PHASE 1 – CORRIB CAUSEWAY - DYKE ROAD, GALWAY APARTMENT SCHEME	HOMAN O'BRIEN Engineering Excellence.

Project No.	Document Title	Rev	Prepared by:	Issue Date:	Checked by:
2326	PHASE 1 – CORRIB CAUSEWAY - DYKE ROAD ENERGY REPORT FOR PLANNING	01	BH	26-02-25	BH

Contents

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- **APPENDIX 1 – DRAWINGS**
- **APPENDIX 2 – DESIGN CRITERIA**

1.0 INTRODUCTION

This report outlines the mechanical and electrical systems and building regulation compliance criteria at Planning stage for the residential development at Dyke Road, Terryland, Galway.

This report has been prepared as a compliance requirement for planning applications made in accordance with Galway City Council Guidelines.

The Residential units will achieve both TGD Part L – Conservation of Fuel and Energy -Dwellings (2022) and EU Taxonomy Compliance.

The report includes the following elements;

- Performance Details for the Mechanical and Electrical Services
- BER and TGD L Compliance
- Water Conservation Report

1.1. Key Energy Reduction and Sustainable Design Features include:

1. The units are achieving a BER of A2.

2. Reduction in Primary Energy compared to a Building Regulation Compliant Residential Building

3. Reduction in CO2 Emissions compared to a Building Regulation Compliant Residential Building to Part L 2018 (public consultation)

Element	***Building Regulation (W/m²K)***	***Dyke Road (W/m²K)***	***Comment***
Walls	0.18	0.18	*NZEB Backstop*
Floors	0.18	0.18	*NZEB Backstop*
Windows	1.40	1.40	*NZEB Backstop*
Roofs *(Flat)*	0.20	0.16	*NZEB Exceeded*

4. Air Tightness Test to achieve $2m^3/m^2/hr$.

5. Thermal Bridging factor 0.08 W/m^2K.

6. Use of LED Lights. LED lights in the residences and in the Landlords areas.

2.0 ENERGY EFFICIENCY & SUSTAINABILITY

2.1 Reducing Energy Consumption – Building Fabric

In order to reduce the energy consumption of the heating and lighting systems integration between the architects, services engineer and structural engineer is required. This approach ensures the form of the building seeks to minimise heat gains in summer and heat loss in winter and also ensures that the choice of heating and ventilation systems will complement the building design and vice versa.

2.2 Elemental U-Values

The U-Value of a building element is a measure of the amount of heat energy that will pass through the constituent element of the building envelope. Increasing the insulation levels in each element will reduce the heat lost during the heating season and this in turn will reduce the consumption of fuel and the associated carbon emissions and operating costs.

Target U-Values are identified below.

Element	***Building Regulation (W/m²K)***	***Dyke Road (W/m²K)***	***Comment***
Walls	0.18	0.18	*NZEB Backstop*
Floors	0.18	0.18	*NZEB Backstop*
Windows	1.40	1.40	*NZEB Backstop*
Roofs *(Flat)*	0.20	0.16	*NZEB Exceeded*

2.3 Air Permeability

A major consideration in reducing the heat losses in a building is the air infiltration. This essentially relates to the ingress of cold outdoor air into the building and the corresponding displacement of the heated internal air. This incoming cold air must be heated if comfort conditions are to be maintained. In a traditionally constructed building, infiltration can account for 30 to 40 percent of the total heat loss; however, construction standards continue to improve in this area.

With good design and strict on-site control of building techniques, infiltration losses can be significantly reduced, resulting in equivalent savings in energy consumption, emissions and running costs.

In order to ensure that a sufficient level of air tightness is achieved, air permeability testing will be specified in tender documents, with the responsibility being placed on the main contractor to carry out testing and achieve the targets identified in the tender documents.

A design air permeability target of ***2.0m3/m²/hr at 50 Pascals*** has been identified.

Air testing specification will require testing to be carried out in accordance with

- BS EN 13829:2001 'Determination of air permeability of buildings, fan pressurisation method'
- CIBSE TM23: 2000 'Testing buildings for air leakage"

2.4 Low Carbon & Renewable Energy Solutions

The building services design on any project is ultimately responsible for how a building will consume energy. The design of heating, ventilation and lighting systems will determine the energy consumption characteristics of the building.

The approach that has been adopted to delivering a development which is both highly efficient and sustainably designed has been to involve all members of the design team from the earliest possible stage in the design process. This integrated design approach will be continued throughout the design process.

This approach ensures that the knowledge and expertise of each member of the design team was available from the outset. The goals for sustainable design were identified at this early stage and each element of the design was progressed accordingly.

Several renewable and low carbon technologies were considered during the preliminary design process. Life cycle costing analysis and technical feasibility studies were conducted.

2.4.1 Combined Heat & Power

The inclusion of combined heat and power plant in any building scheme must be given very careful consideration due to the large capital costs involved and the potential risk of higher running costs than would be incurred if separate heating plant and grid electricity were used.

The most important consideration when designing CHP plant is to carefully assess both the heat load and the electrical load. A CHP installation will typically operate at approximately 80% combined efficiency. Approximately 60% of the useful output will be thermal energy with the remaining 40% being available as electric energy.

E.g. a CHP plant which consumes 100kWhrs of gas will produce approximately 80kWhrs of useful output. 50 kWhrs of this output will be available as thermal energy while the electric energy output will be 30kWhrs.

Given the proportion of thermal energy and electricity produced it is essential that the CHP plant is selected to meet the heat load of the building and not necessarily to meet base electrical loads.

CHP technology will not be included in this development. There is a concern regarding the Heat Losses associated with a large distribution network of LPHW Heating Pipework circulating constantly.

2.4.2 Heat Pump Technology

The general principle of heat pump technology is the use of electrical energy to drive a refrigerant cycle capable of extracting heat energy from one medium at one temperature and delivering this heat energy to a second medium at the desired temperature. The basic thermodynamic cycle involved is reversible which allows the heat pump to be used for heating or cooling.

The efficiency of any heat pump system is measured by its coefficient of performance (CoP). This is a comparison between the electrical energy required to run the heat pump and the useful heat output of the heat pump, e.g. a heat pump requiring 1kW of electrical power in order to deliver 3kW of heat energy has a CoP of 3.0.

This operating principle can be applied to different situations, making use of the most readily available heat source on any given site. The most common types are:

- Ground Source
- Water Source
- Air Source

Water source heat pumps generally offer the highest CoP however they can be expensive to install and maintain and must have a source of water from a well, lake or river.

An initial technical and financial analysis of the technology has shown that they will not be suitable for use within the building. There are also concerns regarding the potential practical difficulties and programming implications of incorporating vertical boreholes on such a tight site.

On a financial level, the significant increase in capital costs associated with the heat pumps and the associated boreholes is not considered to be justified by the potential savings that would be achieved.

Air source heat pump technology is a viable solution for this project. Locations for external condensers / central air to water heat pump have been located.

Heat Pump technology will be included in the development.

2.4.3 Bio-Mass Boilers

The use of bio-fuel in the form of wood chip or wood pellet can provide a realistic alternative to conventional fuels such as oil or gas. In terms of heat output, biomass boilers operate in exactly the same manner as conventional oil or gas fired boilers. There are, however, important differences to be considered.

