apartments

TENURE MIX:
19 cost rental, 2 social

TYPE MIX:
10_1B, 11_2B

SITE SIZE:
0.25 Ha

DENSITY:
84 uph

FUNDING TYPE:
Affordable Housing Fund

DELIVERY TYPE:
LCCC financed, AHB managed

PROJECT STATUS:
Preplanning design

SUSTAINABILITY TARGETS:
Min A2

CONTRACT TYPE:
Contractor Design Build post planning (PW-CF 2)

Description

Sonny's Lands, developed by Limerick City and County Council, represents a mixed tenure development in Limerick City.

The site layout encompasses the reconfiguration of an existing roadway, seamlessly integrating the city wall and reshaping the streetscape into a shared surface pedestrian priority route. This strategic approach resonates with a dedicated commitment to community development and a people-focused design strategy for the landscape and public realms. The overarching goal is to nurture a profound sense of belonging and sustainability that extends well beyond the completion of the project.

At the building block level, innovative decisions include the incorporation of common shared rooms for residents, shared roof terraces, and a distinctive 2-bed ground floor unit with a 2-bed duplex unit above, with own private roof terrace.

The unit typology integrates a stacked modular system, enabling volumetric modular construction on the 3-storey units. Notably, corner apartments across five levels feature a central core feeding three units per level.

The project adopts a mirrored and regularised plan solution on each level. The utilisation of prefabricated modules for service shafts and kitchen/wc contributes to overall material and construction innovation.

Axonometric sketch view of proposal.

The Council aims to fully develop the site into a sustainable mixed-tenure residential project, seeking an economically advantageous, efficient, and low-risk approach. An external design consultancy team will oversee the design process until planning approval, minimising risks in this phase.

The project will follow a two-stage tendering process to select a design and build contractor. This process will use the planning stage project, Employer's Requirements, and performance specifications, allowing flexibility for the use of Modern Methods of Construction (MMC).

The designers will be retained by LCCC for the duration of the works in an advisory capacity, serving in an advisory role. They will have a dedicated and clearly identified resource for reviewing the Contractors' Proposals, conducting compliance sample reviews, and inspecting works at both on-site and off-site manufacturing locations to ensure the employers' requirements and performance specifications are delivered.

Retaining the initial design team post-award of the works contract ensures continuity of expertise and oversight until project completion. It also promotes innovation from the Design and Build Contractor and their design team, utilising their expertise in the overall constructability of the project.

Site layout plan.

Project Focus 1:

Enabling the transition to MMC – A local authority perspective

Author: Mick Ford Bradley, Senior Executive Architect, LA Housing Construction, Housing Directorate; Limerick City and County Council

The Housing for All plan makes provision for innovations to improve, support and accelerate delivery of housing and it identified Modern Methods of Construction (MMC) as one of the innovative developments that should be encouraged as we transition away from traditional building methods..

Local authorities, as a major procurer of construction services, have a key role to play in enabling the increased adoption of MMC in public housing delivery, and the continued modernisation of the Irish building industry.

In the context of the social and affordable housing delivery targets in Housing for All, Local authority led development will account for a significant portion of the demand pipeline for residential construction services and methodologies for delivery over the next decade. The advantages of a mature MMC led building industry are widely documented - speed of delivery, off site manufacture, lean construction with greatly reduced/ eliminated waste material, design for disassembly and re-use, standardisation of building elements with greater quality control and health and safety benefits.

Limerick City and County Council (LCCC) are actively looking at how a local authority can assist and support this transition by prioritising and including a focus on MMC enabled design as a key objective and driver from the early design stages.

Adoption of MMC can benefit from design team structures and procurement strategies that allow for a wider usage of contractor led design build projects.

To that end, LCCC are in the process of setting up frameworks of individual design consultants for the delivery of social and affordable housing schemes with a particular focus on MMC enabled/ flexible design to planning stage, and a subsequent contractor led design build process. The Council's initial design team is retained after award of the works contract in a technical advisor role for inspection and oversight purposes.

Design solutions should ensure a high level of repetition and standardisation in the building layouts and that the layout is suitable for multiple different forms of MMC. By not defining the building method and tendering for a design build contractor post planning stage, one enables the bidding contractors to maximise the benefits of competing in how one builds the scheme, and the time it takes to construct the project becomes a real deciding factor.

A detailed planning pack is necessary, as the key architectural qualities and aesthetic envisioned must be ensured, regardless of the method of construction utilised. Design quality and the detailing of schemes has previously been a key criticism of design build processes, but a greater usage of contractors expertise within MMC, and a freedom for the market to compete on building methodologies is needed if we are to transition to a MMC driven industry. Challenging our design teams to design for multiple possible MMC delivery methods, while still ensuring the delivery of an exemplary architectural vision of quality, is one of the key challenges facing local authorities in this transitionary period.

Article 10 - Indoor Air Quality

Author: Dr Marie Coggins, University of Galway

Integrating indoor environmental quality (IEQ) into EU ambitions to achieving climate neutral residential buildings offers many benefits, including health, thermal comfort, energy efficiency and overall sustainability.

Indoor environmental quality encompasses various factors relevant to creating a healthy indoor environment; indoor air quality, thermal conditions, lighting, acoustics and ergonomics. Addressing all these factors holistically requires a multidisciplinary approach, drawing on expertise in science, engineering, architecture and health science. In this short article we focus on one of these factors, indoor air quality (IAQ). While IAQ is a very important determinant of IEQ, when considering the broader definition of what constitutes a healthy building we should consider IEQ and not just IAQ.

Unfortunately, poor IEQ conditions are prevalent in social housing[1]. Poorly maintained, older housing often located in urban areas tends to be associated with higher exposure to many indoor pollutants, resulting in poorer health outcomes for residents. Energy efficient retrofit presents an opportunity to not only improve the energy performance and thermal comfort of such homes, but also to create a healthier indoor environment for residents, many of whom are often more vulnerable due to age or socioeconomic status.

Indoor air quality refers to the quality of air inside, outside and around our buildings, and the relationship to both the short- and long-term health of building occupants.

The significance of IAQ stems from the fact we spend up to 70% of our time indoors, and an estimated two thirds of this time in our home. Therefore, improving indoor air quality in residential settings can have a significant impact on our health and wellbeing.

Over 2000 pollutants have been detected indoors[2], and this number continues to increase each year as new chemicals are created, marketed, and brought into our homes in consumer products. Exposure to such air pollutants has been linked to health issues ranging from short-term irritation to long-term respiratory and cardiovascular problems, cancers, and the exacerbation of existing conditions such as asthma, or allergies. This exposure is not trivial, and is estimated to cause greater than 2 million healthy life years across the EU, at a cost of approximately €200 billion annually[3].

In the past we relied somewhat on infiltration of outdoor air through a leaky building fabric or draughty windows to to dilute or remove concentrations of harmful pollutants. As we move towards more airtight energy efficient new builds or retrofits, we need to rethink how we manage indoor air quality.

In this new approach, ventilation is going to be our ally. Adequate airflow helps in reducing the concentration of indoor pollutants by allowing fresh outdoor air to circulate inside, diluting contaminants and maintaining a healthier atmosphere. We also need to become more aware of the pollutants of concern, their sources, and solutions to reduce exposure by minimising sources and improving general ventilation.

Example of mould growth at window resulting from poor ventilation.

Example of carbon dioxide sensor.

The greatest health burden from exposure to IAQ in residential settings relates mainly to exposure to pollutants such as fine particulate matter (PM), nitrogen dioxide, radon, ozone, and the volatile organic compounds (VOCs), in particular formaldehyde[4].

Particulate matter is a complex mix of chemicals normally measured and reported in different size fractions for example PM2.5[5] and PM10. The main source of PM indoors is the infiltration of outdoor PM, with the primary outdoor source in Ireland being the residential burning of fossil fuels[6]. The replacement of fossil fuel-based heating systems with cleaner renewable heating systems, via Ireland's National Retrofit programme[7], is a positive step forward to reducing the PM burden from residential fossil fuel combustion. Other indoor PM sources of significance include; tobacco smoking, burning scented candles or incense, cooking and cleaning. Public health concerns related to tobacco smoking are well established and when smoking occurs indoors PM concentrations can rise to over 10 times the World Health Organization (WHO) guidance value, posing not only a significant health impact to the smoker but also to non-smoking occupants[8]. In relation to cooking related PM in airtight buildings, source control is key. The use of a properly functioning cooker hood, that completely covers the hob, with adequate flow and capture velocity is essential to reduce cooking generated PM, and will also reduce nitrogen dioxide released from gas cooking[9].

A recent review of the association between energy improvement interventions and health has identified three important exposure issues emerging from research on indoor air quality post energy renovation, namely increased concentrations of VOCs, radon and mould[10].

Volatile organic compounds (VOCs), such as formaldehyde are emitted from household products like paints, composite wood products, cleaning agents, and furnishings. Higher concentrations of formaldehyde, probably from new materials introduced into the home during retrofit, have been measured in Irish homes as long as three years post retrofit[11].

Choosing low emitting VOC materials seems like the obvious solution to mitigate indoor concentrations, but unfortunately this is not a simple task. Despite much progress in the area of establishing a list of harmonised EU health based reference concentrations for VOCs emission testing (LCI values), there has been little progress to date in establishing a harmonised European VOC labelling scheme[12]. For now, voluntary ECO labelling schemes are available, one just needs to check that they include VOC within their purview.

Biological pollutants like mould, pollen, pet dander, and dust mites are common in indoor spaces and can trigger allergic reactions or respiratory issues. Humidity control is a vital aspect of reducing mould growth. By increased building thermal insulation without due regard for the risk of thermal bridging and/or adequate ventilation has been shown to result in mould growth. This is a particular concern in naturally ventilated homes when occupants don't fully understand the important role of ventilation and decide to remove or block wall vents due to noise or perceived draught concerns.

Exposure to radon is an important public health priority for Ireland due to the high prevalence of igneous rock formations. It is currently estimated that 10% of the Irish population is exposed to levels greater than the action value of 200 Bq/m^3, and exposure accounts for an estimated 350 cases of lung cancer per year[12]. Radon levels tend to increase post retrofit most likely due to increased building air tightness with poor building ventilation or poor design. Post retrofit radon monitoring is essential to identify at risk homes.

Marx Dormoy Apartments, Paris.

As we move to a more energy efficient built environment, efforts to improve IAQ need to encompass a range of actions including;

Education and outreach need to play a central role, providing homeowners or tenants with information on how to maintain good IAQ in an airtight dwelling, the role of proper ventilation, the importance of avoiding certain occupant behaviours, cooking without the use of a cooker hood, smoking etc that can negatively impact on IAQ.

Ventilation is important for both the extraction and dilution of indoor pollutants. Current research is pointing to mechanical ventilation as the solution to reduce the occurrence of harmful levels of pollutants in airtight energy efficient homes. However, field research in Ireland suggests that there are still some challenges around installation and ongoing maintenance of mechanical ventilation, we need to address such issues urgently in order to ensure maximum benefits from energy upgrades.

Technology has allowed the development of low-cost sensors. With the increased availability of low-cost sensors, connected to mobile apps or smart home systems, affordable solutions are now available to measure key air quality pollutants. Carbon dioxide sensors can help identify poor ventilation, and act as a reminder to open windows and doors and bring more fresh air into the space. However, IAQ sensors are only a broad guide and should only be used after carefully following manufacturer instructions.

In conclusion, ensuring good indoor air quality in buildings is pivotal for maintaining the health and well-being of its occupants. Implementing a holistic approach that includes the selection and use of low-VOC construction products, and that utilises well designed ventilation, are crucial steps toward achieving optimal indoor air quality. By prioritising indoor air quality along side energy efficiency, we can create healthier energy efficient living spaces that promote a higher quality of life for their occupants.

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13

Marx Dormoy Apartments, Paris

ARCHITECT NAME:
Barrault Pressacco

PROGRAM:
15 social housing units and 2 stores

TYPE:
new construction

LOCATION:
rue Marx Dormoy, Paris, France

CLIENT:
Paris Habitat

SURFACE:
1 300 m² (SDP)/988 m² (SHAB)

BUDGET:
2 570 000 €HT

CALENDAR:
Livraison 2022

LABELS:
Environemental regulation RT2012 -30%,
Plan Climat Ville de Paris, Certifié H&E niveau Effinergie +, Système individuel de récupération de chaleur sur les eaux grises
Lable Biosourcé niveau 2

TEAM:
LM Ingénieur, structure & thermique
Atelux: fluids
ALP Ingénierie: economy
Les Rondeaux landscape
Tempere Construction
Charpente bois : Dimension Services
Béton de chanvre : SMB

Exterior view of facade.

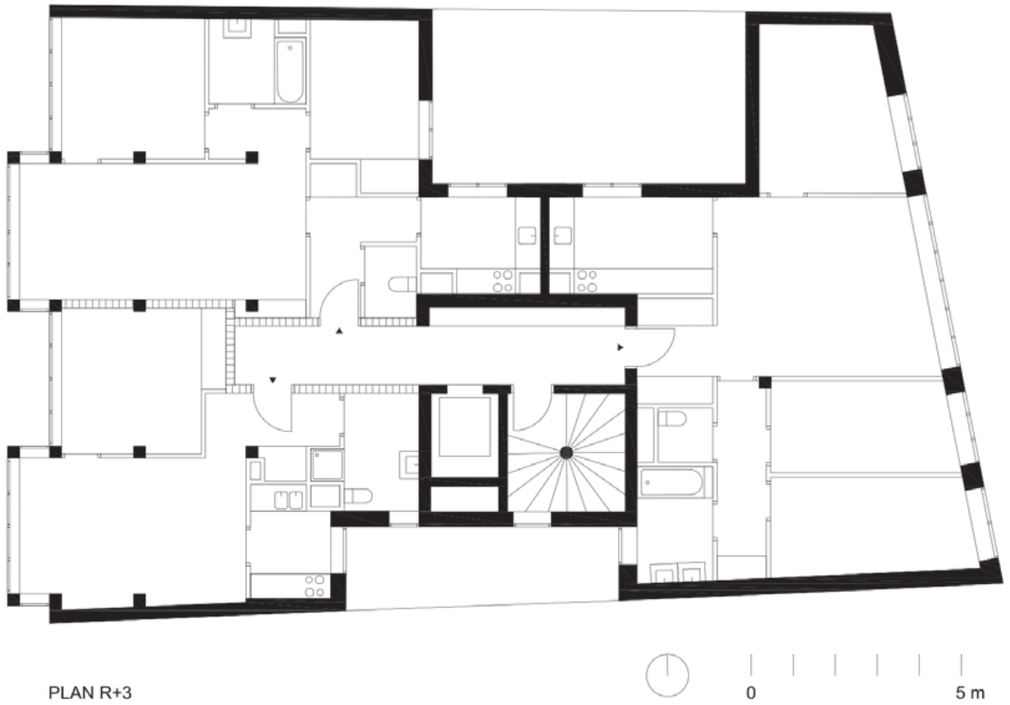
Description

Located on the Rue Marx Dormoy in Paris's 18th arrondissement, the building contains 15 units for social housing along with two shops at ground floor level. With its loggias overlooking the public space, the project revisits the typical Parisian apartment blocks in a wood-frame and hempcrete version.

