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# **SUSTAINABILITY REPORT/ ENERGY STATEMENT**

for the

**DALGUISE HOUSE DEVELOPMENT**

at

**MONKSTOWN  
CO. DUBLIN**

for

**GEDV MONKSTOWN OWNER LIMITED**

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## **EXECUTIVE SUMMARY**

This Sustainability Report / Energy Statement was compiled by METEC Consulting Engineers in October 2022 on behalf of our client, GEDV Monkstown Owner Limited, as part of the Planning Submission for the proposed Dalguise House Development at Dalguise House, Monkstown, Co. Dublin.

The proposed development will consist of 11 blocks of residential accommodation, 3 new houses located in the north west corner of the site, and 3 existing structures undergoing major renovation totalling to 491 no. units and shared amenity spaces.

The development will also include residential shared services; car and bicycle parking at basement and surface levels; public open spaces; play areas; new/revised pedestrian and cyclist access and vehicular access via new entrances on Monkstown Road; and all associated site works on lands consisting of Dalguise House site. The proposed development is referred to as Dalguise House Development.

Our client and the design team recognise the importance of creating a sustainable development which interplays between good urban design, accessibility to sustainable modes of transportation and the most efficient use of energy and natural resources. This report highlights how the construction and long-term management of the proposed development will be catered for and how overall energy considerations have been inherently addressed.

The plan is to follow the requirements of the E.P.B.D. (Energy Performance of Buildings Directive), Building Regulations Technical Guidance Document (TGD) Part L and the Dun Laoghaire Rathdown County Development Plan 2022-2028 which are the current drivers for sustainable building design in Ireland.

The design team plan to achieve building envelope and HVAC performance that is an improvement on the statutory requirements contained in the Irish Building Regulations by using the latest and greatest technologies and design practices. The design team will achieve TGD Part L 2021 Nearly Zero Energy Buildings (NZEB) for the proposed development. A preliminary DEAP analysis has been undertaken on the residential units within the development to inform the design strategy, demonstrate compliance with the domestic Building Regulations Part L and to ensure that the targeted Building Energy Ratings (BERs) of A3 (or better) will be achieved.

A Thermal Dynamic Simulation Model of the communal areas has been constructed to demonstrate compliance with the non-domestic Building Regulations Part L and to ensure that the targeted BER of a A3 (or better) will be achieved using the SEAI approved NEAP methodology. This simulation model will be used to generate heating loads in an energy conscious manner and will also be used to inform key decisions in the building design such as the fabric performance metrics. NZEB will achieved for these areas.

**RESIDENTIAL UNITS**

Summary of the proposed Sustainability target:

Residential Units Energy Rating (BER) using SEAI’s DEAP Methodology	A3 or Better
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Summary of the Energy Performance Quality Assurance checks carried out:

TGD Part L 2021 section 1.3.2 - A compliance check will be carried out to ensure that the average U-value complies with the maximum permitted by the TGD standard	✓
TGD Part L 2021 section 1.3.2 – Maximum elemental U-value Check will be carried out using SEAI approved software (DEAP)	✓
The Energy Performance Coefficient (EPC) for the proposed dwellings will be calculated to ensure it is less than 0.3	✓
The Carbon Performance Coefficient (CPC) for the proposed dwellings will be calculated ensure it is less than 0.35	✓
TGD Part L 2021 section 1.2 – Minimum level of renewable energy technology to be provided check will be carried out	✓
TGD Part L 2021 section 1.3.5 – TM 59 Overheating analysis carried out on apartments	✓
TGD Part L 2021 section 1.4.5.2 – Airtightness to be under 3m <sup>3</sup> /m <sup>2</sup> /hr at 50Pa where Mechanical Ventilation is installed.	✓

**COMMUNAL AREAS**

Summary of the proposed Sustainability target:

Building Energy Rating (BER) using SEAI's NEAP Methodology	A3 or Better
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Summary of the Energy Performance Quality Assurance checks carried out:

TGD Part L 2021 section 1.3.2.2 - Overall Heat Loss Method Compliance Check will be carried out using SEAI approved software (IES VE)	✓
TGD Part L 2021 section 1.3.2.3 - A compliance check will be carried out to ensure that the average U-value complies with the maximum permitted by the TGD standard	✓
The Energy Performance Coefficient (EPC) for the proposed communal areas will be calculated to ensure it is less than 1.0	✓
The Carbon Performance Coefficient (CPC) for the proposed commercial units will be calculated to ensure it is less than 1.15	✓
TGD Part L 2021 section 1.2.1 – Renewable Energy Ratio Check will be carried out.	✓
TGD Part L 2021 section 1.3.5.3 - Solar Overheating Compliance Check will be carried out	✓

## **1.0 INTRODUCTION**

This Sustainability Report / Energy Statement was compiled by METEC Consulting Engineers in October 2022 on behalf of our client, GEDV Monkstown Owner Limited, as part of the Planning Submission for the proposed Dalguise House Development at Dalguise House, Monkstown, Co. Dublin.

The proposed development will consist of 11 blocks of residential accommodation, 3 new houses located in the north west corner of the site, and 3 existing structures undergoing major renovation totalling to 491 no. units and shared amenity spaces.

The development will also include residential shared services; car and bicycle parking at basement and surface levels; public open spaces; play areas; new/revised pedestrian and cyclist access and vehicular access via new entrances on Monkstown Road; and all associated site works on lands consisting of Dalguise House site. A detailed development description is set out in the Planning Report and Statement of Consistency prepared by TPA accompanying this application package.

Both the Client and the Design Team are committed to supporting energy efficiency and energy conservation to facilitate measures which seek to reduce emissions of greenhouse gases and to promote the ethos of sustainability. Residential and commercial buildings account for 55% of total CO<sub>2</sub> emissions and represent the biggest possible opportunity for CO<sub>2</sub> abatement in Dublin (Source: Dublin City Sustainability Energy Action Plan 2010-2020).

This report highlights how the construction and long-term management of the proposed development will be catered for and how overall energy considerations have been inherently addressed. This report also addresses how the proposed development will comply with Technical Guidance Document (TGD) Part L – Conservation of Fuel and Energy 2021 (Dwellings) & 2021 (Buildings other than Dwellings) and which are the main influence on standards of energy performance and carbon dioxide emissions in Ireland. Where possible the design team intend to achieve building envelope and HVAC performance that is a significant improvement on the statutory requirements contained in the Irish Building Regulations.

It is now a requirement for all new domestic and non-domestic buildings to meet the NZEB (Near Zero Energy Building) standard. The design team will incorporate the requirements of this standard into the proposed development.

The building services design strategy for the proposed development utilises as many sustainable design options and energy efficient systems that are technically, environmentally and economically viable for the project to achieve a low energy and environmentally friendly development, while also providing suitable dwellings to meet current market demands.



2.0 SITE PLAN



Figure 2.1 Site Plan

### **3.0 PLANNING POLICY IN DUN LAOGHAIRE – RATHDOWN COUNTY**

The Design Team have paid particular attention to Dun Laoghaire Rathdown County Development Plan 2022-2028. The following policy of Dun Laoghaire Rathdown County Council are relevant to the Proposed Development:

**Policy Objective CA1:** National Climate Action Policy

**Policy Objective CA3:** Guidelines on Climate Action and Measuring Greenhouse Gas Impacts

**Policy Objective CA5:** Energy Performance in Buildings

**Policy Objective CA10:** Renewable Energy

The plan is to ensure that the building services (mechanical and electrical) design strategy is to utilise as many sustainable design options and energy efficient features that are technically, environmentally and economically feasible for the project in an aim to achieve a new mixed-use development that is low energy and environmentally friendly. Making the right decisions in relation to the design / construction can contribute greatly to the sustainability of a building, which will lead to cost savings in the future and raise comfort levels for the occupants of the building.

The design approach that shall be adopted for this development will be the LEAN, CLEAN, GREEN Approach.