The major drawback of a biomass heating system is the inconvenience associated with supply and storage of fuel, the increased maintenance of the boiler plant when compared to gas or oil-fired systems and the increased capital costs. The advantage of the system, however, is the practically zero net carbon emissions associated with the combustion of wood products and the marginal cost savings which can be achieved.

When natural gas is available as a potential fuel source it is always very difficult to make a sound financial argument for the inclusion of biomass heating systems. The unit cost of wood pellet or indeed wood chip (although slightly cheaper than pellet) is generally only marginally less than the unit of cost of natural gas (less than 10%).

This marginal saving is typically offset by the increase in maintenance costs and is never sufficient to offset the increase in capital costs associated with this installation of the biomass systems. Biomass technology will not be included in the development.

2.4.4 Solar Water Heating

Solar thermal collection uses of the sun's energy and transfers the heat generated to the building's domestic hot water supply. Two distinct types of collection panel are available. The evacuated tube array and the flat panel collector. The evacuated tube array is the more effective of the two as it is capable of generating approximately twice as much hot water from the same surface area of flat panel.

Solar thermal collection can deliver up to 50% of the total annual hot water load of a Building. Further to a review the optimum solution was deemed to be Heat Pumps + PV. Therefore, Solar thermal technology will not be included in the development.

2.4.5 Photovoltaic (PV) Panels

PV Panels are capable of generating direct current electricity from the sun's energy, which can then be converted to alternating current and used within the building. They are generally a "maintenance free" technology as there are no moving parts. They also typically have a 20-year manufacturer's guarantee on electrical output and can be expected to operate effectively of 30 years or more. With the renewable energy requirement being achieved using heat pump technology additional renewables in the form of PVS will also be considered.

2.4.6 Wind Turbines

Due to the urban nature of the site wind energy has not been considered.

2.5 Conclusion

From the outset of the design process an integrated approach has been adopted which involved all members of the design team with focus and a holistic approach to sustainable design with a goal to provide a building that is designed in an environmentally sensitive manner while meeting the required comfort conditions of the project. It is the intention of the team that this approach will be continued through the detailed design process to ensure the targets identified are achieved. The proposed solution will incorporate heat pump technologies in the apartments and dwellings.

There is no specific BER rating that is required to comply with Part L, however, the residential units analysed all achieved a BER of A2.

3.0. PART L COMPLIANCE

3.1. Overview

This section sets out to review the method of NZEB compliance with Part L of the Building Regulations. It is important to note that the input data currently used is preliminary, and the design will develop as the project progresses.

Note:
There are a large number of variables to be taken into account, so any changes will need to be re-calculated to ensure that compliance is still achievable.

At this early stage of the project, a number of assumptions have been made regarding fabric performance and ventilation strategy required to meet Part L.

Five residential unit types have been modelled IN DEAP in the preparation of this report. These units are as identified in Appendix 1.

The residential units have been analysed for compliance with the 2022 TGD Part L (NZEB).

There are six main criteria that this report aims to demonstrate compliance with as listed below:

1. Building Energy Rating;
2. Energy Performance Coefficient (NZEB);
3. Carbon Performance Coefficient (NZEB);
4. Renewable energy contribution;
5. Maximum elemental U-Values;
6. Ventilation Strategy

A summary statement regarding compliance with each of the above six criteria is provided below.

1. Building Energy Rating (BER)

Whilst there is no specific BER rating that is required to comply with Part L, residential units compliant with NZEB usually achieve a BER of A2 or A3. All of the residential units modelled for this project meet these BER ratings.

2. Energy Performance Coefficient (EPC)

The EPC and CPC are the two figures that are used to determine whether the dwelling complies with Part L on an overall basis.

The EPC is the calculated primary energy consumption of the proposed dwelling, divided by that of reference building of the same size. To comply with Part L and NZEB requirements, the EPC must be better than the Maximum Permissible Energy Performance Coefficient (MPEPC) which is 0.30. All of the residential units modelled for this project meet the MPEPC requirement.

3. ***Carbon Performance Coefficient (CPC)***

The CPC is the calculated carbon dioxide emissions of the proposed dwelling, divided by that of a 2005 reference building of the same size. To comply with Part L and NZEB requirements, the CPC must be better than the Maximum Permissible Carbon Performance Coefficient (MPCPC) which is 0.35. All of the residential units modelled for this project meet the MPCPC requirement.

4. ***Renewable Contribution***

To satisfy part L, 20% of the building's regulated primary energy demand must be provided via renewable technologies. This is measured in the form of a renewable energy ratio (RER). All of the residential units modelled for this project meet the RER requirement, achieved through the use of heat pump technology for both space heating and domestic hot water. Details of the heat pump technology proposed is provide later in this report.

5. ***Maximum Elemental U-Values***

Technical Guidance Document Part L 2022 sets out maximum U-Values which may not be exceeded for each construction type (see excerpt below). All of the U-values in the proposed project meet this requirement.

Table 1	**Maximum elemental U-value (W/m^2K)[1, 2]**	
Column 1 Fabric Elements	**Column 2 Area-weighted Average Elemental U-value (Um)**	**Column 3 Average Elemental U-value – individual element or section of element**
Roofs Pitched roof - Insulation at ceiling - Insulation on slope Flat roof	 0.16 0.16 0.20	 0.3
Walls	0.18	0.6
Ground floors[3]	0.18	0.6
Other exposed floors	0.18	0.6
External doors, windows and rooflights	1.4[4,5]	3.0

6. Ventilation Strategy

Ventilation requirements are specified in Part F of the Building Regulations. Where an air permeability of less than 3 m^3/hour.m^2 is achieved, it is required to provide continuous mechanical extract ventilation (CMEV). The target air permeability for Dyke Road is 2m^3/hour.m^2 at 50 Pascal, requiring CMEV. The strategy for Dyke Road is to use mechanical ventilation with heat recovery (MVHR), meeting all of the supply and extract requirements. Part F will be fully complied with for the entire scheme, therefore.

3.2. Input Data

It should be noted that this report is based on preliminary information and a number of assumptions have had to be made at this stage. As the project progresses, the model will be refined when HOB is advised of changes to criteria set out in this report, and the results will be advised accordingly.

Fabric performance

U- Value thermal properties:

- External wall — **0.18 W/m^2k** *(NZEB Backstop)*
- Roofs *(Flat)* — **0.16** W/m^2k *(NZEB Exceeded)*
- Ground — **0.18** W/m^2k *(NZEB Backstop)*
- Windows — **1.40** W/m^2k (Double glazing)
- Thermal Bridging — **0.08** W/m^2k

Air Tightness Test to achieve ***2m^3/m^2/hr at 50 Pascals***.

A thermal mass of Medium-high has been assumed for the preliminary DEAP calculations.

4.0. RESULTS

The following table give the calculated results for 5 different types of apartments analysed. The Unit locations are indicated in Appendix 1.

As can be noted below all units comply with TGD Part L 2022 and also achieve a further 10% reduction on this to achieve EU Taxonomy Compliance.