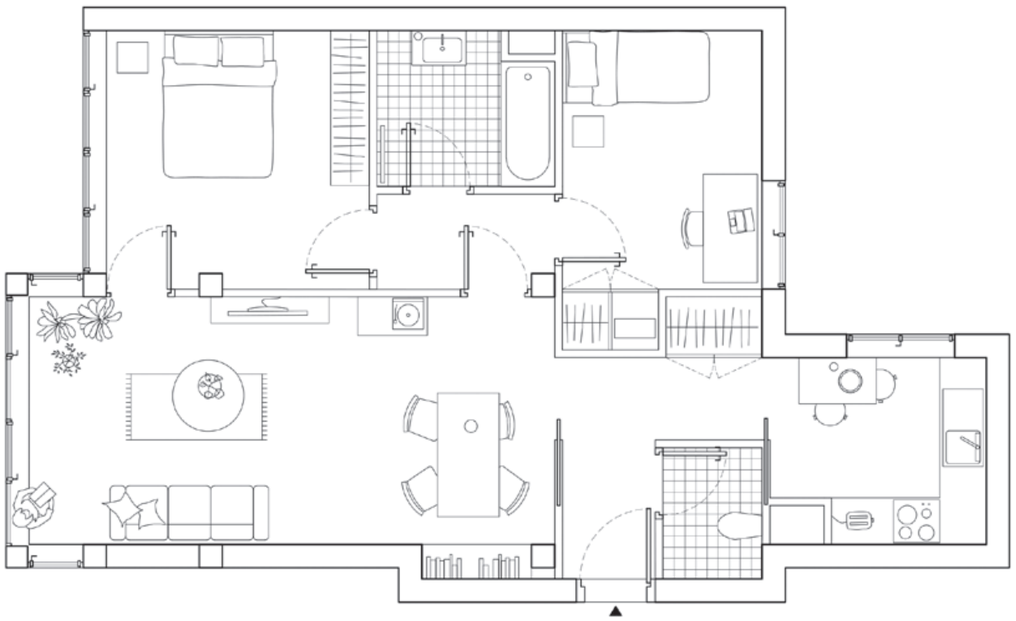
The bow-window fold is used to extend the living rooms, multiplying the facade's length and opening angles. The windows are positioned flush with the exterior of the facade, freeing the window embrasure throughout the full depth of the wall. These inhabited windows offer many possible uses: one could sit and read, sunbathe, grow plants, etc. In this way, the natural material links architectural tradition and environmental issues.

The project nestles in a dense urban fabric, between two existing buildings of different heights. Constructions dating from various periods characterise the neighbourhood.

As a reaction to the narrow and deep plot, we proposed the creation of two interior courtyards responding to the voids in the neighbouring buildings, another feature of Parisian blocks. The typical floor features three apartments that, due to the courtyards, benefit from plenty of sunlight, multiple orientations, and optimal natural ventilation. It also provides a calm interiority in contrast to the dense, noisy urban environment. The post-and-concrete-slab structure and lightweight partitioning allow the program flexibility and adaptability for future needs.

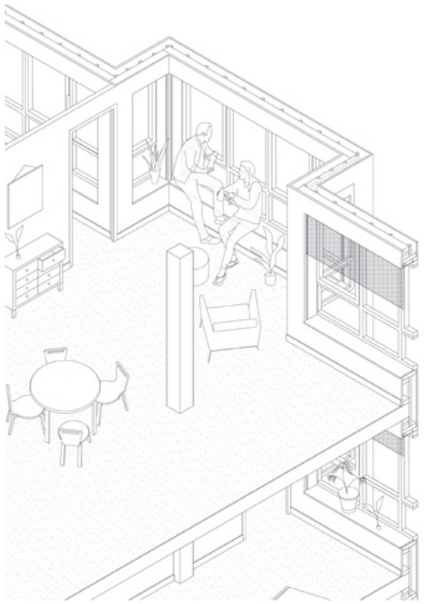


Upper level block floor plan. ©Barrault Pressacco



Typical unit plan. ©Barrault Pressacco

Axonometric drawing with front facade, set within dense urban fabric. ©Barrault Pressacco



Axonometric view of typical apartment with folded facade and layered wall construction. ©Barrault Pressacco

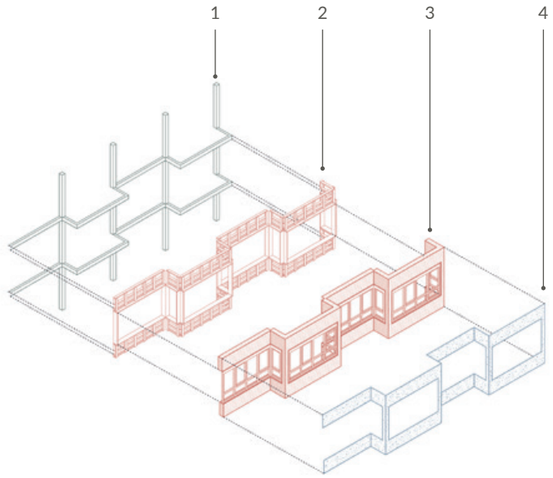


Diagram illustrating layers of low carbon, breathable wall build-up

1 - Structural frame
2 - Timber frame
3 - Hemp & lime insulating material with windows
4 - External lime coating

Photograph of typical apartment following occupation, with window fold extending living room.

Project Focus 1:

Natural materials and experimentation in social housing

Barrault Pressacco is a Paris-based firm that is using biomaterials as a primary element in the design of several low-carbon social housing projects in the capital like hempcrete, wood, massive stone, or maxi-bricks, proving that natural resources can enter the economy of social housing production and meet the challenges of sustainability and long-term maintenance of public assets.

In rue Marx Dormoy, they proposed a hybrid building that uses the right material in the right place: a timber-framed façade is composed of standard cross-section pine elements. This framework rests on the end of a concrete post and slab structure, with a slight cantilever to cover the nose of the floor and avoid linear thermal bridges. Insulating material made from hemp and lime is sprayed into the thickness of the wood framing, forming a thickness varying from 23 to 30 cm depending on the face.

The whole wall is hempcrete, the whole wall is insulation: hempcrete is self-stabilizing insulator that is totally rigid when dry. It is finished with a lime coating. The thickness of the facade resulting from the choice of a natural materials is used here to offer bow-window extensions to the living areas.

This innovative construction method was a first for a 6-storey residential building at the time it was built. To this day, it remains a model for its low carbon footprint and almost totally insulating qualities. The material is produced locally with little industrial transformation and energy consumption. In addition to being a low-carbon local material, hempcrete acts as a genuine hygrothermal regulator: breathing walls improve interior comfort in summer and winter, as well as indoor air quality.

France has a long tradition of state intervention in housing provision, as well as creating the conditions for such pioneering projects to emerge.

There is perceived opportunity for experimentation in the public sector that is believed not to exist in the private sector. The drive to build with greater energy efficiency and a lower carbon footprint has led the public sector in France towards the use of biomaterials as an alternative to concrete in many projects.

The new legislation affecting all buildings financed by the French state aligns with the country's aim to be net-zero by 2050. However, still the lack of official standards, regulations, certifications, and calculations for the use of natural materials hinders their implementation.

Complex testing procedures are necessary and costly and discourage some from taking the step towards this green alternative. The use of natural materials requires a strong commitment on the part of all stakeholders (clients, private developers, social landlords, architects, engineers), and involves raising awareness, educating, and understanding the issues at stake.

Image of low carbon wall build-up: hemp & lime insulating material within timber-framed facade.

Article 11 - Circularity

Author: Irish Green Building Council

1 Introduction

Current building practices treat the world's resources as limitless. We follow an unsustainable linear economic model of "take-make-use-dispose". We extract raw materials, make products to construct buildings, and then once used, we demolish them, often leading to materials being wasted or downcycled.

A circular economy is based on three principles:

- Eliminate waste
- *Re*-Circulate products and materials at their highest value
- Regenerate nature

and is underpinned by a transition to renewable energy [Ellen MacArthur Foundation] (https://www.ellenmacarthurfoundation.org/eliminate-waste-and-pollution).

Buildings and materials can be circular if they are designed to be easily maintained, shared, reused, repaired, remanufactured and, the least favoured option, recycled. Why least favoured? Because recycling requires more energy. Even 100% recycled steel or aluminium will have a carbon footprint as the energy required to retrieve, reprocess and remould still comes from fossil fuels.

2 Policy directives, legislation and frameworks

The transition to a circular economy is embedded in European policy initiatives including the EU's 'Green Deal, Circular Economy' Action Plan, Critical Raw Materials Directive and the EU Taxonomy and EU Level[s] framework. On a national level, the Circular Economy Act 2022 aims to create a circular economy, while the Climate Action Plan 2023, the Whole of Government Circular Economy Strategy 2022-2023 and the EPA's Best Practice Guidelines also highlight the importance of a circular economy.

3 Circular approach and principles

Ireland has one of the lowest rates of circular material use in Europe. Our largest waste stream comes from the construction sector [Eurostat 2020]. What if we used this as an opportunity? A circular approach could be developed with the following principles.

3.1 Design out waste

There are three key ways to design out waste:

Waste efficient procurement. Early collaborative meetings between design and construction teams can improve specification to minimise waste and bring cost savings.

Materials optimisation. Think of how to minimise excavation, while specifying standardised and modular materials. Design for building work to be done off site, and for elements to arrive on site ready for assembly.

Design for re-use. Plan how to use materials so they can be recovered in future. Think about how the material is cut so that waste is minimised, and how it is fixed so that deconstruction is easy and the material retains or increases in value.

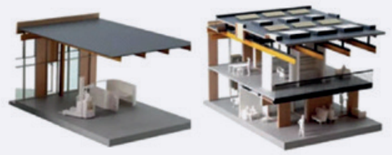
3.1.1 Case study: St Mary's College in Dundalk (https://merrionstreet.ie/en/category-index/education/schools/preferred-tenderer-appointed-for-four-new-schools.html) **(BAM Ireland)**

Under a PPP contract, BAM is using 7Dimension BIM to track the building's asset data for 25 years of maintenance service. This enables optimised facility management from design to demolition, simplified repairs and replacement of parts, and streamlined maintenance for contractors.

3.2 Design for deconstruction: disassembly and reuse

Design for deconstruction is a process of selectively and systematically dismantling buildings to reduce waste and supply high value secondary materials suitable for reuse and recycling. Building elements should be easy to separate, and connections should be reversible, accessible and mechanical.

3.2.1 Case study: School of Art and Design, Bath Spa University (Nicholas Grimshaw Architects)



The repurposing of the Herman Miller factory into the School of Art & Design at Bath Spa University illustrates the shearing layer model (https://www.researchgate.net/figure/Brands-6S-shearing-layers-theory-adapted-from-petermecom_fig2_299985800). The original factory was designed in 1976 by Nicholas Grimshaw, with a double-height space formed from a 10 x 20 m steel grid. In 2016, the same architect converted it from a factory to a design school. The primary structure had been designed independently from the secondary structure, allowing for deconstruction, adaptability and flexibility.

The internal walls and floors were originally lightweight mezzanines and partitions. These were easy to reuse and reconfigure to suit the new spaces of the school.

The original skin was made up of a modular system of interchangeable solid and glass louvres and door panels, which was adapted to suit the school. Over 1,400 tonnes of carbon were saved by retaining the structure and skin layers of the original factory building.

3.3 Design for adaptability

Designing for adaptability and flexibility means allowing enough leeway within the building design so that as occupants' needs change, layouts can be reconfigured without creating waste.

3.3.1 Case study: LivinHome, (https://www.architectsjournal.co.uk/buildings/livinhome-by-geraghty-taylor-architects)**, Croydon (GTH/Architects)**

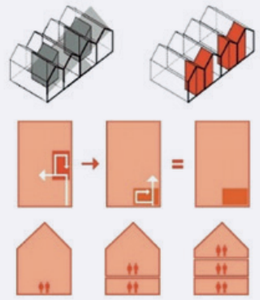


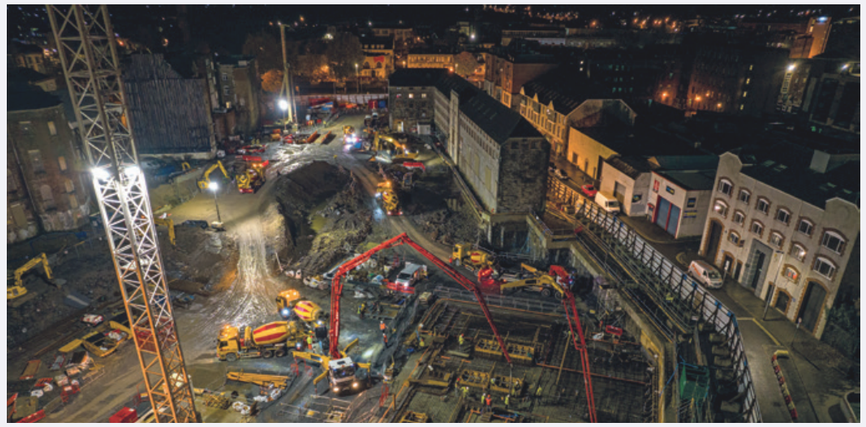
Photo ©Gareth Gardiner

On the outside, this three-storey block looks like six terrace houses. Yet, on the inside, it is divided into 11 units. Each house operates as a single six-bedroom home but can adapt into a two-bedroom flat and duplex, or into three stacked flats.

