metec
CONSULTING ENGINEERS

# LIFE CYCLE REPORT

for

## PROPOSED DEVELOPMENT

at

## GREENHILLS ROAD
## TALLAGHT
## DUBLIN 24

for

## O'MAHONYS HOLDINGS SPRL

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## 1.0 INTRODUCTION

This report was compiled by METEC Consulting Engineers on behalf of the applicant, O'Mahony Holdings SPRL, as part of the planning submission for the proposed new residential development at Greenhills Court, Tallaght, Dublin 24.

This report deals specifically with the topic of Operation and Management of Apartment Developments as outlined in the new Planning Guidelines [28], Sustainable Urban Housing: Design Standards for new Apartments, Guidelines for Planning Authorities (2018).

This report describes the following;

- Context to the Planning Guidelines
- Description of the proposed energy strategy
- Estimated annual running costs
- Building Management System (BMS)
- Recommended maintenance schedules
- Estimated mechanical plant lifespan
- Building Façades design principle

## 2.0 SITE AND DEVLOPMENT SUMMARY

The application site is generally bounded to the north by St. Basil's Training Centre, to the east by Greenhills Road, to the west by Old Greenhills Road, and at the south eastern corner by Main Street. The subject site is currently partly developed with an existing residential scheme known as Greenhill's Court comprising 17 no. apartment units in 4 no. apartment blocks ranging in height from 2 to 4 storeys, including basement car park.

The development will consist of: the demolition of 3 no. existing apartment units (c. 239 sqm) and bin store (c. 18 sq m) and the construction of a residential development arranged in 2 no. building blocks, (Block A and Block B) ranging from 3 to 6 no. storeys in height over basement level (c. 3728 sq m, including basement). Block A comprises 11 no. residential apartments (c. 1256 sq m) in a 5 to 6 storey building, and including a ground floor level café (c. 93 sq m) at the building's southeastern corner. Block B comprises 15 no. residential apartments (c. 1393 sq m) in a 3 to 5 storey building. The proposed development will comprise 26 no. new residential units (5 no. studio apartments, 6 no. 1-bedroom apartments, 7 no. 2-bedroom apartments and 8 no. 3-bedroom apartments), with associated balconies and terraces. The proposed development will comprise a total of 40 no. apartment units derived from 26 no. new apartments and 14 no. existing apartments.

The development will also consist of: Relocation of existing basement access on Old Greenhills Road and the upgrade and extension of the existing basement level; provision of internal footpaths; landscaped communal open space (including outdoor gym equipment, children's play area and 'working from home' area); public open space; 13 no. car parking spaces and 74 no. long-stay bicycle parking spaces and 1 no. motorcycle parking spaces at basement level; 2 no. shared car parking spaces and 20 no. short-stay bicycle parking spaces at surface level (15 no. car parking spaces, 94 no. cycle parking spaces and 1 no. motorcycle parking in total); all piped infrastructure and ducting; elevation treatments; plant room; lift access and stair cores; hard and soft landscaping and boundary treatments; changes in level; waste management areas; attenuation tank; backup generator; solar photovoltaic panels; lighting; and all associated site development and excavation works above and below ground.


Figure 2.0.1 – Proposed Development Site Layout Plan

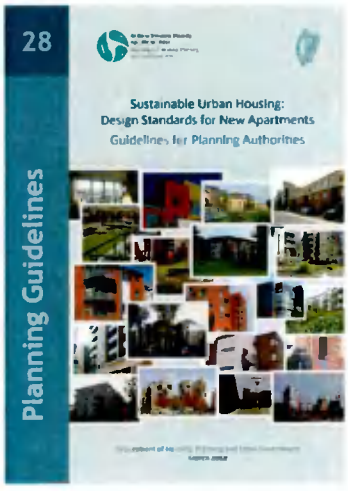
## 3.0 PLANNING GUIDELINES 28 - LIFE CYCLE REPORT REQUIREMENTS

This report responds to the new Planning Guidelines [28], Sustainable Urban Housing: Design Standards for new Apartments, Guidelines for Planning Authorities, in particular to the Operation and Management of Apartment Developments.

These guidelines state the following;
*"6.11 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.*

*6.12 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.*

*6.13 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."*




Planning Guidelines [28], Sustainable Urban Housing: Design Standards for new Apartments, Guidelines for Planning Authorities.

## 4.0 DESCRIPTION OF THE ENERGY STRATEGY

### Exhaust Air Heat Pumps

An alternative to Air to Water heat pumps being considered for the energy strategy for this development is to design individual apartment heating systems using an Exhaust Air Heat Pump as the heat generator.