Appartment Number	Floor Area	Total heat loss (W/K) taken from DEAP	Total heat loss in W	EPC	CPC	RER	HP Tool RER (Adjusted)	BER Rating	Energy kWh/m2/yr	Co2 kg/m2/yr	PV kWH/yr	TGDL PART L Compliance	EU Taxonomy Compliance
APT_B_L01_05_3 Bed	91.66	66.501	1596.024	0.246	0.165	0.309	0.460	A2	30.6	3.92	0	PASS	PASS
APT_B_L03_08_1 Bed	47.84	32.788	786.912	0.222	0.152	0.212	0.440	A2	34.61	4.43	0	PASS	PASS
APT_B_L03_04_2 Bed	71.3	41.521	996.504	0.222	0.152	0.213	0.440	A2	28.65	3.67	0	PASS	PASS
APT_A_L04_15_1 Bed	49.18	52.387	1257.288	0.263	0.176	0.333	0.470	A2	45.96	5.88	0	PASS	PASS
APT_A_L08_02_2 Bed	71.05	74.174	1780.176	0.268	0.178	0.355	0.480	A2	41.61	5.33	0	PASS	PASS
										Pass Percentage		100%	100%

5.0 WATER CONSERVATION PLAN

Water consumption and the conservation of water has become increasingly important in recent times. There are a number of potential advantages from the conservation of water both environmentally and financially. The reductions in usage of water result in reductions in energy, wastewater and in turn associated costs.

The water supply for the site will be taken from the Local Authority mains network.

There are a number of features which will be included in the design of the water services installation which will reduce the consumption of potable water.

5.1. Low Water Use Sanitary Ware

The sanitary ware selected within the building can have a significant effect on the water consumption. Low use appliances such as aerated taps, dual flush WC's and low water use showers will be installed throughout the development

The following is a table detailing maximum water consumption for various appliances:

Appliance	**Minimum Standard**
Dual Flush Cistern	6/4 Litres or better
Showers	<9 litres/min
Taps	Aerating Taps (approx 0.5l/use)

5.2 WATER STORAGE 24 HOURS

Apartment	Storage
1 Bed	227 L
2 Bed, (1bath+ en-suite)	317 L

6.0 BUILDING LIFE CYCLE

The new Apartment Guidelines are as outlined in the Introduction in this Document.

Under Section 6.0 Operation and Management of Apartment Developments states the following:

"*Certainty regarding the long-term management and maintenance structures that are put in place for an apartment scheme is a critical aspect of this form of residential development. It is essential that robust legal and financial arrangements are provided to ensure that an apartment development is properly managed, with effective and appropriately resourced maintenance and operational regimes.*

In this regard, consideration of the long-term running costs and the eventual manner of compliance of the proposal with the Multi-Unit Developments Act, 2011 are matters which should be considered as part of any assessment of a proposed apartment development.

Accordingly, planning applications for apartment development shall include a building lifecycle report which in turn includes an assessment of long term running and maintenance costs as they would apply on a per residential unit basis at the time of application, as well as demonstrating what measures have been specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents".

6.1. Design Measures to ensure Low Maintenance and Low Running Costs

The following measures will be incorporated into the Design to achieve Low Maintenance and Running Costs.

These measures will include but not limited to;

- Efficient Heating System using Centralised Heat Pump Technology
- Efficient Hot Water Generation also using Centralised Heat Pump Technology
- Low Air Infiltration & Thermally modelled junctions reducing heat losses
- User friendly Heating and Hot Water Controls to enhance occupant comfort and reduce over heating
- LED Low Energy Lighting throughout

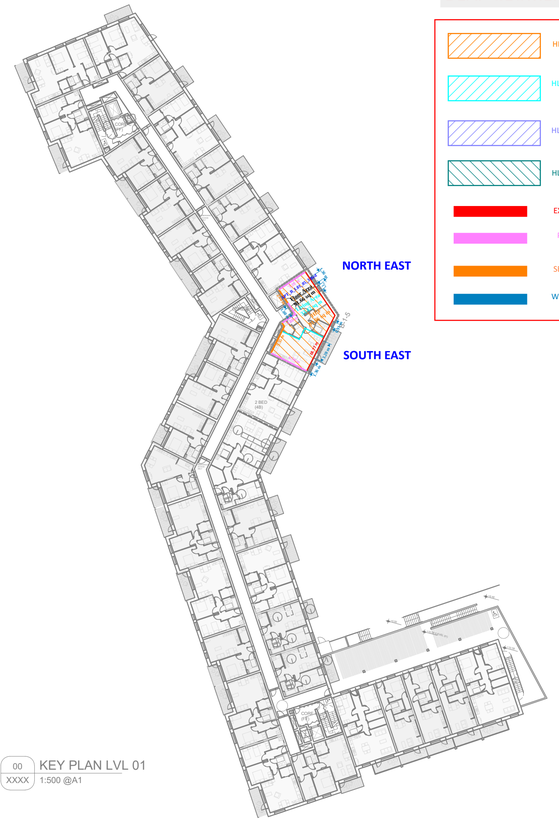
6.2. Estimated Annual Heating, Hot Water and Lighting Running Costs.

All of the apartment units have been scheduled together with their calculated energy consumption and energy consumption costings. It is intended this information will be used to feed into an overall building Life Cycle Report which will also have input from the Client, Property Managers and Consultants.

APPENDIX 1 – DRAWINGS

DEAP GEOMENTERY LEGENDS

- HLF_EXPOSED FLOOR
- HLF_SEMI EXPOSED FLOOR
- HLR_EXPOSED ROOF
- HLR_SEMI EXPOSED ROOF
- EXTERNAL WALL
- PARTY WALL - TO DWELLINGS
- SEMI-EXPOSED WALL - TO RISER & LIFT
- WINDOW AND DOOR DIMENSTIONS



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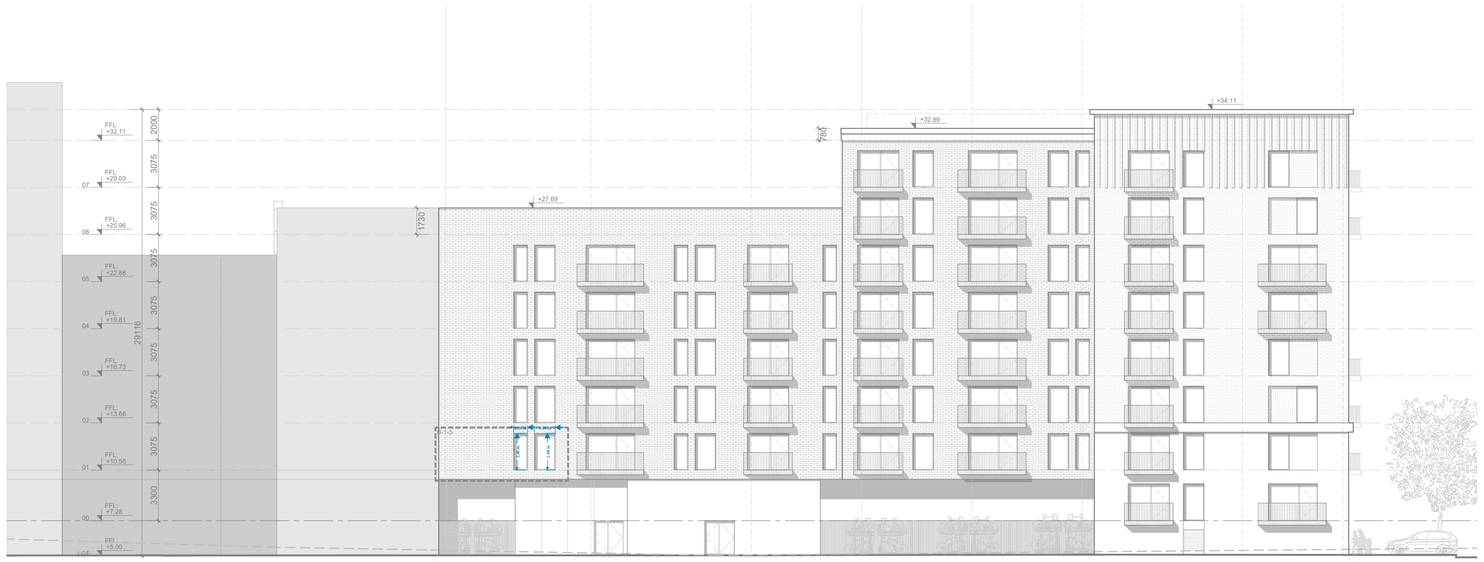