3.4 Reusing buildings

Re-using vacant buildings reduces the carbon intensity of construction and supports a circular economy for the built environment. Early design and construction team collaboration is essential to achieve this.

Bertelotte social housing, Paris (NZI Architects).
Photograph ©Juan Sepúlveda



3.4.1 Case study: Bertelotte student housing, Paris (NZI Architects)

Bertelotte was a re-use project to convert 4,400 square metres of office space into 150 apartments for students. The renovation used prefabricated wall panels with interior and exterior timber cladding and straw insulation. The straw came from Ile-de France nearby, creating short supply chains. One and a half floors were demolished to allow light into the ground floor, basement rooms and collective garden spaces at the centre of the buildings.

3.4.2 Case study: Park West Plaza (Tuath Housing)

In Ireland office buildings were repurposed into 86 apartments at Park West Plaza, Dublin. The office blocks, which were vacant for 20 years, were converted by adding a new floor.

3.5 Reuse, material selection that is circular and durable

Case Study: Opera Square Project in Limerick

The Opera Square Project (https://www.youtube.com/watch?v=fcpdrh8XESc) project team developed a reuse and repurpose sustainability programme (https://limerick2030.ie/esg/). A vital step in the process was to conduct a **pre-demolition audit**. This identified materials and components that were re-usable on and off site, or could be repurposed or remanufactured. Along with brick and stone, other materials were retained and reused on site such as palisade fence panels, metal gates, stone pillars, historic limestone and door cases. Other materials segregated for reuse on the development were carpet, ceiling tiles, timber, and glass. By salvaging bricks and stones within the site in that particular contract, over 99% of materials onsite were diverted from landfill.

Delivery

DeFlat Apartments, Netherlands.
Jan van Grunsven Architect; Stijn_Poelstra.

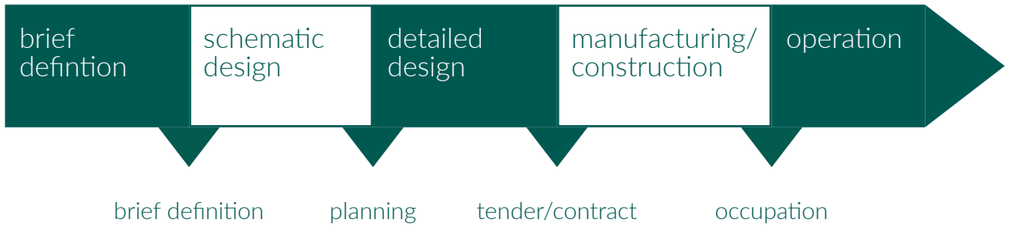
Decisions in project delivery significantly impact the project's success. Procurement models are often set at the project's outset and have a profound effect on its design processes, execution and the ultimate quality of the building.

Innovative project delivery may include practical strategies like rethinking stakeholder engagement, exploring funding types and procurement models, early manufacturer engagement or integrating mixed-use elements to improve viability

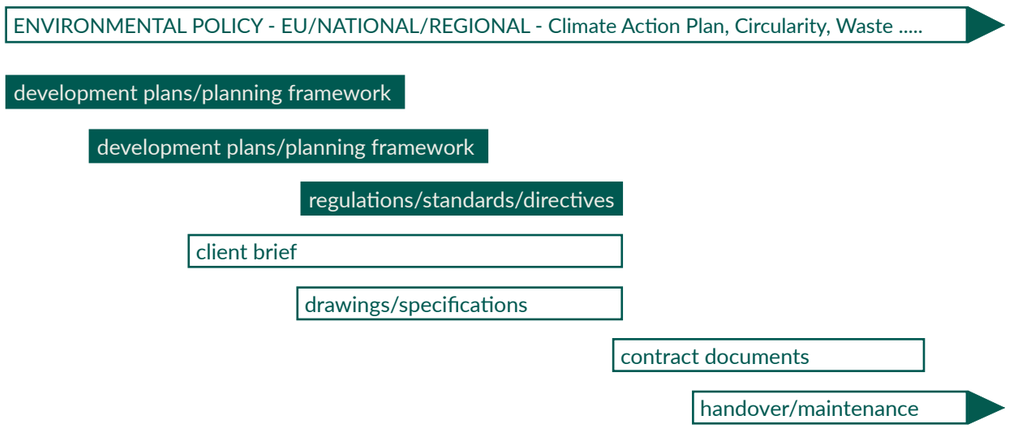
Efficiencies through robust and thoughtful design can be found in the design or construction programs reducing overall project risk during regulatory and construction stages.

This section highlights building examples demonstrating innovative project delivery methods through extended community consultation and direct delivery by AHB. The focus turns to the Netherlands for an innovative approach to delivering retrofit housing. Contributions from Margaret Geraghty discuss the current Irish landscape of cost rental delivery.

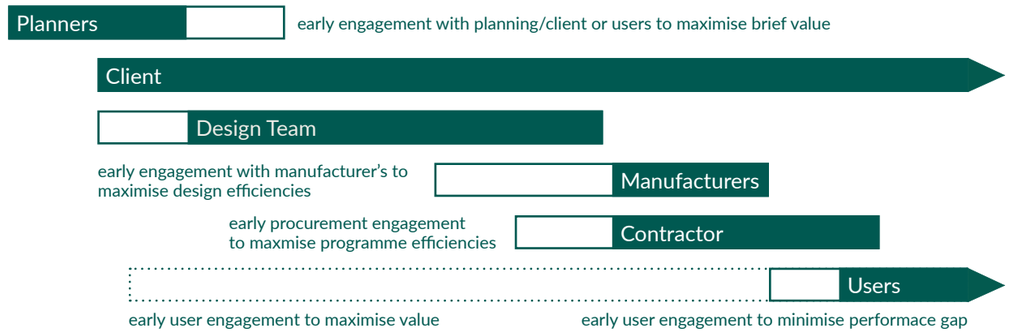
Project Life



Quality Documents



Participants



Emmet Road, public consultation event.

14

Emmet Road, Dublin

ARCHITECT NAME:
Bucholz McEvoy Architects

PROJECT CLIENT:
Dublin City Council

LOCATION:
Inchicore, Dublin 8

DWELLING TYPE:
Apartments

TOTAL NOS:
578 apartments

TENURE MIX:
76% Cost Rental, 24% Social

TYPE MIX:
110(ST), 172(1B), 250(2B), 46(3B)

SITE SIZE:
3.72 Ha

PLOT RATIO:
1:1.53

FUNDING TYPE:
SSF/TBC

DELIVERY TYPE:
Traditional Employer Designed

PROJECT STATUS:
Planning Granted (July 2023)

SUSTAINABILITY TARGETS:
NZEB

CONTRACT TYPE:
PW CF1/TBC

Rendering, pedestrian/cyclist permeability through residential development with view to Richmond Barracks beyond.

Description

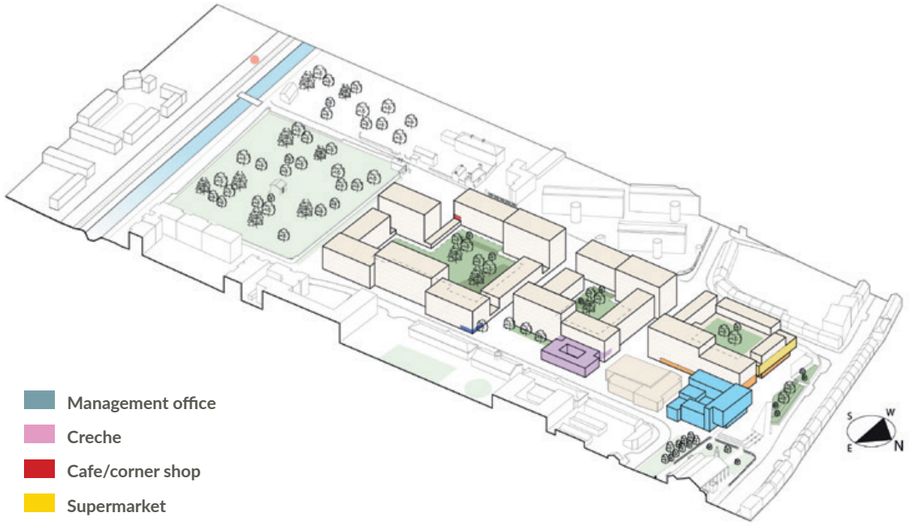
Located within Strategic Development Regeneration Area (SDRA) 9 at Emmet Road, the mixed use development comprises 578 apartments, a community hub/library, creche, supermarket, small retail related units, and a series of new public open spaces and public realm.

The objective of the development is to introduce a sustainable living and working environment with adequate facilities and to establish a new community designed around a series of courtyard blocks and high-quality public spaces which combine to impart a sense of place, recreation, and enjoyment, as well as being safe and attractive for use by the existing and new community in Inchicore.

The proposed development provides a mix of units and tenures comprising social housing and cost rental apartments.

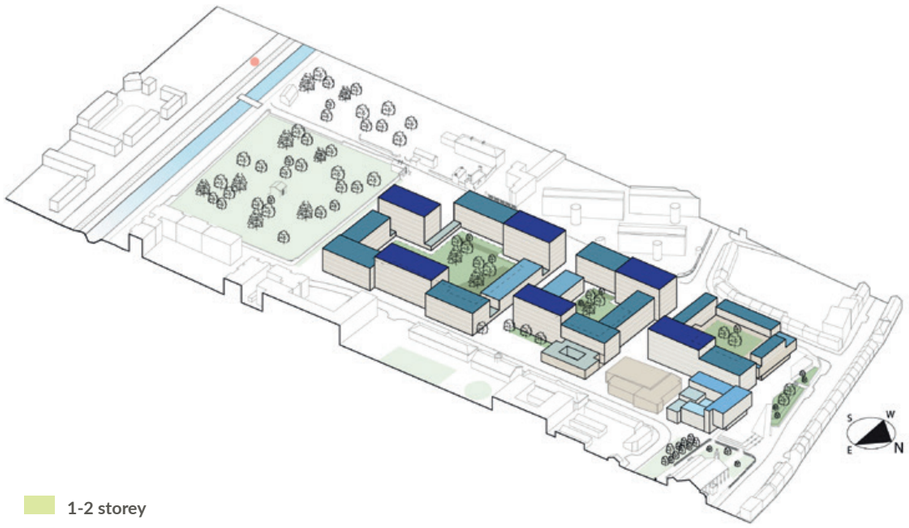
In consideration of the location within a well served public transport corridor, the development includes a sustainable level of car parking (106 spaces) inclusive of a dedicated car club, along with 1,285 no. cycle spaces.

The design and layout of the proposed development was developed with careful consideration of the surrounding character and unique architectural heritage of the area, including Richmond Barracks, St. Michael's Church and Goldenbridge Cemetery. The height of the proposed development is predominately a mix of 5 and 7 storeys along with 3 storey elements. The proposed layout will result in significant positive impact on the wider public realm and enhance the experience for residents and visitors within the area.



- Management office
- Creche
- Cafe/corner shop
- Supermarket
- Retail/cafe
- Library/community hub
- Energy centre

Proposed Site Uses Axonometric Diagram: mixed uses supporting residential community.



- 1-2 storey
- 3 storey
- 5 storey
- 7 storey

Proposed Site Massing & Height Axonometric Diagram, illustrating three residential courtyards.

- Healthcare
- Residential
- Childcare
- Religious
- Green Space
- Commercial
- Education
- Waterways
- Sports
- Civic Service

Interpretive site context map with observations of existing neighborhood uses and proposed development stitched into context, used as part of community engagement process.

Phase 3 public consultation event at Richmond Barracks with 1:100 scale timber model.

Project Focus 1:

Community Engagement Process

Working closely with the key stakeholders, including the Inchicore Regeneration Consultative Forum (IRCF) and the local community, the aim is to create a new neighbourhood of the highest quality, optimising the development potential of the site in a sustainable manner.

The proposed development was subject to extensive engagement with the local community and public from feasibility stage through to the lodgement of the planning application, to ensure that knowledge, views and concerns of local and key stakeholders would be taken on board.

In 2018 Dublin City Council (DCC) established the Inchicore Regeneration Consultative Forum (IRCF), comprised of community delegates including elected councillors, DCC officials, representatives from residents associations, community groups, and statutory organisations. The aim of the Forum was to represent the community and provide a direct line of engagement with design team and DCC in the development of a vibrant, mixed use urban quarter at Emmet Road.

Following the engagement of a design team, Dublin City Council appointed Connect the Dots, a specialist, neutral third party with demonstrated track record of facilitating successful community participation, with the role of assisting with the facilitation of the engagement process for the development at Emmet Road. In conjunction with Dublin City Council and the project architects, Connect the Dots developed a community consultation outreach strategy and methodology, facilitating a series of online and in person workshops with the community. A three phase consultation process was developed for the project, with each phase concluding in a published consultation report to summarise findings.

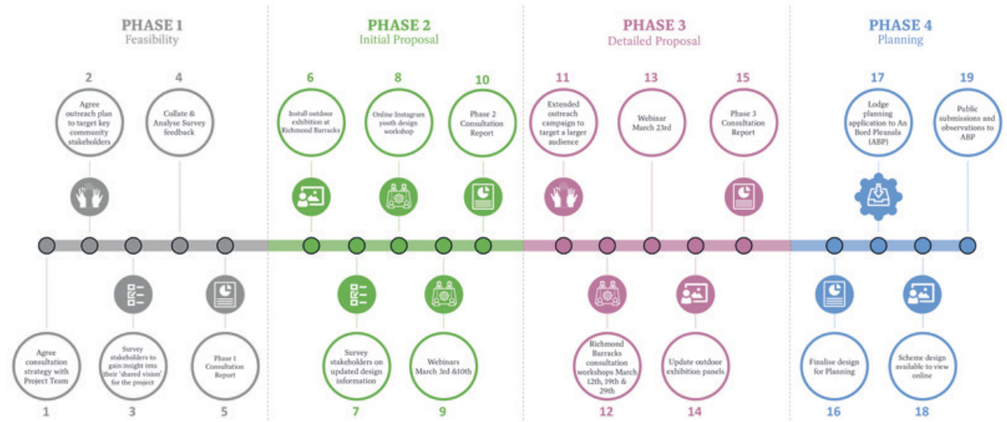
Phase 1 of the consultation process, aligned with the project feasibility stage, was focused on research and information gathering, with the aim of revealing the unique sense of place and potential for the site.