Exhaust Air Heat Pumps (EAHP), uses the same Vapour Compression (Refrigeration) cycle as the Air to Water Heat pump detailed above but use a mixture of high temperature air from the apartment extract system and outside air to produce high grade heat suitable for space heating and hot water production. No additional ventilation system is then required. The higher temperature air passing through the evaporator results in high efficiency and low running costs. Modern Exhaust Air heat pump systems can be used in applications where there is a significant year-round demand for heating and hot water and have the advantages of not requiring any fossil fuels to stored or distributed. This can bring significant air quality benefits to the surrounding areas. An added advantage is that there is no outdoor unit to be located, all mechanical parts are within the apartment in a single 600mm x 600mm casing.

The heat emitted from the Heat Pump is used to provide space heating and domestic hot water. Modern Exhaust Air Heat Pumps use a variable speed drive type compressor and have load and weather compensation system build in as standard ensuring maximum efficiency is achieved and running costs are minimised. It is worth noting that electricity in Ireland (as of July 2018) has a Primary Energy (PE) factor of 2.08 (2.08 energy units per kWh delivered). Most Exhaust Air heat pumps have a coefficient of performance (COP) exceeding 4.00 Therefore the difference between the COP and the PE factor can be considered renewable i.e.

| | |
|---|---|
| Renewable Contribution | = COP – PE Factor |
| | = 4.00 – 2.08 |
| | = **1.92** |

These residential units have a predictable year-round demand for hot water, this makes Exhaust Air heat pumps a potentially suitable technology for the development. At the detailed design stage, the thermal & electrical load profiles will be analysed using a thermal dynamic simulation model which will use building occupancy profiles and real weather data. Each individual Heat Pump would then be sized to suit the demand & load profile of each unit. The diagrammatic image on the next page shows how a typical Heat Pump (i.e. NIBE) would be integrated into each unit:

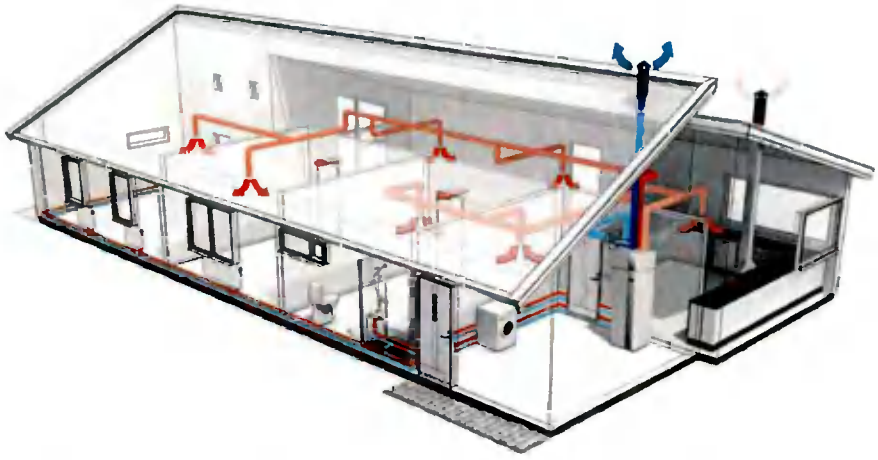


Figure 4.01 Typical Daikin Air to Water Heat Pump System (Space Heating emitters can be Radiators or Underfloor Heating or a mixture of both)

## 5.0 RECOMMENDED MAINTENANCE SCHEDULES

The Applicant and the project design team have fully considered the long term running and maintenance costs associated with the proposed apartment scheme. In considering various energy strategies for this development, a central district heating system has been deemed the preferred option, largely due to the fact that plant maintenance for the most part can be scheduled centrally within the landlord plant areas. This approach ensures that effective and appropriately resourced maintenance and operational regimes can be carried out with minimal disruption to individual tenants.

**Exhaust Air Heat Pump Service Schedule (Located in each apartment)**

Typical service plan rates for Exhaust Air Heat Pumps are approximately €200 per heat pump unit per year. By their design and very nature, maintenance requirements are very low. An annual check is often all this is required to ensure optimum system operation.