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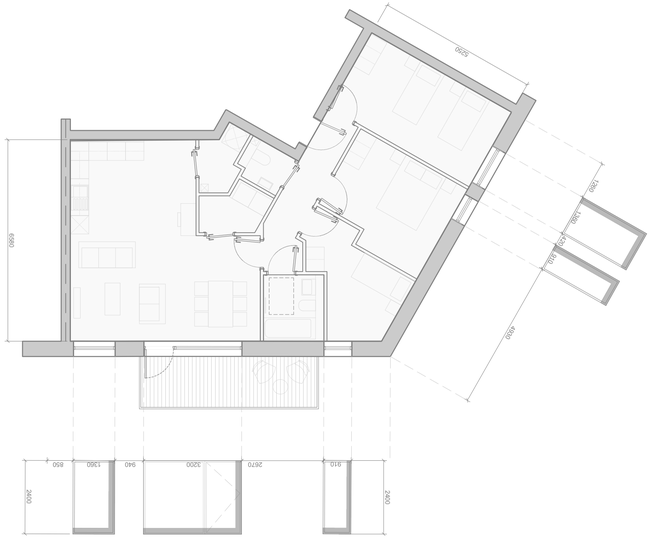

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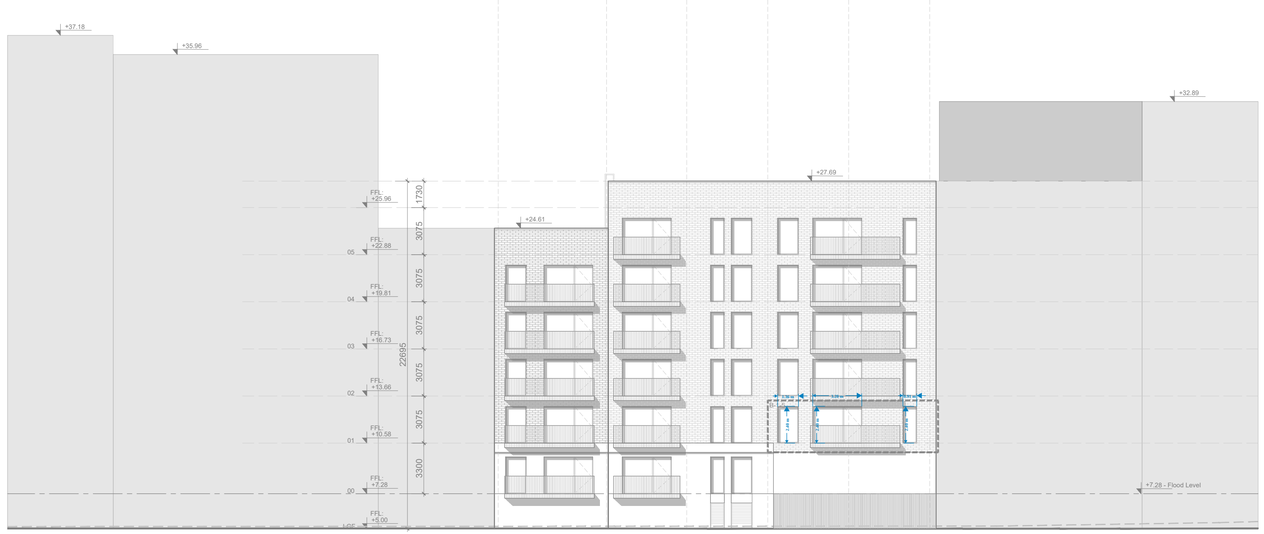

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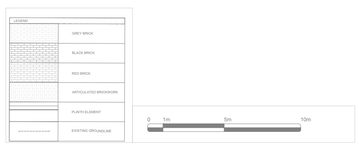

Key Plan (not to scale):

Rev:	Date:	Description:

MOLA
2 Donnybrook Road,
Donnybrook,
Dublin 4, Ireland
Telephone +353 1 218 3900
www.mola.ie

Notes
Do not scale.
Use figured dimensions only.
This drawing is to be read in conjunction with all relevant specifications and drawings.
All dimensions to be checked on site.
In the event of any discrepancies between drawings, the contractor is to inform the Architect immediately.

Stage: PRE-PLANNING

Client: LDA
Project: DYKE ROAD
Drawing: PART L B-1-5 3BED
Date: 10/06/2024 Scale: VARIES @ A1 Int. Job No: 23018
Drawing No: DRG-MOLA-ZZ-XX-DR-A-0130 Status: ... Revision: 0

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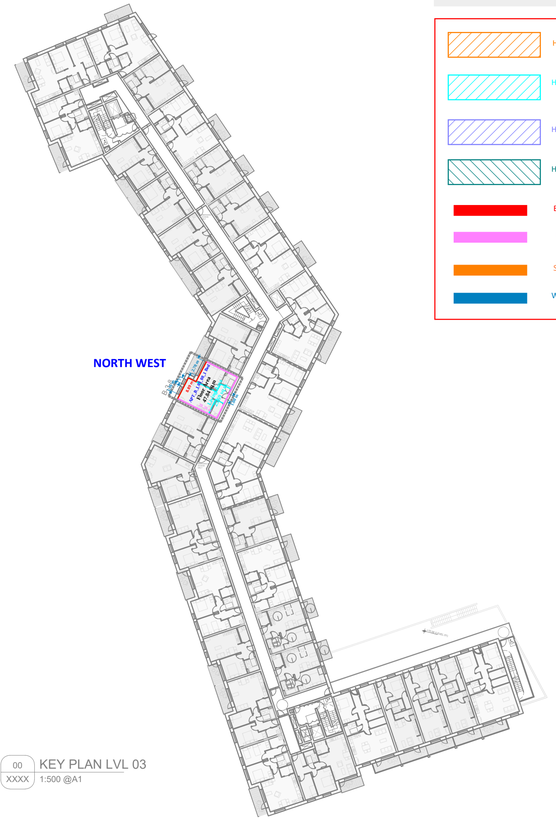

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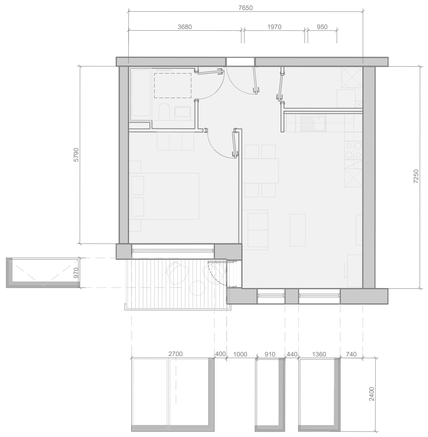