The rich community context was explored through desktop study, site visits and community events, with the development of a series of interpretive maps organised under a series of themes. Out of this process opportunities were observed for the project to strengthen the context and support the community fabric, improve connections and facilities, offer new public spaces and bring vibrancy and life to the heart of Inchicore. The consultation methodologies were adapted to suit the constraints of the Covid-19 pandemic, inclusive of a series of online, telephone and hardcopy surveys and an online webinar to present the findings and gather community insights.

Phase 2 of the consultation process included the installation of an outdoor exhibition located at the edge of the site developed from the Phase 1 findings, with a project specific graphic design identity. A series of design layers were developed by the project design team to assist with community understanding of the proposals and overall project design aspirations: creating an attractive vibrant neighbourhood; establishing a connected living community; providing healthy homes; prioritising affordability over time; and resilience. The design layers provided a means of explanation of the overall masterplan approach, driven by a place-making agenda, promoting shared spaces to enhance the lives of both the residents and the surrounding community, whilst encouraging social activity in a pedestrian and cycle friendly public realm, attractive and accessible to all. Combined with online surveys and social media engagement with youth groups, this consultation phase culminated with two public webinars to present initial concept designs for the development.

Phase 3 of the consultation process, aligned with the developed design stage prior to planning, was centred around the installation of a large scale (1:100) timber model in Richmond Barracks located opposite the site. A series of in-person consultation events included open drop-in sessions for the public, dedicated youth events for the local primary school and teenagers, and a dedicated workshop with the IRCF stakeholder group. The outdoor exhibition was expanded to communicate the developed design proposals to the local community. A series of focused workshops scheduled throughout this phase with the Inchicore Regeneration Consultative Forum (IRCF) enabled additional engagement.

The results of the consultation process were summarised and collated into an overall report contained within the planning application.



Public consultation strategy timeline.

Shanganagh, Dublin.

Article 12 - Opportunities and challenges of affordable housing delivery

Author: Margaret Geraghty; HDCO, LGMA

In Ireland, local authorities, have a key role to play providing affordable homes for purchase and rent. The *Housing for All* policy has placed the provision of affordable housing, very firmly on the agenda.

The Housing Delivery Coordination Office (HDCO) supports local authorities, the City and County Management Association (CCMA), DHLGH and other key stakeholders to deliver on social and affordable housing targets, develop programmes and implement measures to increase the supply of social, affordable purchase and cost rental homes.

Local authorities are actively engaged in restarting affordable housing, providing c.760 new affordable homes delivered in the last two years. Developing a housing pipeline of any kind takes time and we are now seeing a growing pipeline of local authority affordable housing projects to 2030. Housing for All has a suite of measures and funding supports available and every effort is being made to activate local authority lands for development, bring schemes through design, planning and into construction and to collaborate with key stakeholders in the Approved Housing Body Sector, Land Development Agency, Housing Agency etc. Local authorities also actively engage with the private development sector through various procurement processes, advance purchase arrangements and Part V. These measures, together with the success of the First Homes Scheme, are creating a visible pipeline of affordable homes, increased multi-tenure development and the activation of private sector development.

Meeting housing supply requirements and supporting economic development needs all sectors providing a mix of housing solutions across all income ranges. This includes a role for private investors and ensuring we have sufficient levels of private rented housing available.

Local authorities are focused on providing affordable housing for households who need a level of State funding support to buy or rent an affordable home.

Cost rental, as a new form of tenure in Ireland, is an essential element of this and local authorities are bringing forward proposals for cost rental. This is a new delivery stream for local authorities and is a big change. As projects are developed, there will be issues and challenges to be addressed to ensure early projects are successful and add value in terms of affordability and attractiveness for eligible households. Collaboratively addressing challenges related to funding levels, borrowing requirements, rent setting, optimum management solutions, will enable local authorities to develop cost rental with confidence.

In the context of housing demand, compact growth and the intensification of our cities, larger multi-tenure developments will be an increasing feature of housing supply. Affordable housing can play a pivotal role in redeveloping and regenerating inner city areas, support brownfield development and adaptive reuse of existing buildings and provide for much needed residential development. To be delivered sustainably, we must ensure that services and facilities are in place to ensure multi-tenure developments work, are affordable and attractive to prospective households and offer more than a stepping stone or a transient housing option.

Article 13 - Local authority delivery of affordable housing

Author: Ann-Marie Farrelly, Fingal County Council

An important part of our remit in the local authority is to create opportunities for people to achieve their ambition of home ownership. Housing availability for lower income purchasers at a price they can afford is a priority and there is a range of Government initiatives to support affordable housing. Local authorities, including Fingal are responding to the challenges of home ownership by creating a pipeline of reasonably priced housing schemes.

In order to deliver successful, sustainable and affordable housing, a great deal of research and planning is undertaken by a local authority. Experienced multidisciplinary teams comprising of planners, architects and housing professionals work together by analysing the property market, identifying suitable site locations and examining the available financial measures and supports which ultimately lead to home ownership for purchasers.

What are we building and for whom? How can we build as efficiently and cost effectively as possible? How will this community evolve in the coming years? There are many variations of potential purchasers all with different requirements and options, therefore these and other questions are important to ask from the initial concept. Taking the financial position of potential purchasers into consideration is an important point when planning a build - so too is anticipating people's requirements and expectations when choosing a place to call home.

Variety is a key element in the planning of housing schemes from ensuring supply of single occupancy units and 2-bed apartments right up to larger homes with the capability to cater for larger families over their lifetime. Local authorities are now guided by The Sustainable Residential Development and Compact Settlement Guidelines which are important in understanding that the design and density must suit the site location, whether that's a suburb or town centre location. The planning for and building of residential spaces has hugely evolved in recent years and the emphasis is to create attractive and sustainable communities with associated infrastructure, leisure amenities and good cycle and transportation links.

In Fingal, continued gained experience and refining our processes have enabled us to make good strides in our housing delivery programme. Effective procurement practices have brought to the market a wealth of innovative and modern building methods designed to promptly deliver high spec and attractive homes. Our first affordable housing scheme at Dun Emer in Lusk saw owners of 39 new homes take possession last year. Construction commenced in January 2024 on the latest phase of the Church Fields Master Plan. A diverse mix of 180 affordable purchase homes, 80 cost-rental homes, and 40 social homes will be delivered. This development is part of the broader plan to introduce 1,000 new properties in total at Church Fields, and by enhancing the area with a blend of residential and public amenities.

The market is now familiar with this approach to development and better pace has been achieved which has delivered an earlier Development Agreement with the successful bidder and the ability to get to site quicker. Efficient practices ensure prompt delivery, and it has never been more important to ensure a steady supply of houses which will simultaneously meet demand and high standards.

Our considerable achievements in housing delivery can be attributed to many factors, chief among them is good collaboration. We have worked closely with the Department of Housing, the Land Development Agency and developers like Glenveagh, GEM, Ballymore, Lagan, Gannon and Manley to achieve our targets under Housing For All of delivering affordable purchase and cost rental homes by 2026. Almost 500 homes in these categories will be made available for purchase in Mulhuddart, Donabate, Hollystown, Rush, Balgriffin, Lusk and Swords between now and the end of May. It is expected that there will be huge interest generated in these schemes and I certainly look forward to seeing momentum continuing in this type of development in the county in the coming years.

Shanganagh, Dublin

15

Railway Court, Dublin

ARCHITECT NAME:
Seán Harrington Architects

PROJECT CLIENT:
Circle Voluntary Housing Association

LOCATION:
Railway Street, Dublin 1

DWELLING TYPE:
Duplex/Apartment

TOTAL NOS:
1no. Community Room + 47no. Dwellings

TENURE MIX:
Rented Social Housing from local authority housing list

TYPE MIX:
5no. 3 Bed Duplex + 10 1-bed apartments + 27 2-bed apartments + 5 3-bed apartments

SITE SIZE:
0.36-hectare

PLOT RATIO:
1.3

FUNDING TYPE:
direct build Construction Project: HFA/AIB combined funding

DELIVERY TYPE:
direct delivery by AHB

PROJECT STATUS:
on site – Substantial Completion anticipated April 2024

SUSTAINABILITY TARGETS:
NZEB

CONTRACT TYPE:
PW-CF1: Public Works Contract for building works designed by the employer

Aerial view, in context.
©Seán Harrington Architects

Description

The 0.36-hectare brownfield site in the north-east inner city, surrounded by mainly residential buildings ranging from 4 to 7 storeys, holds historical significance as the former site of Corporation Flats. The site's ownership transitioned to Circle VHA in 2022.

Positioned centrally in Dublin 1, the site presents an opportunity to foster a vibrant community, addressing the underdeveloped nature of the north inner city. However, short to medium-term concerns about safety and security in the area required careful consideration.

The design prioritises creating a high-quality living environment and enhancing the social, environmental, and visual quality of the area.

The client and the architect engaged closely with Dublin City Council, local residents and An Garda Siochana throughout the design stage of the project, which was helpful in developing the design approach. This included the formation of an agreed strategic approach based on the principles of defensible space; provision of passive surveillance of the surrounding streets, buffer zones and privacy strips at ground floor street edges, and a secure communal courtyard for residents. A resident's community facility has also been provided at the northwest corner of the building at ground floor level fronting on to both the pedestrian street and Railway Street, providing a valuable resource and meeting space for residents and the wider community.

Climate-sensitive design, considering orientation and topography, maximises amenity and energy efficiency.

Emphasis is placed on enclosure, clear separation of public/private realms, and good permeability.

The scheme forms a protected courtyard with a new building fronting Railway Street and a pedestrian street connecting to Liberty Park. The layout includes a taller building element at the corner, increasing visibility and connectivity to surrounding green spaces.

The building, ranging from 4 to 7 storeys, provides well-proportioned apartments with three lift and stair cores for access. Ground floor dwellings directly connect to the street, fostering community engagement. An enclosed courtyard balances security, parking, waste management, and cycle storage while prioritising resident use.

The compact building form minimises the ratio of external wall to floor area. Individual air-to-water heat pumps and photovoltaic panels contribute to energy efficiency. High-quality, low-maintenance materials, influenced by surrounding buildings, are chosen to complement the context.

Typical upper level floor plan, with colour coding of 1 Bed, 2 Bed, and 3 Bed apartment typologies.
©Seán Harrington Architects

West elevation. ©Seán Harrington Architects

Project Focus 1:

Direct Delivery by AHB

Railway Court, is being delivered through direct build by Circle Voluntary Housing Association; an Approved Housing Body (AHB). Direct build allows the AHB to exercise greater control over the design process, ensuring homes align with tenant needs and meet quality standards. This hands-on involvement contributes positively to overall housing targets, addressing the consensus that housebuilding in Ireland requires acceleration.

However, the procurement of direct build affordable housing comes with its own set of complexities. Governed by strict procurement rules, the process tends to be time-consuming, leaving AHBs vulnerable to increased inflation. The procurement of the project design team is also subject to public procedures, resulting in duplicated impacts of time and cost inflation. A recent report by the SCSI, titled "The Real Cost of New Housing Delivery 2023," notes that the delivery timeframe difference can exceed three years.

Publicly funded AHBs must adhere to the Capital Works Management Framework (CWMF), which includes best practice guidance, standard contracts, and template documents. While the framework aims to transfer risk to the contractor, it can have implications on tender returns.

In the case of Railway Court, the project benefited from being on a Local Authority disposal site for social housing. This provided a head start for the project as AHBs often face challenges in securing land through the private market due to competition with private developers, who have various financial sources, access to lower interest rates, and competitive construction rates.

As a publicly funded entity, stakeholder engagement is crucial for AHBs. Beyond resident consultation, projects require approval from the Local Authority during the planning process and the Department of Housing, which makes the ultimate decision on funding for development.

16

DeFlat Apartments, Netherlands

ARCHITECT NAME:
NL Architects & X\/W Architectuur

LOCATION:
Amsterdam, the Netherlands

CLIENT:
Flat:KondorWessels Vastgoed, Hendriks CPO, Vireo Vastgoed, Hollands Licht/Martijn Blom

NO. OF DWELLINGS:
500

AREA:
Gross floor area 65,600 m²

NET FLOOR AREA:
59,400 m²

YEAR:
2016

Description

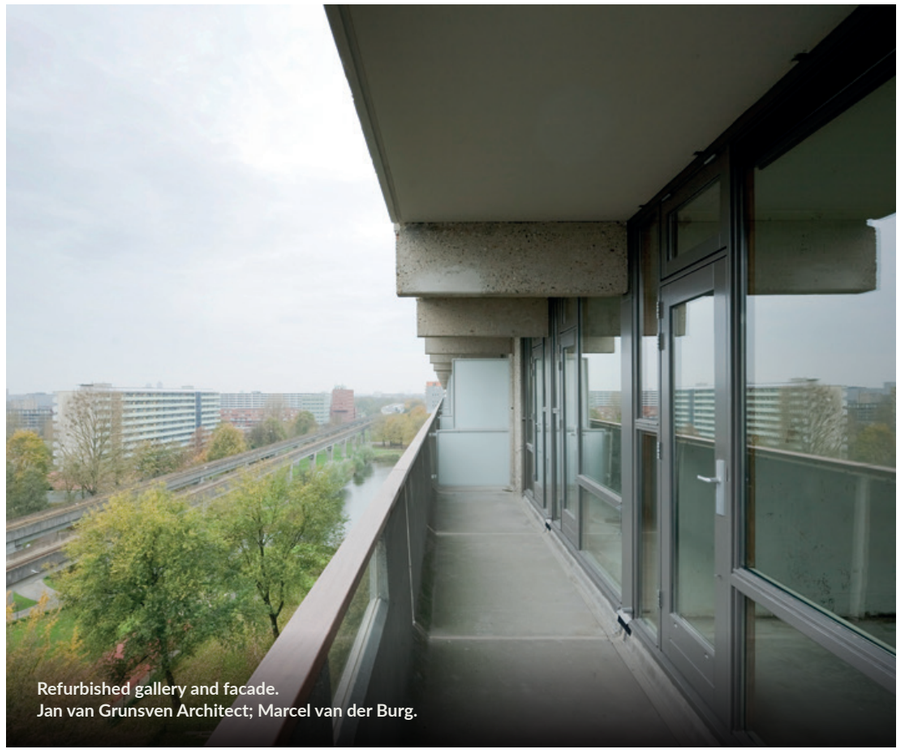
Kleiburg, situated in the Bijlmermeer, was part of the CIAM-inspired expansion of Amsterdam in the 1960s, designed to provide a green, light, and spacious alternative to the deteriorating inner city. It stands as one of the largest apartment buildings in the Netherlands, featuring 500 apartments across a 400-meter-long, 10 + 1 story structure. As the last original building in the area, Kleiburg faced demolition plans by Housing Corporation Rochdale due to estimated renovation costs of around 70 million Euros.