**Lean:** The plan is to reduce the demand for energy by designing efficiency into the very fabric of the building. This focus will extend to air tightness, thermal bridges and solar control, as well as taking into account the thermal mass of the areas being considered. A full DEAP (Domestic Energy Assessment Procedure) shall be carried out for all residential units to ensure compliance with TGD Part L 2021. All residential units on the site shall achieve the required Energy Performance Coefficient (EPC) and Carbon Performance Coefficient (CPC) in accordance with the DEAP methodology. Separately a full NEAP (Non-Domestic Energy Assessment Procedure) and NZEB Analysis shall be carried out for the commercial units to ensure compliance with TGD Part L 2021.

**Clean:** In specifying mechanical and electrical services the plan is to use systems that are best in class technology and most efficient in their range. Consideration will be given to both the embodied energy and the energy consumed over its lifespan within the building. This is relevant to the heating system, hot water generation, ventilation systems and lighting. The design team will also focus on the control and metering these energy

end uses which would greatly assist future energy measurement and verification activities.

**Green:** leveraging renewable technologies to a higher degree due to the greatly reduced energy requirements of the building.

By adopting this approach ensures that where renewable technologies are considered, they are sized efficiently, not based on excessive over-sized plant loads. This approach helps to develop a more cost-efficient renewable solution.

Dun Laoghaire Rathdown Co. Co. is committed to encouraging more sustainable development, the efficient use of energy and the use of renewables in new buildings. In accordance with Dun Laoghaire Rathdown Co. Co. Planning Policy, a feasibility assessment shall be carried out *during the detailed design stage* to determine the practical, economic and environmental benefits of such technologies for this development.

#### **4.0 SERVICING APPROACH**

The plan for the building services (mechanical and electrical) design strategy is to utilise as many sustainable design options and energy efficient features that are technically, environmentally and economically feasible for the project in an aim to achieve a development that is low energy and environmentally friendly. Making the right decisions in relation to design / construction can contribute greatly to the sustainability of a building, which will lead to cost savings in the future and raise comfort levels for the occupants of the buildings.

Typical considerations when defining our approach include but are not limited to the following:

- Our Clients preferences i.e. Centralised vs Decentralised system
- Space Heating & Hot Water needs of the buildings
- Choice of fuel, in particular with reference to net carbon emissions
- Overall Running Costs
- Capital Costs & Ongoing Maintenance requirements
- Regulatory Requirements i.e. NZEB, TGD's etc.

Servicing approaches that have been considered for this development include:

- District Heating with CHP and/or Air Source Heat Pumps (ASHP)
- Individual Heat Pumps
- Exhaust Air Heat Pumps
- Gas Boilers with Solar Photovoltaic

##### **District Heating with CHP and/or Air Source Heat Pumps (ASHP)**

This approach uses centralised heating plant which typically includes Combine Heat & Power and/or ASHP's with Gas fired boilers for meeting the peak loads i.e. very cold weather or morning hot water peak.

Heat is produced efficiently by the centralised plant and delivered via highly insulated main pipes to each dwelling unit for heating and hot water, both of which are produced in a Heat Interface Unit (HIU) within each dwelling. It is important to note that the electricity produced by the CHP is used directly by the ASHP which has a Seasonal Coefficient of Performance of c.3.0. This effectively means that for every 1 kWh of natural gas input into the heating plant results in c. 1.4 kWh of high-grade heat being delivered to the dwellings. Such an arrangement can meet the renewable requirements of TGD Part L 2021.