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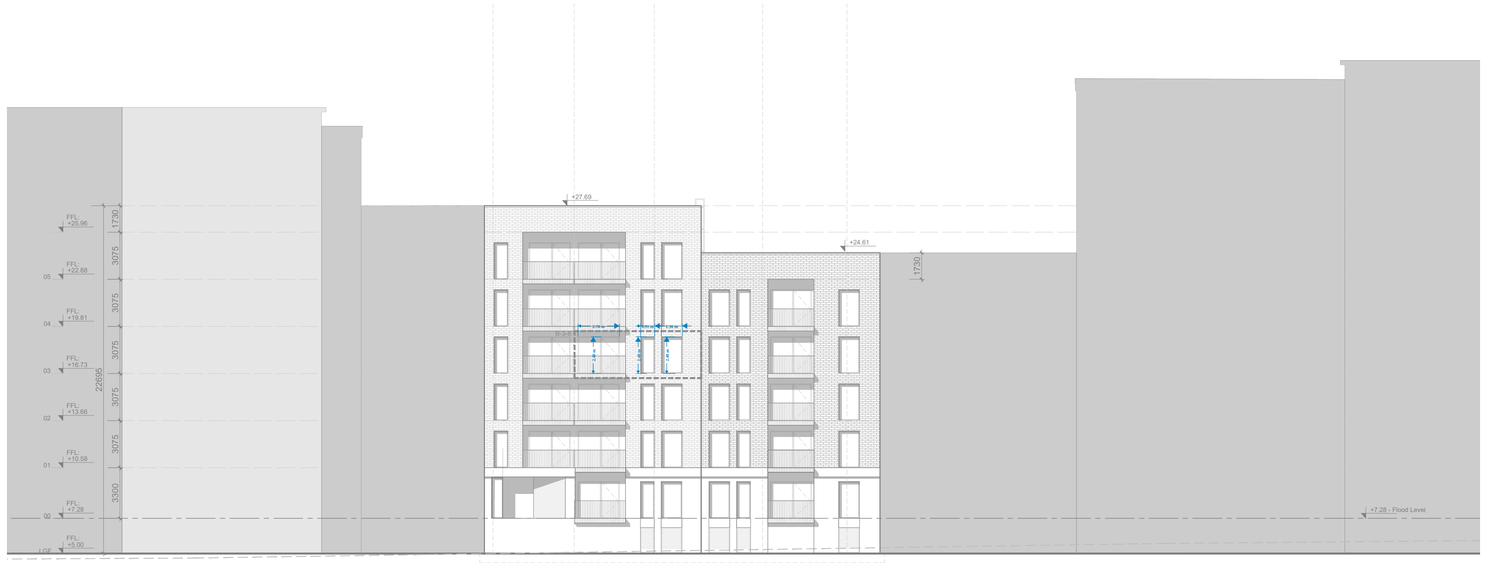

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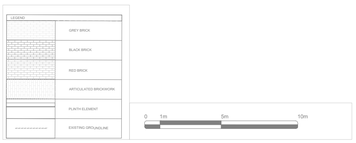

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Drawing: PART L B-3-8 1BED
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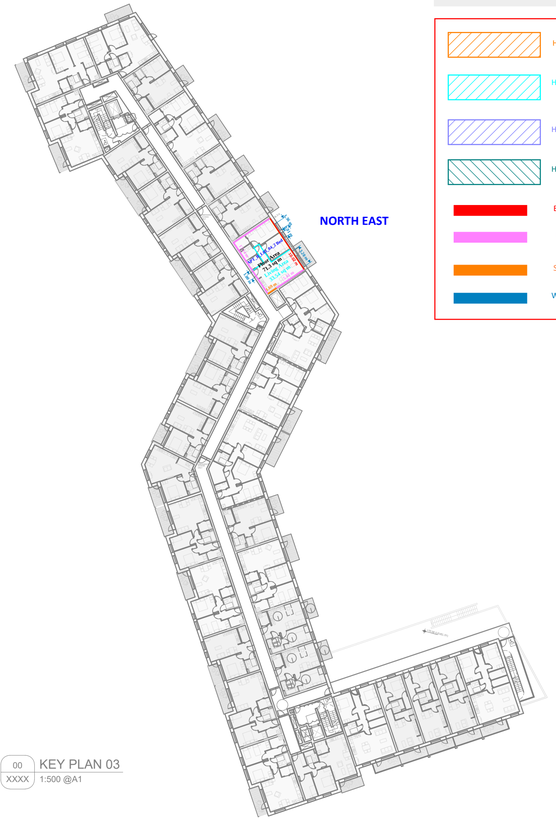

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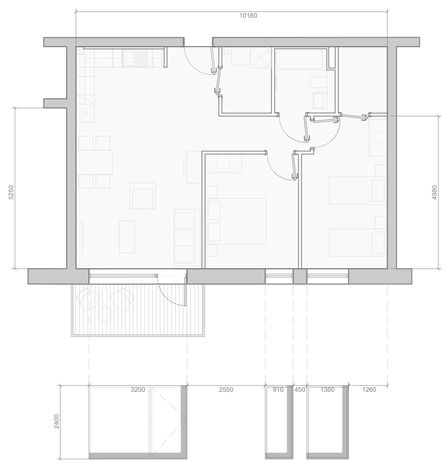

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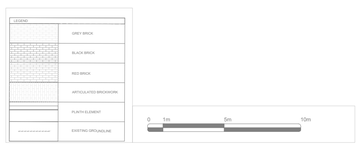

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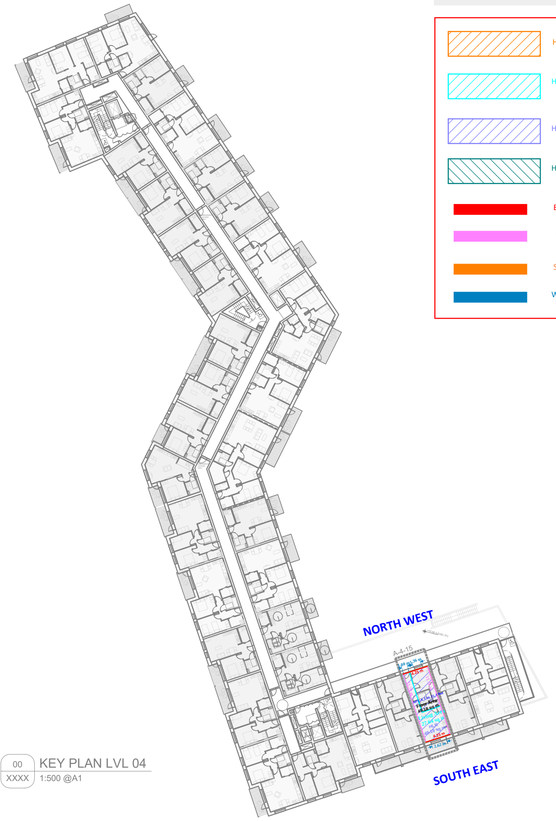