Overview of development, Jan van Grunsven Architect. ©Stijn_Poelstra

Despite the potential financial burden, Rochdale recognized the architectural significance of Kleiburg and sought alternatives to demolition. In a unique move, they offered the building for ONE EURO to encourage economically viable proposals. Over 50 responses were received, ranging from student and elderly housing to live/work units and accommodations for the homeless.

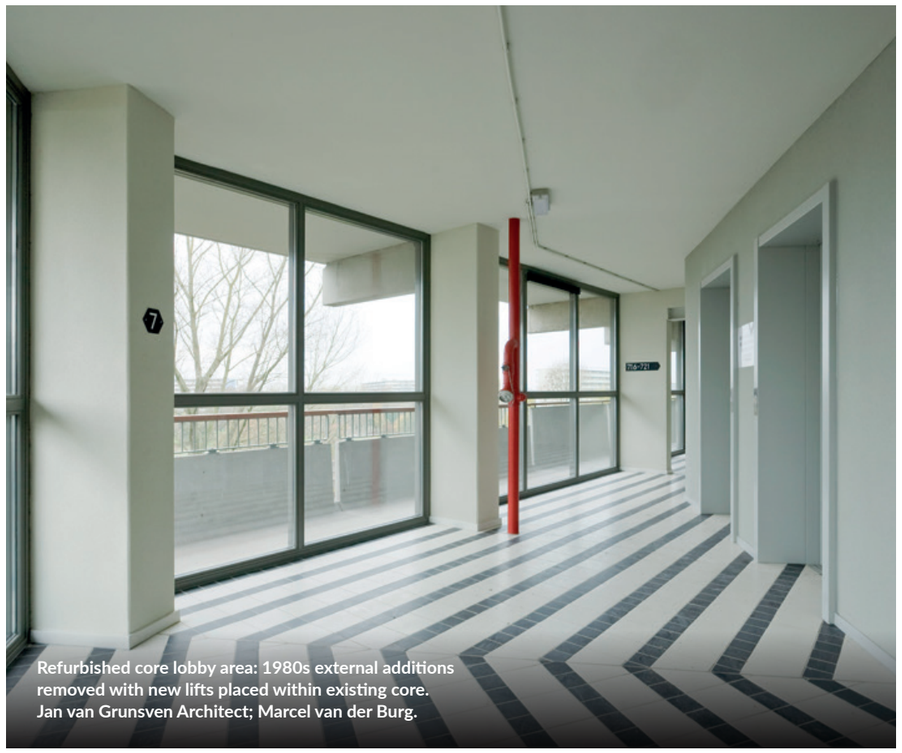
Consortium De FLAT, composed of KondorWessels Vastgoed, Hendriks CPO, Vireo Vastgoed, and Hollands Licht, emerged as the chosen team with their vision to transform Kleiburg into a Klusflat, emphasising a “do-it-yourself” approach.

The Klusflat concept involved renovating the essential structure - elevators, galleries, installations - while leaving the individual apartments unfinished and unfurnished, omitting kitchens, showers, heating, and room divisions. This innovative approach minimised initial investments, creating an alternative housing business model in the Netherlands. The ambition was not only to preserve Kleiburg but also to redefine living spaces, offering new typologies by combining multiple flats, creating vertical and horizontal connections, and opening up possibilities for diverse ways of living.



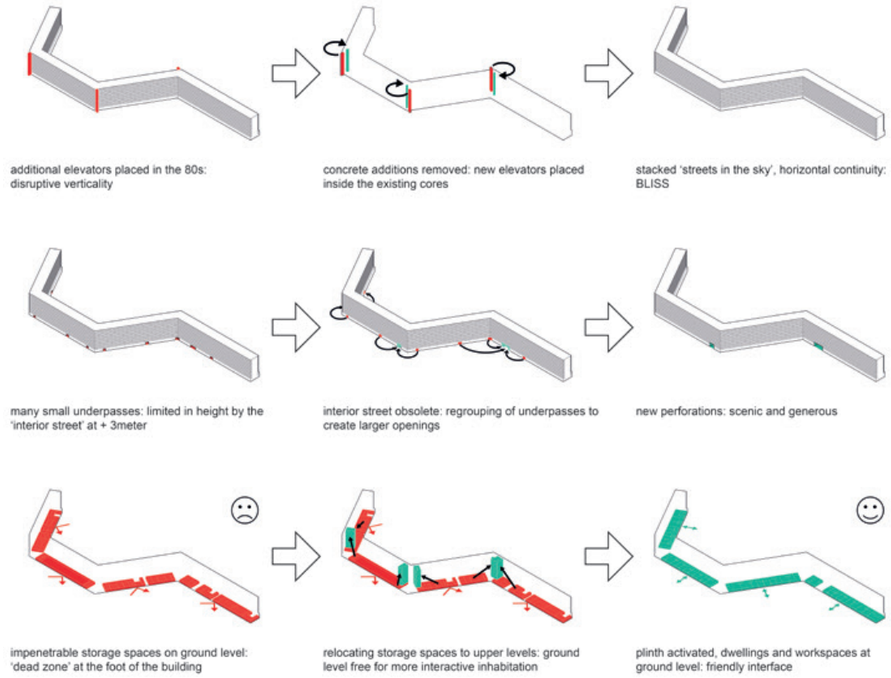
Refurbished gallery and facade.
Jan van Grunsven Architect; Marcel van der Burg.

Construction stage refurbishment process.
Jan van Grunsven Architect. ©Stijn_Poelstra

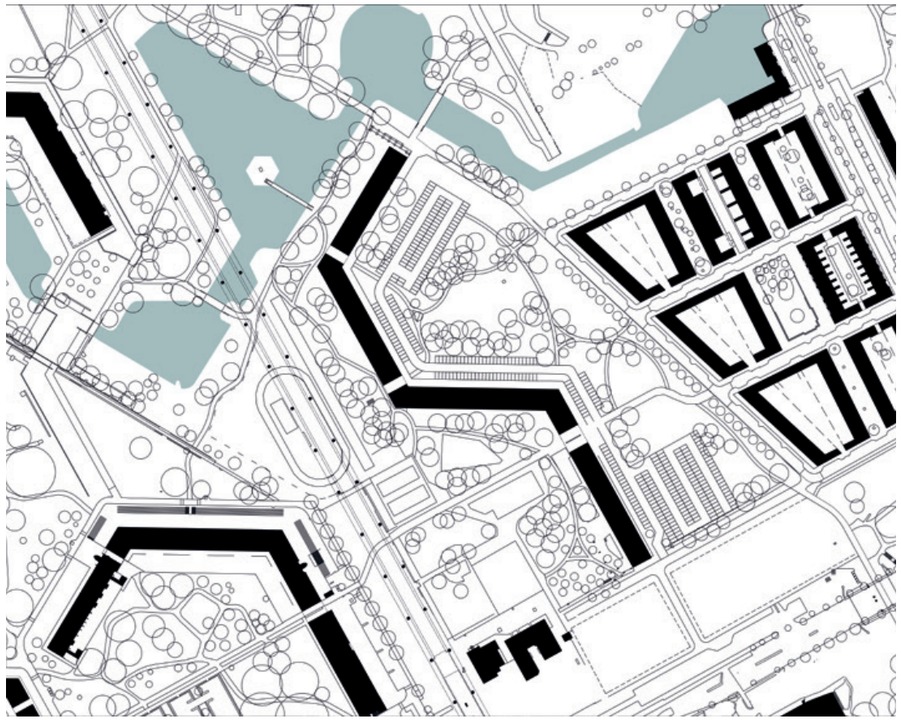


Refurbished core lobby area: 1980s external additions removed with new lifts placed within existing core.
Jan van Grunsven Architect; Marcel van der Burg.

View of refurbished facade from ground floor level.
Jan van Grunsven Architect; Marcel van der Burg.



Diagrams illustrating existing conditons/challenges within block, and refurbishment strategy with key alterations completed.



Plan of urban setting: after redevelopment.

Project Focus 1:

Alternative Refurbishment Delivery

Kleiburg, an expansive '70s social housing slab with 500 units spanning 400 meters, faced imminent demolition when a conventional renovation was deemed unfeasible. The impending loss of this cornerstone-block, situated in the last remaining part of the original urban fabric of the Bijlmermeer, prompted protests from Bijlmer enthusiasts, residents, architects, and urbanists. In response to these protests, amidst the post-Lehman financial crisis, a director from the council suggested that, with a sound plan, the entire building could be acquired for €1. Four project developers embraced this challenge, and after numerous twists and turns, their idea manifested into a new lease of life for Kleiburg: transforming the entire block into a DIY project.

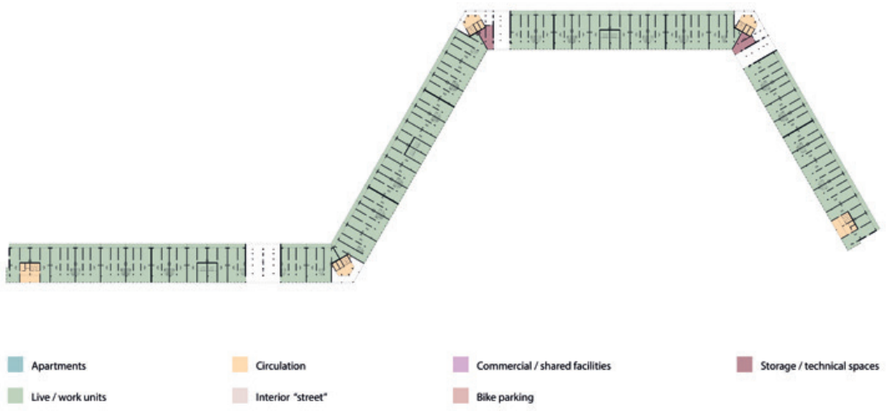
A consortium of architects, contractors, and developers devised a proposal focusing on significantly improving only the communal parts of the building—such as facades, shared ventilation, heating, amenities, and staircases. Everything behind the front doors of the apartments was left untouched, to be customised and finished by the new owner-residents. By effectively halving the 'professional' scope of the project, the business case was also halved, reducing costs, risks, and time. Consequently, the apartments, retaining old wallpaper, lacking toilets or kitchens, could be offered to the market at mortgage costs almost equivalent to social rent, presenting an extremely affordable option in Amsterdam's overheated housing market, even during the crisis.

With all residents already rehoused in preparation for the demolition (with the permit already issued), the redevelopment team seized a unique opportunity to reprogram parts of the building, especially the ground floor zone.

In the 1980s, three exterior shafts with additional elevators were added to Kleiburg, disrupting its original design. However, during interventions, it was discovered that these concrete additions could be removed, and new elevators could be placed inside the existing cores. This restoration revealed the softness of the pre-cast concrete, surpassing even travertine in quality. The relocation of storage spaces from the ground floor to upper levels freed up the ground level for more interactive uses, such as apartments, workspaces, and daycare facilities, activating the plinth as a social base integrated into the park.

The interior street, once a connector between parking garages and elevator cores, became obsolete with the renewal of the area. This allowed for larger, more scenic openings connecting both sides of the building. Galleries, initially closed and unwelcoming, underwent improvements by replacing opaque parts of the facade with double glass. A catalogue of facade modules was created for future inhabitants to choose window frames that matched their customised layouts, creating a personal interface to activate the galleries. Gallery illumination, often dominating single-loaded apartment buildings, was reconsidered. Energy-saving motion detectors were proposed for all gallery lights, creating a dynamic lighting experience and preserving the warm radiance of individual apartments behind a screen of cold lights.

After a year of DIY work, the new residents had transformed their 'empty shell' into their own personal, individual space, investing as much as they desired within the reinstated monumentality of the grand building amidst the lush green of the Bijlmermeer.



First floor level following renovation.

Variations of interior layout arrangement as completed by residents, based on a single delivered unit type.

Occupation

In the phase of occupation and building use, continuous innovations and considerations are vital for the sustained success of a housing project. This stage extends beyond construction, focusing on how the building functions and meets the evolving needs of its occupants.

Reliable data for buildings in use is a significant unknown, and there is a paucity of information in this critical area. Recognizing this gap, it becomes imperative to address the importance of accountability and efficiency, starting in the earlier design stages and being conscious of the limits and boundaries of the design and measuring tools we work within.

Valuable decisions during this stage and those that proceed can significantly enhance the building's efficiency, sustainability, and overall performance. Implementing Post Occupancy plans and evaluations becomes imperative to create holistic and accountable buildings that meet or exceed the goals set out in the design vision, whether through energy modelling or life cycle costing. This strategic approach ensures that investments align with the project's goals, contributing to its lasting success.