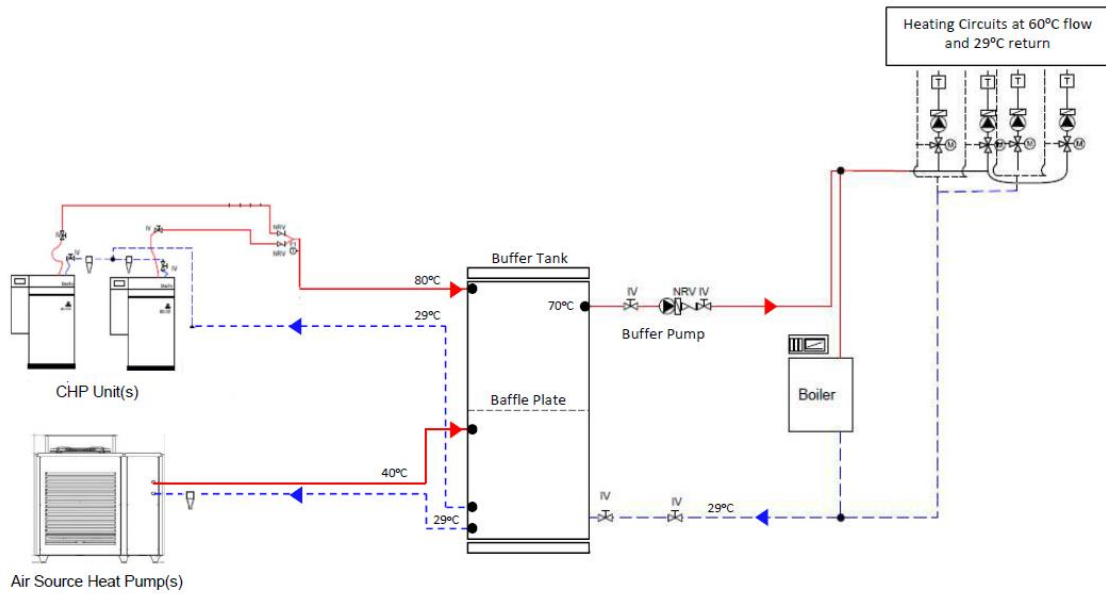


Fig. 4.1 – Typical Centralised Heating Plant incorporating CHP and Heat Pumps with Gas Boilers for meeting Peak Loads

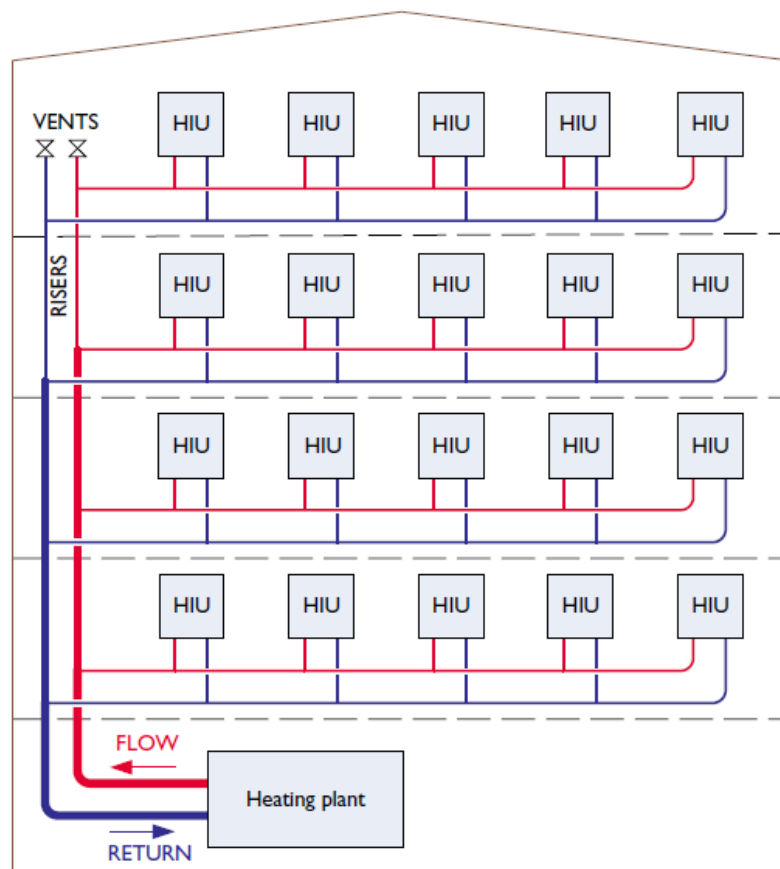


Fig. 4.2 - Apartment block with district heating using Heat Interface Units.