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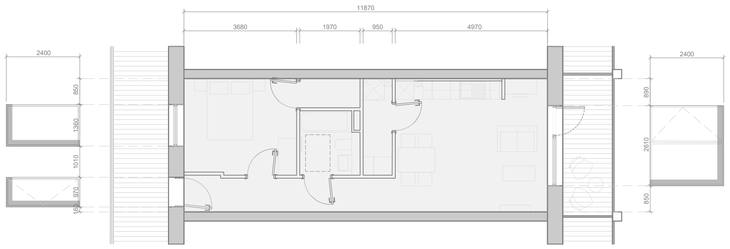
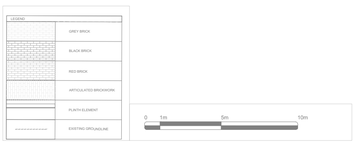


00 XXXX — A-4-15 UNIT PLAN — 1:100 @A1

00 XXXX — NORTH ELEVATION (10) — 1:200 @A1

NOTES / LEGEND



Key Plan (not to scale):

Rev:	Date:	Description:

MOLA
2 Donnybrook Road,
Donnybrook,
Dublin 4, Ireland
Telephone +353 1 218 3900
www.mola.ie

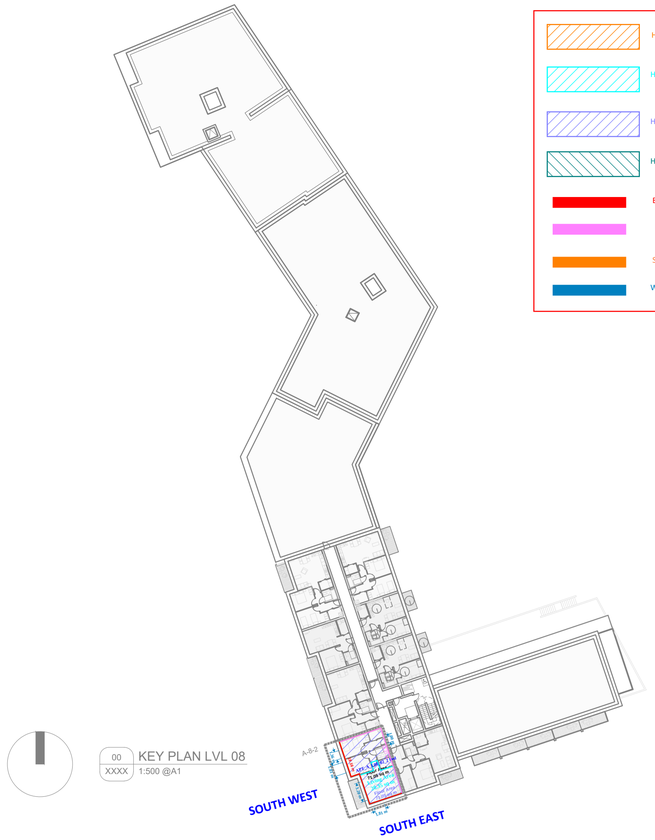
Notes
Do not scale.
Use figured dimensions only.
This drawing is to be read in conjunction with all relevant specifications and drawings.
All dimensions to be checked on site.
In the event of any discrepancies between drawings, the contractor is to inform the Architect immediately.

Stage: PRE-PLANNING

Client: LDA
Project: DYKE ROAD
Drawing: PART 5 A-4-15 1BED
Date: 10/06/2024 Scale: VARIES @ A1 Int. Job No: 23018
Drawing No.: DRG-MOLA-ZZ-XX-DR-A-0130 Status: .... Revision: 0

DEAP GEOMENTERY LEGENDS

- HLF_EXPOSED FLOOR
- HLF_SEMI EXPOSED FLOOR
- HLR_EXPOSED ROOF
- HLR_SEMI EXPOSED ROOF
- EXTERNAL WALL
- PARTY WALL - TO DWELLINGS
- SEMI-EXPOSED WALL - TO RISER & LIFT
- WINDOW AND DOOR DIMENSTIONS



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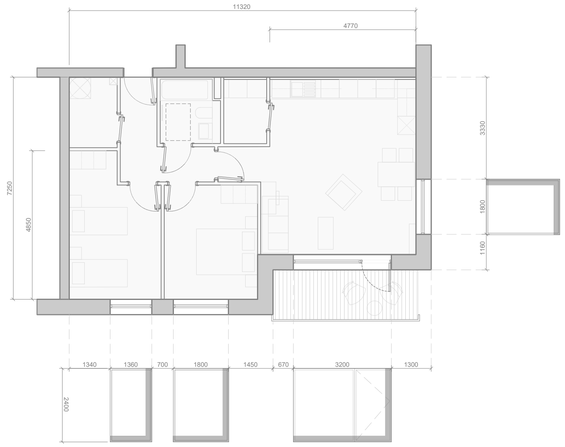
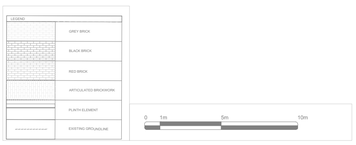
00 XXXX WEST ELEVATION (4)
1:200 @A1



00 XXXX A-8-2 UNIT PLAN
1:100 @A1

00 XXXX SOUTH ELEVATION (5)
1:200 @A1

NOTES / LEGEND



Key Plan (not to scale):

Rev: Date: Description:

MOLA
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Stage: PRE-PLANNING

Client: LDA
Project: DYKE ROAD
Drawing: PART L A-8-2 2BED
Date: 10/06/2024 Scale: VARIES @ A1 Int. Job No: 23018
Drawing No: DRG-MOLA-ZZ-XX-DR-A-0130 Status: .... Revision: 0

APPENDIX 2 – DESIGN CRITERIA

NO.	ITEM
1.0.	**MECHANICAL**
1.1	**Design Criteria**
	The Mechanical Services shall be designed to comply with the Irish Building Regulations and the Chartered Institution of Building Services Engineers (CIBSE) Guidelines and all other relevant International and Local Authority Standards. **Indoor Climate:** Operative temperature: Winter mode: min. *21 °C* **Outside Design Conditions – Dublin:** ▪ Winter: Temperature -5°C 100% RH ▪ Summer: Temperature 26°C (dry bulb) Humidity 19.5°Cwb (wet bulb) **Air Quality:** Rooms such as toilets, shall be put in under negative pressure towards surrounding room spaces. Exhaust air discharge points shall be placed in compliance with CIBSE Guidelines. Air velocity within the occupation zones 0.15/ms **Background Noise Levels:** **Area** **NR** Bedrooms (Night Time) ≤NR25 Stairwells and Corridors ≤NR40 Entrance Lobby, ≤NR40 Kitchen ≤NR45 Toilets ≤NR45 External Plant: In accordance with acoustic consultant criteria and design report.
1.2.	**Mechanical Site Services**
	Site services associated with the Mechanical Services comprises of incoming water mains pipework.
1.3.	**Heating System:**
	A Centralised Heating system will be provided to serve all of the apartment units. A Central Energy Centre is located within the apartment block. This Centralised Heating System will be an Air to Water Heat Pump System. Heating Flow and Return Pipework will be distributed from this plant to all apartment units Within the Central Plantroom variable speed heating circulation pumps will be provided supplemented with a small jockey pump. The proposed designed Heating Flow and Return Temperatures are 60ºC / 30ºC giving a mean water temperature of 45ºC. This compares favourably within the mean water temperature of a conventional 80ºC / 70ºC system of 75ºC. The Variable Speed Pumps typically will cycle to 30%, however, during the night they will switch off with the small jockey pump operating to maintain pipeline temperatures. Within each Apartment, a Heat Interface Unit (HIU) will be provided. Served from this HIU each Apartment will be provided with a radiator heating circuit via a Heat Exchanger within the HIU. Also within the HIU a dedicated Heat Exchanger will be provided for hot water heating for the apartment.