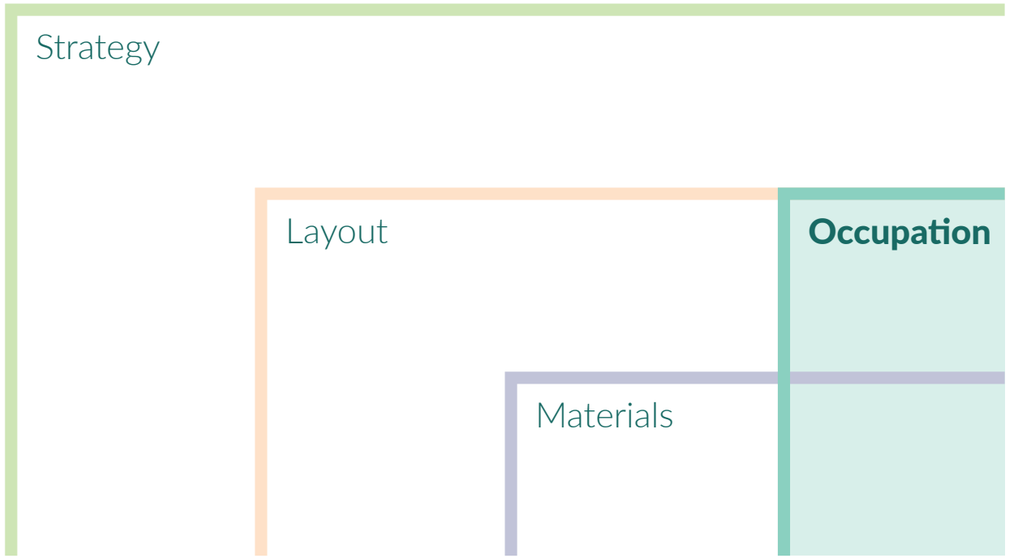
Possible evaluation could include occupant surveys, comfort, air and fabric monitoring alongside the implementation of efficient maintenance protocols. Embracing technology for smart building solutions, integrating sustainable practices into daily operations, and fostering a user-centric approach all contribute to the ongoing success of the building.

Addressing the performance gap – the variance between predicted and actual building performance – is crucial for achieving the intended outcomes. In this landscape, where there is little information, it raises a crucial question: how can stakeholders collectively contribute to the collection and interpretation of feedback or data post building use? Establishing a collaborative industry approach where stakeholders actively participate in sharing and interpreting data can create an ecosystem of knowledge, paving the way for more accountable buildings. This transformative shift towards a data-driven culture can revolutionise the industry, making the comprehensive understanding of building performance a norm rather than an exception.

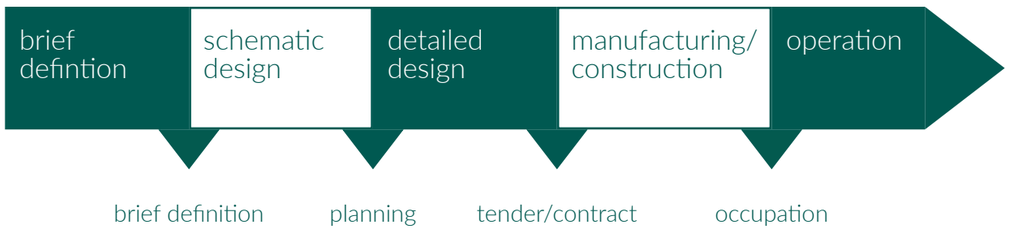
This section demonstrates an example of robust post-occupancy evaluation at Kilbride Court by COADY Architects and ongoing energy monitoring and maintenance considerations as described by Cork City Council.

DeFlat Apartments, Netherlands,
Jan van Grunsven Architect; Stijn_Poelstra.

TYPICAL PROJECT TIMELINE



Project Life



Occupation
- In Use

ADAPTIVE BEHAVIOUR OF OCCUPANTS

UNREGULATED LOADS

LIFECYCLE COSTING – INFLUENCE

MONITORING IN USE

SERVICES REFINEMENT POST OCCUPATION

POST OCCUPANCY EVALUATION

WELLNESS BENIFITS

SOFT LANDINGS

ADAPTATION

EVOLUTION

Article 14 - Cork City Council – Improving the housing stock through energy efficiency

Author: Brian Cassidy, Cork City Council

As part of Ireland Climate Action Plan local authorities are tasked with improving the energy efficiency of the social housing stock. Cork City Council has a social housing stock of just under eleven thousand units. The targets are to improve the energy rating so that all properties achieve the standard of a B2 energy rating or the cost optimal equivalent as defined in the Building Regulations (Part L).

There are two milestones. The first is that twenty-five per cent of the stock will achieve the target by 2030. The second is that one hundred percent of the stock will achieve the target by 2050. The work involves assessing the property's energy rating, determining what measures will assist in achieving the desired energy rating, installing the measures recommended and finally reassessing the energy rating of the property once the works have been completed. Certificates showing the thermal properties of the material installed play a key role in the reassessment process.

Improving the energy efficiency of the property has added benefits for the occupants. Energy efficient homes are warmer, less prone to damp and mold, and are better ventilated. This provides tenants with a better quality of life and improved health outcomes.

There is much innovation in the sector. Cork City Council with support from the tenants has participated in a number of research projects in recent years that demonstrate the importance of monitoring energy consumption and the environment in the home before and after changes are made to the home's energy efficiency.

A significant stakeholder in the Interreg Europe project Empower (EMPOWER | Interreg Europe) Cork City Council learned how other European regions were using energy monitoring to support plans to improve the energy efficiency of the housing stock.

With the Intensify Project (INTENSIFY | Interreg Europe) Cork City Council demonstrated that by intensifying engagement, citizens will show a greater interest in reducing energy consumption in the home. With additional support from the Horizon 2020 project UPSTAIRS (UP-STAIRS - UP-STAIRS) and University College Cork, Cork City Council opened a home energy upgrade office (HEUGO) that operated for eighteen months until December 2023. This office offered advice and support to homeowners who were considering the journey to upgrade their properties. In excess of seven thousand homeowners visited the office.

The Horizon 2020 project Ministor (MiniStor – This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869821) will demonstrate how thermal energy can be stored successfully in a mini sized container and subsequently used to heat the home. The stored energy is derived from solar thermal panels that are also solar PV panels. The Solar PV is used to supply electricity to the home (and the grid if required). Cork City Council and University College Cork are the Irish partners in this project.

Example of thermal energy storage in a mini sized container, as part of the Horizon 2020 project Ministor.

Cork City Council, Carbery Housing Association, Glas Technologies and the Contract Research Unit in the Atlantic Technological University Sligo are the Irish partners in the Interreg North West Europe Project Red-Wolf (RED WoLF - Rethink Electricity Distribution Without Load Following | Interreg NWE (nweurope.eu)). This project demonstrated the feasibility of using low carbon electricity from the grid to charge electric storage heaters in the home. Low carbon electricity is generated when winds speeds are high (turning wind turbines) and when the sun is shining (solar energy farms). The system also included solar PV and battery to provide low carbon electricity to the rest of the home. The energy data collected to determine the success of the project included consumption in the home, carbon content of the grid and energy consumed by the storage heaters.

In addition to the above Cork City Council is also participating in two Interreg Europe projects that aim to reduce the need for energy consumption and carbon generation. The Furgal cities project (FEEL - Frugal cities through Energy Efficiency and Low-tech communities | Interreg Europe - Sharing solutions for better policy) aims to assist the local authority to develop policies that reduce carbon generation by focusing on Sufficiency (Consuming what you need) and Cooperation (working and sharing with others). The Zero Carbon Initiative (ZCI - Zero Carbon Infrastructure | Interreg Europe - Sharing solutions for better policy) aims to develop policies that will accelerate the provision of zero carbon infrastructure.

Increasingly the drive towards reducing energy consumption in the home and elsewhere will be a combination of increased community engagement, a focus on human behaviour, improved energy monitoring, and implementing zero/low carbon solutions. All are necessary to ensure that the existing housing stock becomes carbon neutral by 2050.

Article 15 - Kilbride Court: Post-Occupancy Evaluation

Author: COADY Architects

The acquisition and interpretation of real-world data play a pivotal role in addressing Ireland's performance gap in building design. Departing from a 'design for compliance' paradigm, the emphasis is on instilling a 'design for performance' ethos across the entire life cycle of buildings. This involves the use of existing tools, funding upskilling initiatives, and major educational efforts to underscore the broader significance of reporting actual building metrics, the latter aligning with Environmental, Social and Governance (ESG) reporting requirements. This as-built and operated performance is considered vital in order to address both the performance gap and the climate and biodiversity crisis.

Coady Architects is actively involved in a post-occupancy evaluation (POE) for the Kilbride Court low rise medium density (53 uph) suburban social housing scheme, led by Senior Architect Simon Keogh in alignment with the RIAI's 2030 Climate Challenge (adopted by RIAI in November 2021).[1]

Out of the 40 homes all distinguished by a Gold rating under the Irish Green Building Council's Home Performance Index (HPI)[2] 12 are scrutinised over one year. The evaluation, driven by empirical data, includes quantitative assessments of energy consumption, potable water use and other Indoor Environmental Quality (IEQ) related indicators.

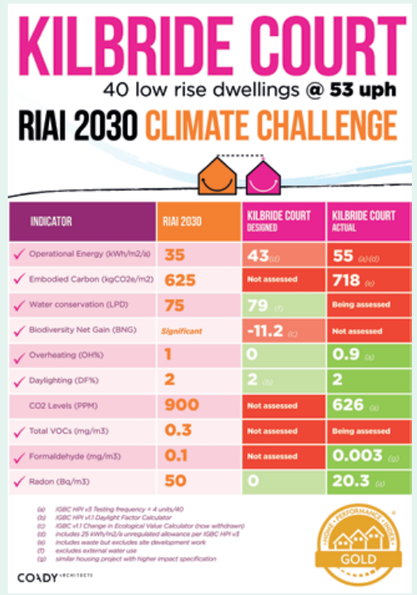
Under the guidance of Ian Pyburn from IES through the SEAI-funded AMBER project, the initiative collected data on CO2 levels, relative humidity and temperature. Dr. Shane Colclough from University College Dublin also contributed by surveying user experience including heat pump performance within the SEAI research project MacAirH.

Graduate architect Sawsan Bassalat from UCD's College of Engineering and Architecture, led by Dr. Oliver Kinnane, evaluated the data under an internship with Coady Architects forming part of a masters linked research project module. This entailed a comparison of monitored operational energy and IEQ data against design calculations, coupled with the measurement of occupant satisfaction using the Building Use Studies (BUS) methodology.

The evaluation assessed homes against operational energy and IEQ targets set in the RIAI 2030 Climate Challenge. Specifically, the focus was on achieving the 2025 operational energy goal of 60 kWh/m2/yr, and comparison to the 2030 target of 35 kWh/m2/yr encompassing both regulated and unregulated energy. This approach significantly deviates from DEAP, which considers only regulated energy. Bassalat's research contributed by evaluating both regulated and unregulated energy offering valuable insights into performance metrics and the Energy Performance Gap (EPG).

An illustration of the information gathered thus far encompasses different survey types:

- Operational Energy Surveys - Results for 12 homes with a 35% improvement on Part L 2019 (nZEB) were achieved through meter readings assessing the actual energy consumption of 109 kWh/m2/yr against predicted energy consumption of 87 kWh/m2/yr revealing and EPG of 22 kWh/m2/yr. The predicted energy consumption was based on designed regulated primary operational energy of 37 kWh/m2/yr using DEAP plus an allowance for unregulated energy of 50 kWh/m2/yr. Notably, only 3 out of 12 homes met the predicted energy consumption of 87 KWh/m2/yr. 11 out of the 12 units fell short of the RIAI Climate Challenge 2025 target by 49 kWh/m2/yr and all units fell well short of the 2030 target by 74 kWh/m2/yr revealing a significant performance gap. Factors contributing to these gaps encompass the lack of use of energy modelling tools, well known DEAP underestimation, likely unique occupant behaviour as well as variations in occupancy hours and appliance ratings revealed through quantitative analysis. Recommendations include using energy modelling tools like Passive House Planning Pack (PHPP), Design Builder and IES VE, as DEAP is a design for compliance rating tool only. We note the importance of robust overheating risk and daylight analysis especially when compensating for heat gain with lower G values (solar thermal transmittance). It is recommended that mandatory DECs stating actual energy consumption for all public buildings are extended to include all building types.
- IAQ CO2 Surveys - Results were completed for 12 fully compliant homes, with data collected over a year. Whilst the average CO2 levels were 626ppm, being significantly lower than the RIAI Climate Challenge of <900ppm, peaks were noted in three homes up to 1366ppm which will necessitate further surveys to determine air path blockages and user behaviour impacts. Findings were linked to specific living rooms and bedrooms using rules (set in iScan software), prompting recommendations for refining targets and analysis reporting for Indoor Air Quality (IAQ) including: (i) increase limit to <1000PPM per BB101, HSE and Ventilation Expert Group guidelines (defining <1000 as very good air quality); (ii) measure over 8 hrs as the most consistent occupancy period (e.g. dwellings 22.00 – 06.00 in bedrooms); (iii) measure full occupancy bedrooms; (iv) assess during deep heating period (Nov – Feb) when we rely more on ventilation systems for air quality; (v) set >1500ppm for <10% and <2000ppm for <2% over the 4 month deep heating season (Nov - Feb)
- Radon Surveys - Actual POEs on radon levels were carried out on 42 fully compliant homes as it typical of COADY Architects specification on all public housing projects. All units met EPA Ireland reference levels of radon concentration of <200 Bq/m3, with 1 unit achieving 197 Bq/m3 and all units achieving an average of 40.3 Bq/m3 aligning with Irish Green Building Council and RIAI 2030 Climate Challenge targets of <50 Bq/m3. Recommendations includes advocating for lower national reference levels for improved IAQ and mandatory testing of all homes.
- Occupant surveys were conducted on 12 homes unveiling high satisfaction levels with winter and summer temperatures, indoor environment, comfort, and well-being. Issues surfaced concerning user comprehension of heat pump operations, timing functions, and temperature settings. While ventilation received high satisfaction, understanding of the system's workings and maintenance was lacking. Distinctive behaviors were observed, including the closure of windows due to noise and different indoor temperature settings based on personal preferences.



Summary Table of Key Project Performance Indicators: Comparison of as designed vs actual results.

1. ARIAI 2030 Climate Challenge.
2. IGBC HPI Manual V3.

Comparison of MMC on a Live Sample Basis

MMC Pilot Studies Introduction

The two pilot programmes in this study, the Toppins Field Modern Methods of Construction (MMC) Case Study selected by Limerick City and County Council and CromCastle Construction Methodology Study selected by Dublin City Council, examine the most efficient methods of delivery while maximising affordability and value for money through their design and construction.