A Wi-Fi adapter can be fitted to most heat pumps to notify any faults remotely to the heat pump supplier. Apartment occupants are not expected to carry out any maintenance. Modern heat pumps are very reliable systems and when designed and installed correctly, have a very long lifespan.

| Unit | Service Interval |
|---|---|
| Exhaust Air Heat Pump | Exhaust Air Heat Pumps are inherently low-maintenance space heating systems. A maintenance check every year is sufficient unless otherwise advised by the manufacturer.<br><br>In general, maintenance requirements are similar to that of a typical gas or oil boiler. Very little user input is required.<br><br>Inspection and maintenance procedures for the heat pump should follow manufacturer's guidance and include at least the following:<br><br>• Clean fan unit and ensure airflow path is clear.<br>• Anti-Freeze level check and top up if necessary.<br>• Internal strainer & filter cleaning<br>• Removal of any trapped air<br>• Check system pressure & flow rate is correct<br>• Check Circulating pump is operating correctly<br>• Control valves must respond to demand signals for heating and hot water<br>• Check Expansion Vessel charge<br>• Supply temperatures to heating and hot |

| | |
|---|---|
| | water as commissioned<br>• Check safety valve (where fitted)<br>• Check Immersion Heater<br>• Clean each extract valve.<br>• Check outdoor air damper and confirm correct operation.<br>• Check ducting and confirm condition<br>• Complete Maintenance Report<br>• Consumer satisfied with heating and hot water performance |

## 6.0 ESTIMATED PLANT LIFESPAN

| Exhaust Air Heat Pump | | |
|---|---|---|
| Lifespan | Key maintenance Requirements to improve the lifespan | End of life, Parts that can be recycled |
| 15-20 Years | Annual Service | All of the parts can be recycled with the oil and refrigerant being removed prior to disposal. |

| Ventilation System | | |
|---|---|---|
| Lifespan | Key maintenance Requirements to improve the lifespan | End of life, Parts that can be recycled |
| 15 Years | Replace filters (where present) and clean grilles. | Rigid plastics, metals, cabling and electronics can be recycled. The use of the WEEE scheme (or similar) is recommended to ensure the optimal recovery, recycling and reuse of materials. |

## 7.0 BUILDING FAÇADE

The design of the building façade has been such that consideration has been given to reducing the running and maintenance costs of the residential units through the specification of the following:

- The proposed development will meet or exceed the requirements of the current building regulations, see Figure 7.0.1 below, in terms of thermal performance, thus ensuring that heating energy consumption is considerably reduced at source.
- The glazing specification of the proposed development will be such that the useful benefit of light transmittance and solar gain are all carefully balanced to ensure that the specification is optimal. A high level of light transmission will allow daylight to internal spaces to be maximised thus reducing reliance on electric lighting systems, similarly utilising solar gain during the winter months when the suns path is low will provide a passive heating source to the dwellings.
- External brickwork and rendering systems will be such that regular maintenance shall not be required.

| 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<br>- Insulation at ceiling<br>- Insulation on slope | 0.16<br>0.16 | 0.3 |
| Flat roof | 0.20 | |
| 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 |

*Notes*
1. *The U-value includes the effect of unheated voids or other spaces.*
2. *For alternative method of showing compliance see paragraph 1.3.2.3.*
3. *For insulation of ground floors and exposed floors incorporating underfloor heating, see paragraph 1.3.2.2.*
4. *Windows, doors and rooflights should have a maximum U-value of 1.4 $W/m^2K$.*
5. *The NSAI Window Energy Performance Scheme (WEPS) provides a rating for windows combining heat loss and solar transmittance. The solar transmittance value $g_{perp}$ measures the solar energy through the window.*

Figure 7.0.1 Part L 2019 (Dwellings) Maximum Elemental U-values.

## 8.0 PROPERTY MANAGEMENT

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

The property management company shall enter into a contract directly with the OMC for the ongoing management of the built development. This contract shall be for a maximum period of 3 years and in the form prescribed by the Property Service Regulatory Authority (PSRA).

The property management company shall be responsible for establishing and maintaining a scheme in respect of an annual service charge budget for the development. The service charge budget shall cover items such as insurance, maintenance and repair of the development common areas in accordance with the Multi-Unit Developments Act 2011 (MUD Act).

The property management company shall establish and maintain a building investment fund referred to as a 'sinking fund'. These funds shall be to discharge expenditure reasonably incurred on various items such as refurbishment and improvement. In accordance with the requirements of the MUD Act, the members of the OMC will determine and agree each year at a General Meeting of the members, the contribution to be made to the sinking fund.

As the specific details associated with the maintenance/repair costs to this development can only be determined after the detailed design stage, the costs have not been included within this report.

The domestic waste management strategy shall allow for black, brown and green bin storage. A competitive tender process for waste management collection will be undertaken to ensure that competitive waste charges are achieved.