	Heat Meters will be provided in each HIU. All meters will be linked via BMS to a front end PC within the Facility Managers Office for bill logging (which can also be done remotely off site if required). In additional to straight forward billing, the software/application will be capable of comparing actual usage with pre-programmed acceptable usage levels for all metered consumption. 7 day, 24 hour acceptable consumption profiles will be accommodated by the software. A dedicated HIU will provide heating via LPHW radiators to Landlord Spaces within the Apartment Block. The heating installations will be designed in accordance with the Chartered Institution of Building Services Engineers (C.I.B.S.E.) Guidelines and Part J of the Building Regulations Technical Guidance documents and amendments where applicable.
1.4.	**Ventilation**
	Each apartment will be provided with a dedicated Mechanical Ventilation Heat Recovery (MVHR) system. The MVHR unit will have a ducted fresh air intake and discharge to outside. Air will be supplied from the MVHR unit to habitable rooms and extracted from bathroom(s), the kitchen and storeroom(s).
1.5.	**Water Services:**
	Water will be supplied to the apartment block and will enter beneath the ground and into the water storage room and rise to a check meter. Water will serve the outlets located in each apartment via a dedicated booster pump and break-tank. Sectional GRP cold water storage tanks to Format 30 Specification will be installed. Water storage tanks will be provided typically with a storage allowance of 227 litres per dwelling. A pump set will serve a dedicated water piped service to each dwelling. The tanks will be located so that it is possible to repair or replace any sections of the tank without any fabric / structural changes. All tanks will be supplied with lightweight covers and fitted with drip trays. Provision will be made in the tanks cover for access to the ball cock. Overflow and warning pipes to the tanks and drip trays will be incorporated discharging at a point of visibility. Hot water will be generated instantaneously via the HIUs. All water services distribution pipework shall be appropriately insulated. The insulation shall be of preformed sections of rigid mineral wool incorporating aluminium foil laminate cover and fitted in accordance with the manufacturers' instructions. The insulation shall also be applied to all connections, bends, tees and valves. Proprietary jackets with Velcro fixings shall be used on all valves over 32mm. Additional taping shall be provided at 2m intervals on the insulation within the heating centre plant room. Thermostatic shower mixers will be provided to all showers. The water systems will be designed and installed to ensure water hammer and air locking does not occur, and will be provided with an adequate number of isolating valves for the purpose of isolation and maintenance. The dead leg distribution pipe to all outlets will be kept to a minimum in accordance with current industry standards.
1.6.	**Fire Fighting:**
	First aid fire fighting will be provided in accordance with building regulation requirements.
1.7.	**Sprinkler System**
	A Domestic Sprinkler System is proposed for the Apartment Block. The sprinkler system will be designed in accordance with BS 9251 2021 "Sprinkler systems for residential and domestic occupancies – Code of Practice." This Standard gives recommendations for the design, installation, components, water supplies, commissioning and maintenance of fire sprinkler systems for use specifically in residential and domestic occupancies. , not exceeding 45 m in height, include apartments, residential homes, houses of multiple occupancy (HMOs), blocks of flats, boarding houses, aged persons homes, nursing homes, residential rehabilitation accommodation and dormitories.

Fire sprinkler systems for domestic and residential application are designed to provide an additional degree of protection of life and property, above that already achieved by the installation of smoke and/or fire detectors and systems.

Residential and domestic fire sprinkler systems are systems that consist of a water supply, backflow prevention valve (check valve), stop valve, priority demand valve (where required), automatic alarm system (both internal and external) and pipework to quick response sprinklers.

The sprinklers are fitted at specified locations, the appropriate sprinkler type being used for each location.

Sprinklers operate at a pre-determined temperature to discharge water over a known area below. The flow of water thus initiated causes the sounding of an alarm. Only those sprinklers operate which are individually heated above their operating temperature by the heat from the fire.

The design of the sprinkler system will take cognisance of the following principle issues stipulated in BS 9251 ; 2021 when being designed;

Category of System:
The BS identifies 4 category types of sprinkler installation. The Category of the sprinkler system is determined by the type of building as indicated in Table 1 of the standard. The apartments will fall into Category 4.

The chosen category determines the design density and duration of supply under Table 2 of the standard the minimum discharge density is 2.80 mm/min, number of design sprinklers 1 or 2 and minimum duration of supply 60 minutes.

System Type:
A residential sprinkler system should be a wet pipe system, i.e. one that is permanently charged with water.

Extent of Sprinkler Protection:
Sprinkler protection will be provided throughout with the permitted exception of;

- bathrooms with a floor area of less than 5 m2
- cupboards and pantries with a floor area of less than 2 m2 or where the least dimension does not exceed 1 m;
- attached buildings such as garages and boiler houses without direct access from within the protected building;
- crawl spaces;
- ceiling voids;
- external balconies permanently open to the outside and uninhabited loft/roof voids.

Water supply:
Subject to meeting the minimum performance criteria of the BS and where applicable local authority approval the following water supply options will be considered during the design stage;
Sprinkler systems should be connected to a reliable and sustainable supply, for example;
• Mains water supply:
• Mains pressure only;
• Mains water supply boosted by a pump;
• Stored water supply:
• Pump supplied from a water tank;
• Regulated pressurized vessel;
• Gravity-fed stored water system

Fire Pump & Storage:
Where a pump is used, the recommendations of 5.3.3 of the BS will be met and the pump should be:
a) Located such that it is unlikely to be affected by a fire;

	b) Located where the temperature will be maintained above freezing; c) Protected electrically by suitable fusing; d) Protected against the effects of fire; e) Of sufficient capacity to ensure the recommendations of 5.3.3 of the BS are met; f) Suitably designed and manufactured such that testing is needed at not more than annual intervals; g) Operated automatically on demand and require manual shut down. A combined sprinkler and domestic supply pump can be provided subject to meeting the stated minimum criteria in 5.3.3. of the BS. Category 2 systems typically have a water storage requirement of 3 – 4.5 m^3. **Sprinklers:** Only sprinkler heads in accordance with BS 9252 or as agreed with the local authority with quick-response temperature-sensing elements should be used in the inhabited parts of the building. Sprinkler heads should be of pendent, upright or sidewall spray pattern types suitable for flush, recessed or concealed installation. The sprinkler head type to be proposed to the Local Authority will be either a Viking Freedom Residential Pendant Sprinkler type VK 466 (K 5.2) or Tyco rapid response Series LFII Residential 4.9 K- Factor Pendant Sprinkler. Only new sprinkler heads should be used. Any sprinkler head removed from a system should be discarded. Fusible link sprinklers should be colour coded on the frame or sprinkler body; glass bulb sprinklers should be colour coded by the bulb liquid in accordance with BS 9252 or EN 12259-l. The temperature rating of the sprinklers should be: a) The closest to but at least 20°C greater than the highest anticipated ambient temperature of the location b) Within the range of 79°C to 100°C when installed under glazed roofs. For normal conditions the sprinkler temperature ratings will be 57°C to 77°C. **Power supply:** The electrical supply to the fire pumps will be installed in such a way as to minimize the risk of electric supply failure. In all other instances the electrically operated devices should be capable of carrying out their function the event of a complete failure of the mains electrical power supply.
1.8.	**Sanitary:**
	Above ground soils and wastes form part of the Building Services scope of the project. Generally, the above ground soils and wastes shall be run in PVC piping to BS 5572, and shall include vents, anti-siphons and traps to all fittings as appropriate. The design of wet areas in a stacked configuration facilitates this simple and low maintenance approach.
1.9.	Renewables
	To achieve the renewables requirement stipulated in TGD Part L, Centralised Air to Water Heat Pumps will be provided.
1.10.	Sustainability Target
	BER Target is NZEB Part L 2022 Compliance.