The studies explore, and cost, innovative construction and delivery options on these sites and compare these costs and timelines with traditional methods. The main phase of the study involved establishing a desktop review of various options for delivery/construction before detailed design options were advanced. Each project is a direct delivery scenario by local authorities (as supported by their already procured design teams) and involved reviews of various designed construction typologies/options on a comparative basis.

Significantly, the two studies examines delivery methods and efficiencies for the sector by offering support to local authorities currently examining construction methodologies for projects that are currently being designed, at pre-planning or being applied for or have planning consent and are entering the detailed design phase of a project.

The Toppins Field Case Study considers a series of potential options for incorporating MMC. The project reviews traditional construction methods by providing a 'baseline' against which the selected MMC systems have been compared. The Cromcastle Construction Methodology Study provides a preliminary indication of the possible current building costs that may be incurred by carrying out the construction works outlined in the study.

The findings provide an evidence base in strengthening delivery capability, on a sectoral level, for affordable and cost rental housing. The costs of various construction approaches are demonstrated with lessons learned from each option. While the primary advantages of MMC are highlighted, such as the speed of delivery and the potential sustainability benefits, the findings show how design choices are linked to measurable outcomes with each system demonstrating inherent benefits and constraints and different construction methods appearing more suitable than others depending on the project's needs, scale and context/location.

As industry and the regulatory framework adapts to new innovations in housing delivery, the availability and viability of different systems is likely to become a more crucial factor in addressing the need to increase housing supply and reduce carbon emissions from the construction industry. It will also support affordability and best-practice in housing delivery over the medium to long term.

Pilot programme for local authorities regarding delivery methods/ efficiencies for affordable housing and an examination of differing construction options on a live sample basis (modern methods of construction/off site construction) - COMPARISON 1

1. Description of brief

The study was to be undertaken in parallel with LCCC and the IDT team progressing a planning application for phase 1 of the Affordable & Social Housing Development at Toppins Field, Limerick City

The intention was to review different MMC methods with a focus on time, risk, sustainability, looking at the benefits of reducing embodied carbon, achieving good air tightness and also any implications on adaptability over time. The consultants were also to include cost advice on the relative implications and benefits of each option.

The house layouts would follow the Design Manual for Quality Housing, such that the study would have a wider benefit for other projects and other local authorities.

Initially, within the scope of the research, a shortlist of three selected systems, would be analysed in relation to the scheme layout and unit typologies, being compared in costs, timelines and sustainability criteria versus traditional methods.

This was expanded upon to be the eight systems looked at in the final document. It is acknowledged the LGS (Light Gauge Steel) Frame, ICF (Insulated Concrete Formwork), and EWI (External Wall Insulation on solid masonry) systems are also of interest and prevalent in the Irish market, but a limitation had to be agreed on the number of systems analysed. It is recommended that they be included in any subsequent expanded research on the topic.

DeFlat Apartments, Netherlands,
Jan van Grunsven Architect; Stijn_Poelstra.

2. Approach

To include how the brief was interpreted and the approach taken

In this study we are focusing on four of the categories of MMC that are most appropriate to the project's scale and context.

The general aim of this study has been to identify the most appropriate MMC systems for house building in Ireland and to display these in a simple and helpful manner for easy comparison. The system types analysed have been described in a manner consistent with the Department of Housing, Local Government and Heritage 7 categories of MMC (developed with reference to the UK government's definitional framework). They are as follows:

- **Pre-manufacturing**
  3D primary structural systems (Volumetric)
- **Pre-manufacturing**
  2D primary structural systems (Panellised)
- **Pre-manufacturing**
  Non-structural assemblies and sub-assemblies
- **Product-led site labour**
  Reduction & productivity improvements

The study focusses on the scale of the two storey terraced house in a manner applicable to Ireland as a whole, using the Toppins Field site in Limerick City as a case study.

These MMC systems are contrasted against the "traditional construction method", referring to the most common building makeup of concrete block, insulated cavity, tiled roof, external render & dry-lined internal finish.

3. Metrics

A summary table may be included at the beginning of this section, broken down by the headers below.

3.1. Construction typology considerations.

In determining the most appropriate construction methods for investigation, consultations were held with industry experts and manufacturers of various construction systems. The benefits and limitations of each method were analysed using ten distinct criteria (see below).

Criteria for analysis

1. **Time/programme**
   Efficiency and speed achieved through factory manufacture and innovative detailing of elements
2. **Labour**
   On-site labour hours, effect on cost and the benefits achieved through factory-condition manufacturing.
3. **Environmental Impact**
   Sustainability of the supply chain, material and manufacturing process from raw materials to built product.
4. **Existing Skills**
   Extent to which the necessary skills & expertise are present in the Irish construction industry.
5. **Adaptability**
   The extent to which the units can be changed and extended for future needs of the residents.
6. **Cost**
   The relative cost estimate of the system in context and at the scale of two-storey housing.
7. **Performance**
   Levels of fire performance and, for building envelopes, air tightness and thermal performance, and the consistency of quality.
8. **Regulatory Compliance, Insurance, Certification, etc.**
   The restrictions the system may face with insurers and regulators in the Irish market, plus complications associated with the UK's departure from the EU.
9. **Embodied Carbon**
   The material carbon footprint as calculated by volume of structural components.
10. **Logistics & Cranage**
    Difficulties faced through the transport, delivery and cranage of built elements to the site.

3.2. Summary/typology of construction options for a specific project in terms of time, cost, quality and scalability (for other applications).

Using the criteria described above, the following systems were deemed most relevant to the Toppins Field case study:

- **Rapid Assembly on Site**
  - Thin Joint
- **Rapid Assembly on Site**
  - Large Component
- **Prefabricated Structural Frame**
- **Panel Assembly**
  - SIPs
- **Panel Assembly**
  - CLT
- **Panel Assembly**
  - Full Off-site Panel System
- **Prefabricated Volume**
  - Modular House
- **Prefabricated Volume**
  - Pods

The findings are summarised at the end of the document in a simple table. This table aims to provide an overview of the possibilities offered by these innovative construction methods in the Irish construction industry, taking into account considerations of time, cost, quality and scale.

3.3. Supply chain in Ireland.

The report deliberately does not identify a single system as most successful due to the number of variables which require consideration and the fact that the case study scheme is currently at planning stage as opposed to a more detailed level of design resolution. All systems included in the study have features which may or may not be considered beneficial depending upon the particularities of the project. The study only includes systems which are available in the Irish market and, where a particular system is more widely used within the Irish construction industry, this is clearly stated.

4. Conclusions

Summary of findings

The following table (next page) provides a summary of key points for each system based on the ten criteria considered. Each is shown to have inherent benefits and constraints and different construction methods will appear to more suitable than others depending on the scale and context of the project.

While the primary advantages of MMC are the speed of delivery and the potential sustainability benefits, many factors are at play and become more or less relevant depending on project's needs and context.

In the future, the availability and viability of different systems is sure to change as the industry and regulatory framework catches up to these innovations in housing delivery. Considering the need to rapidly increase housing supply and reduce carbon emissions from the construction industry, embracing these advancements will be crucial in the coming years.

MODERN METHODS OF CONSTRUCTION	Cost	Embodied Carbon	Programme	Labour	Existing Skills	Supply Chain Sustainability	Logistics	Performance	Regulation, Insurances, etc.	Adaptability
Rapid Assembly On-site										
Thin Mortar Joint	Savings from reduction of labour and programme	Aerated, low carbon concrete	Allows internal trades to start early	Some savings compared to traditional	Common industry method	Low-waste factory conditions	Easy delivery	Precise but reliant on site conditions	Easy to gain compliance	Readily adaptable with common trades
Large Component	Savings from reduction of labour and programme	Low carbon concrete options available	Can speed up delivery	Less labour with large panels	Easily adapted skills	Low-waste factory conditions	Delivery logistics to be considered	Precise but reliant on site conditions	No notable issues	Possible to adapt and change
Prefab-Structural Frame										
Timber Frame	Some savings, but labour intensive	Low carbon material	Can reduce time for structural system	Some savings compared to traditional	Common industry method	Timber can be forested sustainably	Delivery logistics to be considered	No consistent reliant on-site conditions	Fire safety concerns	Can be easily extended and changed
SIPs	Savings from reduction of labour and programme	Low carbon material, efficiently produced	Integrated frame and insulation, quick to assemble	Less labour with large panels	Existing and growing industry	Low waste production, can be forested sustainably	Lightweight but can require cranage	High performance possible	Fire safety concerns	Adaptable interior, expertise needed to change envelope
Panel Assemblies										
CLT	Cost savings at larger scale	Low carbon material, delivered from central Europe	Can reduce time for structural system	Less labour with large panels	Rare in house building	Efficient, sustainable production	Cranage and moisture control required	High performance possible	Fire safety and moisture ingress concerns	Possibility for flexible roof space
Full Off-site Panel	High upfront cost, but reduced labour	Low carbon concrete, efficiently produced	Major programme savings	Significant reduction in labour	Non existent, can be delivered	Low-waste factory conditions	Significant cranage required	High performance possible	No notable issues	Can be designed for adaptation
Prefabricated Volume										
Modular	High upfront cost, but reduced labour	Timber framed can be low carbon	Major programme savings	Factory production very little on-site labour	Non existent, can be delivered	Low waste production, can be forested sustainably	Delivery constraints and cranage required	Consistent, controlled quality	Possible difficulty with delivery	Timber Modules easily adapted and extended
Pods	Possible savings if repeated at scale	Various specifications available	Savings compared to on site trades	Very little on-site labour	Non existent, can be delivered	Low-waste factory conditions	Delivery logistics to be considered	No major performance benefits	No notable issues	Can allow house to be adapted freely
Traditional										
Blockwork	Low upfront cost, but slow and intensive	High embodied carbon	High embodied carbon	Much more labour than other systems	Common trade practices, shortages in labour	Not a sustainable process	Easy delivery	Not consistent, reliant on site conditions	Easy to gain compliance	Readily adaptable with common trades

Pilot programme for local authorities regarding delivery methods/ efficiencies for affordable housing and an examination of differing construction options on a live sample basis (modern methods of construction/off site construction) - COMPARISON 2

1. Description of brief

The brief for the current study was to provide an evidence base for research currently being undertaken by the Housing Agency on behalf of the Department of Housing, Local Government and Heritage (DHLGH), by presenting a set of three or more detailed but differing construction options for the next phase of their project (Detailed design stage) which demonstrate a high quality or consistent approach to;

(i) Design layout and innovation in unit typologies;

(ii) Efficient use of layouts coupled with preferred innovative construction approaches.

2. Approach

The purpose of this study is to assess different construction typologies for their suitability for use in developments intended for the governments Cost Rental homes scheme. Criteria such as build quality and construction cost are important as they would directly affect rental rates through initial capital and ongoing maintenance costs. Reliable supply chain and reduced construction program would also benefit in allowing developers to better address acute pressure in housing demand. Current and upcoming legislation should also be consideration, particularly relevant to enabling the scheme and upcoming developments to return best value in the future.

The Cromcastle site currently being developed by the LDA was selected as the subject of the study as it is typical of the type and scale of apartment buildings stipulated in the brief. The design of the sample development is approaching the stage where investigations and decisions will be made in the Architectural and Structural construction methods, therefore the existing level of engagement on the project will transition well into a wider study on construction methods.

It is most practical to focus the detailed analysis of different construction methodologies on a limited area representative of the scheme as a whole, as indicated above. This is inclusive of a lift and stair core alongside six varying apartment typologies stacking over 5 floors above a ground floor podium slab.

The scoped area has been developed and coordinated with the structural engineer with the use of BIM, with the federated model used for further analysis on the various construction methods.

The nature of assessing the various methodologies has a tendency to become complex and difficult to digest. It Is proposed that following a process of research, design and analysis, findings will be entered into a qualitative assessment spreadsheet. Outputs extracted from this type of assessment have previously been found to quickly and clearly highlight both positive and negative qualities of the different methods. Each scheme will receive a score from 1-5 in each subset of the four main criteria. The resulting chart allows comparison of the overall scoring of each scheme, as well as enabling comparisons between each of the four sections of the assessment.

3. Metrics

3.1. Construction typology considerations.

7 no options were initially considered, with 1 no dropped and 6 no continuing to detailed analysis following initial investigation.

Criteria for analysis

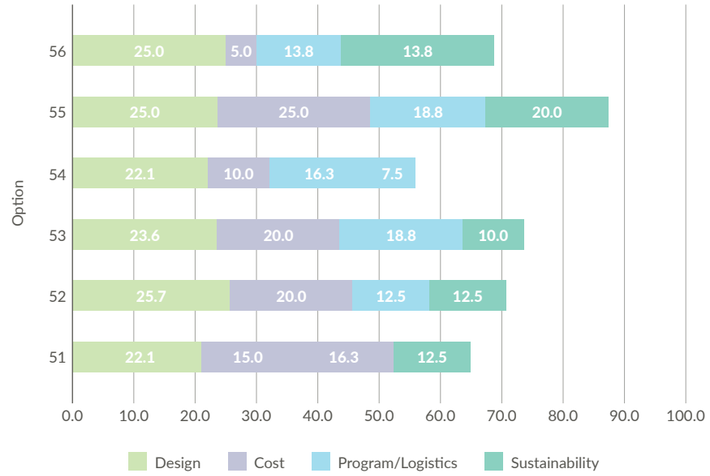
1. **Traditional in-situ flat Reinforced Concrete (RC) slab with in-situ rising RC fin columns:**
   i. This is the most common type of construction we are experiencing being built across apartment and hotel sectors. For this reason it will be used as a baseline when comparing other methodologies.
   ii. An SFS/Metsec inner leaf infill is currently commonplace and will be the basis of assessing this method. Lighter and more cost effective than traditional block infill.
2. **Post tensioned RC floor slabs with in-situ rising RC fin columns:**
   i. Post tensioned RC is common in UK and other industrial countries, used to reduce thickness of slab. Currently more limited use in Ireland.
3. **Precast hollow core floor with traditional RC rising walls:**
   i. Common apartment building method favoured by fire engineers due to robustness of continual RC.
4. **Precast wide slab floors with two story precast façade panels:**
   i. Investigating due to reputation of factory quality and speed of in site construction.
5. **Light gauge metal stud load bearing frame:**
   i. Manufacturers recently gaining NSAI certification for buildings up to 10 stories.
   ii. Reputation for lightweight and fast construction.
6. **CLT and Glulam:**
   i. Promised gains in quality, speedy onsite construction, low carbon and lightweight.
   ii. TGD B currently a barrier to adoption, however considered safe and becoming increasingly numerous in mainland Europe.
7. **Modular pods:**
   i. We have noted recent difficulties experienced meeting compliance to the Irish building regulations as noted in the design review appendix.
   ii. Ultimately disregarded from further assessment as would require a departure from the current apartment design, limiting effective comparison with other schemes.

3.2. Summary/Typology of construction options for a specific project in terms of time, cost, quality and scalability (for other applications).

Following a process of research and design development, the schemes were reviewed with an experienced contractor to further develop an understanding of cost, program and supply chain. An assessment of the embodied carbon involved in each scheme's construction was also undertaken, along with reviewing the process of disposal and recycling at the end of the building's useful life.

The table on the next page summarises the above assessment of each of the schemes reviewed.

Schemes 1 and 2 both utilise site poured RC fin columns as vertical structural elements. Due to this there are a large number of similarities, with them scoring similarly in the majority of criteria. They represent current norms of construction cost and program and the skills and materials used are commonplace in the Irish market this presenting good scalability.



Where Scheme 2 makes improvements is in the application of post tensioned slabs. This has a small positive affect on a reduction of intermediate slab thickness up the building, however where this method has most impact is by reducing the transfer slab from 700mm deep to 450mm. This is significant and has positive knock-on effects to material cost (€-107,000), slab curing time and reduction in embodied carbon, (-108tCO_2e). Its use however is caveated by there being a smaller number of suppliers in the Irish market and cost sensitivity to changes and fluctuation in price of traditional reinforcement. There are also further considerations regarding difficulty in later alterations to the structure and consideration to demolition at end of life due to the highly stressed nature of the slab. It is worth noting that this slab construction could be applied to any of the schemes assessed in order to make similar savings.

Schemes 3 and 4 also have a number of similarities between each other. They both employ continual RC to the both the inner leaf of the external walls and to the apartment party walls. This has historically been favoured and still used today due to its robustness in the event of fire as well as excellent reduction in airborne sound transmission. This increased use of dense and carbon intensive materials does have a negative effect on cost and embodied carbon however.

The continuous solid nature of these wall materials also prevents placing insulation in both the inner leaf and the cavity of the external wall build-up. This has a result of increasing the cavity by +90mm to 250mm in order to accommodate all of the insulation within the cavity. For brick finished facades this means the use of more expensive and non-standard brick support angles and ties, further increasing cost and difficulty of construction.

The use of precast hollowcore flooring in scheme 3 does provide some improvements on cost, program, slight reduction in slab thickness, embodied carbon and is readily available in the supply chain. Drawbacks include a requirement to structurally trim any future penetrations in the slab and difficulty in achieving compliance with TGD E without additional sound reduction measures being taken.

The biggest benefits of scheme 4 would be the offsite production of panels in factory conditions. Factors such as quality and operative health and safety are extremely high due to this, along with extended levels of design flexibility. It will also suite congested sites and buildings being built close to the boundary as finished panels are loaded straight from the delivery trailer into place on the building.

Alongside enlarged wall thicknesses already mentioned, there are further difficulties such as limited suppliers, long lead times, suppliers manufacturing schedule, high embodied carbon and high cost which makes it difficult to recommend outside of specific scenarios.

Scheme 5 uses a structural Light Gauge Metal Stud system which scores the highest overall out of all schemes assessed. This is a very lightweight method of construction relying on all internal and external walls contributing to the support of the slab end additional floors above. This does reduce future ability to amend internal layouts of apartments as almost all internal walls are contributing structurally to some extent. The advantages however are that wall build-ups are thinner, fewer and lighter weight structural elements make this the cheapest build cost of the study. These properties also contribute to a very low level of embodied carbon. Large single story panels of this construction are produced under factory conditions, providing benefits in quality and increasing the safety and comfort of operatives. As with most offsite produced modular elements, on-site standing of walls is extremely fast. Irish adaptation of the technology for Irish building regulations relies in the provision of RC floor slabs which tie the composite elements together and provide a robust horizontal barrier to fire. This has resulted in a number of suppliers gaining NSAI certification, one in particular being rated to 10 stories high for residential buildings.

Scheme 6 consists of CLT mass timber and Glulam beams. This is the most lightweight of all the methodologies, it permits 150mm reduction in a standard RC transfer slab and is the only option light enough to reduce the size and footprint of the building foundations, saving 28 tCO_2e alone. Story high panels manufactured in factory conditions can be efficiently transported to site and erected quickly. There are still significant compliance issues to be resolved regarding fire prior to it being considered for use in Ireland and insurance companies are also apprehensive, however the latter can be resolved through training and increased exposure to the construction type.

Many countries in Europe have assessed the construction method to be safe and are delivering schemes in CLT. Some states are suitably convinced by fire safety testing and environmental merits that France for example have legislated to require government buildings be constructed of at least 50% timber since 2022. Continued dialog to ensure a safe and practical consensus on how best to unlock this technology for use in the Irish construction industry is essential.

Due to most of the forestry and factories that produce CLT and Glulam products being situated abroad and that supply chains are still relatively new, particularly in Ireland, it currently remains an expensive construction methodology in comparison. Where this methodology really shines however is in the low levels of embodied carbon associated with the material. Taking into account both standard calculation methods and including the RC foundations and first floor transfer slab, this scheme produces as little as 572 tCO_2e, the lowest in this study. This calculation also ignores that the growth phases of the trees that went into the production of this material has sequestered 463 tCO_2e, reducing the net carbon further to 109 tCO_2e. CLT and Glulam are also unique in this study in that it can be dealt with sustainably in a number of ways at the end of the building's useful life. It suites application of Design for Manufacture and Assembly (DfMA) principles, the panels can be disassembled and reassembled into other structures and buildings. The wood material could also be repurposed into other smaller timber elements or can be processed into woodchip or pulp for use other industries, all while preserving the sequestered carbon. Finally, the waste or damaged timber can be burnt as a renewable resource of power generation, however the sequestered carbon is released back into the atmosphere in this case.

3.3. Supply chain.

The construction methodology that scores the highest in this study has undergone a number of recent successful pilot programs with large developers. While this is extremely encouraging it is doubtful that the Irish supple chain has yet to have ramped up to the extent required for a large scale national roll out. It would be expected that this will change in the near future based on the success of existing pilots.

For the most mature and capable supply chain, schemes 1 and 2 are currently the most viable options.

4. Conclusions

It is difficult to recommend a single construction methodology for use. A variety of different materials, techniques and trades need to be drawn on in order to meet demand for housing and meet government targets of an average 33,000 new units per year. Settling on a mono-solution also does not set the scheme up well for emerging construction methods and upcoming legislation. Therefore a multi-stage approach is proposed to deal with current conditions, while also putting plans in motion for the future.

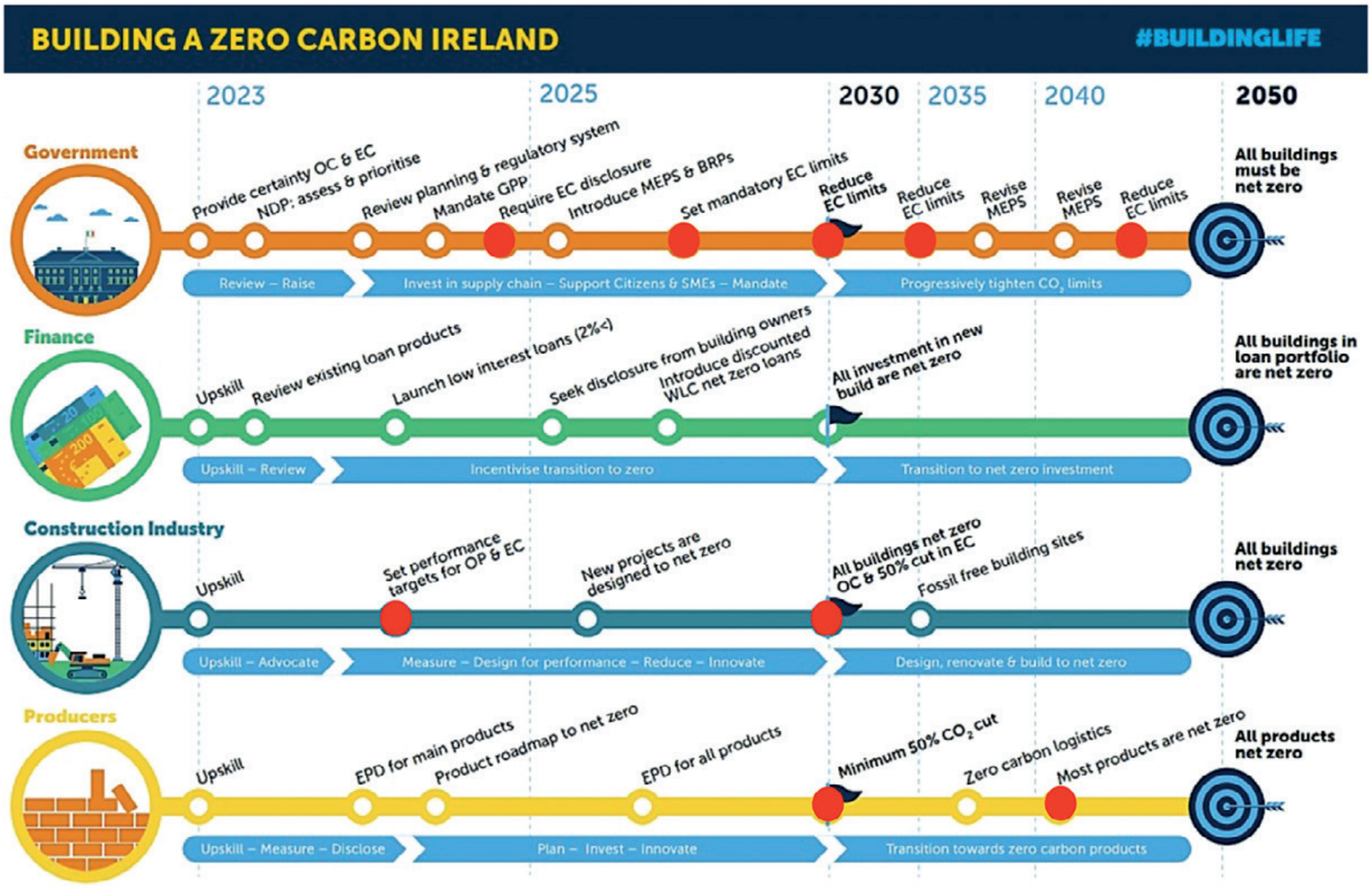
As reflection of the current supply chain and skillset abundance in the Irish construction industry, either Scheme 1 or 2 could be considered optimum for developments looking to be delivered in the immediate term. Wall build-ups are reasonably efficient, build costs are in line with the current norm and they score acceptably in sustainability criteria compared to the other methods investigated. This approach should ensure there is no delay in commencing prompt delivery of quality and affordable housing.

As alluded to previously it would be wise to advance a range of construction methods to diversify material use and supply chains, upcoming legislation will also have much more emphasis on sustainability and embodied carbon; potentially forcing alternate methodologies to be adopted weather the intention is to diversify or not.

From recent presentations and discussion at the ZEB Summit, there will soon be requirements to meet embodied carbon targets, with regular reductions in targets every 5+ years as indicated with red dots in the graphic below. Much of this is already planned to integrate into revisions to EU Taxonomy and the HPI scheme.

Scheme 5, structural light gauge metal stud, would be the most likely option to address the above legislation and diversity concerns. It is the overall best scoring scheme in this study and has already undergone a number of successful Pilots with developers such as Cairn Homes and Hines. As more systems/ manufacturers undergo relevant testing and gain certification with bodies such as NSAI, the supply chain will only become more robust. It would be prudent to plan pilot schemes using this methodology in the near future to gain better understanding of it's suitability and foster relationships in this industry.

Finally, although compliance with current fire regulations presently rule scheme 6 out, it is difficult to ignore the positives of this construction method. In both the design and sustainability criteria of the study, CLT scores higher than the study-leading Scheme 5. It's cost is currently quite high due to it being a relatively new method of construction, which would be expected to come down with increasing use and capacity in Europe. It also scores poorly in risk, however this is primarily due to its current non-compliance with TGD B and not its inherent fire properties. Should the issues affecting this criteria be improved then this method will likely take the lead from scheme 5.


BUILDING A ZERO CARBON IRELAND
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2023
2025
2030
2035
2040
2050
Government
Provide certainty OC & EC
NDP: assess & prioritise
Review planning & regulatory system
Mandate GPP
Require EC disclosure
Introduce MEPS & BRPs
Set mandatory EC limits
Reduce EC limits
Reduce EC limits
Revise MEPS
Revise MEPS
Reduce EC limits
All buildings must be net zero
Review – Raise
Invest in supply chain – Support Citizens & SMEs – Mandate
Progressively tighten CO_2 limits
Finance
Upskill
Review existing loan products
Launch low interest loans (2%<)
Seek disclosure from building owners
Introduce discounted WLC net zero loans
All investment in new build are net zero
All buildings in loan portfolio are net zero
Upskill – Review
Incentivise transition to zero
Transition to net zero investment
Construction Industry
Upskill
Set performance targets for OP & EC
New projects are designed to net zero
All buildings net zero OC & 50% cut in EC
Fossil free building sites
All buildings net zero
Upskill – Advocate
Measure – Design for performance – Reduce – Innovate
Design, renovate & build to net zero
Producers
Upskill
EPD for main products
Product roadmap to net zero
EPD for all products
Minimum 50% CO_2 cut
Zero carbon logistics
Most products are net zero
All products net zero
Upskill – Measure – Disclose
Plan – Invest – Innovate
Transition towards zero carbon products