2.0	**ELECTRICAL**
2.1	**Design Criteria**
	The Electrical Services shall be designed to comply with the Irish Building Regulations, The Electro Technical Council of Ireland (ETCI) Guidelines and the latest IEE Regulations.
2.2	**Incoming Power Supply**
	1 dedicated ESB sub-station will be sited in the development to serve the entire site. The supply to all buildings, landlord and tenant services will be at LV. The LT switch room for each core will be designed to accommodate a main distribution board suitable for multi tenancy metering, provision for power factor and surge protection equipment and have spare space of 20%. Switchgear shall be located in areas protected from flooding or water ingress. Main power supply cables will have a spare capacity of 20%. External site services will be supplied via dedicated ESB meters & DBs located in the building. Electric car chargers will be supplied via dedicated ESB meters & DBs located in the building.
2.3	**Switchgear and Distribution Boards**
	ESB metering for each dwelling and landlord services will be provided for each building with a landlord distribution board. All main distribution boards (MDB) will be Form 4 type 2 and local Sub Main Boards will be Form 3b. Individual meters will be provided to each unit.
2.4	**Standby Power Supply**
	Standby generator or battery back-up supply will be provided by the Landlord to support all firefighting and life safety systems in the development.
2.5	**Power Factor Correction**
	Power Factor Correction equipment will be provided by the Landlord to ensure a minimum corrected value of 0.95 exists on all phases.
2.6	**Voltage Equalising Equipment**
	The building will be equipped with lightning arresters in the form of roof leads, down-leads, ring leads and foundation earth points. The buildings will be equipped with a leading-in protector to eliminate transient over voltages that may enter the building through the external cable network.

2.7	**Cable Distribution (Duct Systems)**
	The duct system in common areas will include for four separate cable runways. ▪ One for LV sub mains distribution. ▪ One for LV outgoing final sub circuits. ▪ One for the data network and ELV functions ▪ One for Fire Alarm ▪ In common areas vertical risers will connect all floors and horizontally distribution will be in accessible ceiling void.
2.8	**General Services**
	The general services installation will be designed according to the current The Electro Technical Council of Ireland (ETCI) Guidelines and the latest IEE Regulations. General services outlets and small power requirement shall be provided to all areas of the development as required. Circuit management will be considered in the design and each general services socket circuit shall be provided with a 30mA trip residual current device (RCD) at the local distribution board/ Consumer unit.
2.9	**General and Emergency Lighting**
	The general lighting installation in all areas shall incorporate energy efficient lamps within selected luminaires, to provide suitable and adequate levels of illumination in accordance with required standard and in compliance with the current EU Directive on interior lighting and the C.I.B.S.E. / SLL Code for Lighting 2016. Lights in landlord core areas will be energy efficient LED recessed downlighters generally designed to an average of 100 lux with a uniformity of 0.7 with light switching control facilities to provide efficient use of the lighting system. Lighting in plant areas will be provided by surface IP rated LED fittings with vapour resistant polycarbonate diffusers. External lighting will be provided on roadways, car parks, utility and amenity areas in compliance with design standards. Emergency Lighting will be provided within the Apartment Block. The emergency lighting installation will comply with IS3217. Emergency lighting shall be independent LED and provided via independent battery packs. In the event of power failure these battery packs will power the fittings for 3 hours and will provide adequate light for safe escape. An emergency lighting central test unit shall be installed.
2.10	**Fire Alarm Installation**
	The fire alarm system will comply with IS3218. 2013+A1 2019 and the specific requirements of the Fire Certificate. The system will be designed for L3 for common areas & LD2 for the dwellings coverage as defined in IS3218 2013+A1 2019. The fire alarm system will be fully addressable and capable of interfacing with other systems. The control panel should be capable of providing status outputs to the Building Management System (BMS).

2.11	**Earthing & Bonding**
	Earthing system shall be installed in accordance with ET101:2008. Equipment such as window frames, bathroom fixtures, all incoming services pipework and lightning protection installation shall all be bonded. Bonding shall be carried out across non-metallic apparatus.
2.12	**Security and Cableway Provision**
	The building will come complete with landlord-controlled access control, CCTV and intruder alarm systems installed at main entrance and exit points to the building. These systems will be IP type adaptable to an open network. The site will be covered with CCTV system. A landlord system which will be monitored and controlled by the landlord with the building systems. Internal cameras shall be 3.0-megapixel day, 1.5-megapixel night, PTZ colour type with auto-iris lens. External cameras shall be 3.0-megapixel day, 1.5-megapixel night, PTZ colour type with auto-iris lens all contained within a vandal proof IP65 housing combined with heater and thermostat. A suitable sized multiplex unit shall be provided to cater for all cameras. The ground floor apartment units and UD Units will be wired for an intruder alarm system to SI 199 standard.
3.0	**LIFTS**
3.1	**Passenger Lifts** The lift to fully comply with EN 81. The passenger lift will provide a level of service which meets or exceeds the following: - Internal lift car dimensions – 13 person capacity. Lift door clear height 2100mm All lifts serve all floors Quality durable internal car finish Display in car
3.2	**Fire Fighting Lift**
	To be provided in accordance with BS 9999:2008, as and where required.
4.0.	**Satellite TV**
	Space for 1 no. 1.2m (nominal diameter) satellite dish is allowed for the roof. The dish will be able to see an arc of the sky from southeast to southwest, above an angle of 20 degrees elevation.
5.0	**PUBLIC UTILITIES**
5.1	All Main Telecom Providers are available in the area. A dedicated telecom system provider's communications room is provided centrally within each core of the development.

6.0.	**BUILDING CONTROL SYSTEM**
	A complete Building Management Control System including all necessary motor control centres and front end PC will be provided. The Building Management Control System will operate on an open network to allow interface with the following:- Lighting Controls Fire Alarm Access Control Security Systems The Building Management Control System will provide the following:- Status of all plant Record energy consumed Monitor and adjust temperature set points Monitor and adjust time schedules and sequence of operation of all plant. Be compatible for remote connections
7.0.	**TESTING AND COMMISSIONING**
	All systems shall be commissioned in accordance with CIBSE and BSRIA codes. All systems will be demonstrated to the tenants Engineers prior to acceptance of PC. The O&M Manuals and Record Drawings should be available in Draft form at PC with the final documents submitted within 4 weeks of PC.