### Individual Air Source Heat Pumps (ASHP)

Air Source Heat Pumps utilise low grade environmental heat from the outside air and use refrigerant cycle to convert this heat into high grade heat that can be used with radiators or underfloor heating and to produce hot water in a very efficient manner. The heat pump then transfers this energy to a water circuit for space heating and hot water production.

As most of the energy is extracted from the outside air, the efficiency of this system, measured using a metric called SCOP (Seasonal Coefficient of Performance) is very favourable in terms of energy and running costs. For example, typically, one kWh of grid supplied electricity will generate between 3 & 4 kWh of heating depending on the system.

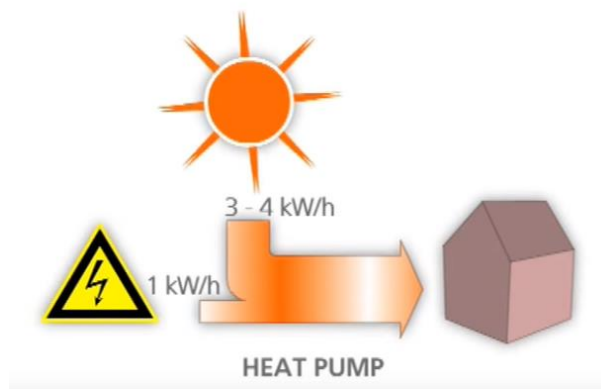


Fig. 4.3 – Heat Pump Energy Balance Illustration



Fig. 4.4 – Typical Air Source Heat Pump Installation

### **Exhaust Air Heat Pumps (EAHP)**

An all-in-one unit – Heat recovery ventilation, Heating and Hot water. Suitable for apartments that will be at a high level of air-tightness and low heat loss. Therefore, the building envelope will need to achieve low U-values. This unit is not suitable for existing building where it has not been possible to upgrade the building envelope thermal performance to meet the current standards. For this system to work effectively, the building needs to be air tight with low heat loss.

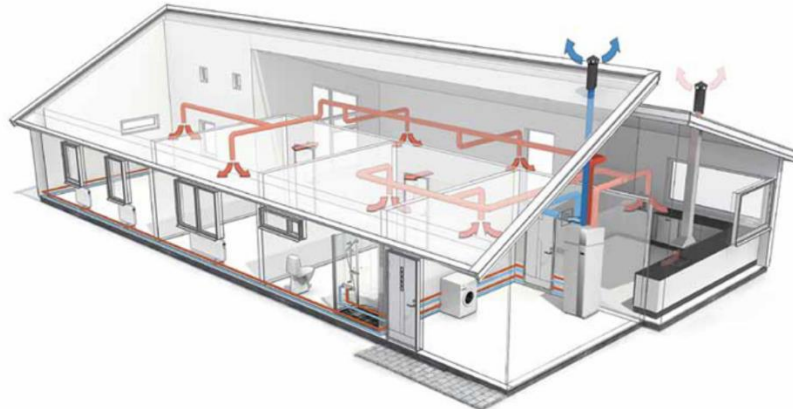


Fig. 4.5 – Typical Exhaust Air Heat Pump Installation

An Exhaust Air Heat Pump (EAHP) extracts heat from the exhaust air and transfers the heat to domestic hot water and/or hydronic heating system (underfloor heating, radiators). This type of heat pump requires a certain air exchange rate to maintain its output power. Since the inside air is approximately 20-22 degrees Celsius all year round, the maximum output power of the heat pump is not varying with the seasons and outdoor temperature. It has similar operating characteristics to an Air Source Heat Pump, for every 1 kWh of electricity inputted, 3-4 kWh of usable heat is produced.



Fig. 4.6 – Typical Exhaust Air Heat Pumps

### **Gas Boilers with Photovoltaic Cells (PV)**

In this approach, traditional gas boilers are used to provide space heating and hot water in a conventional manner with Solar Photovoltaic panels used to meet the renewable requirements of TGD Part L.

Photovoltaic (PV) modules convert sunlight/daylight to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, a very small amount of impurities are added to the semiconductor material, which creates two different layers called n-type and p-type layers. Certain wavelengths of light are able to ionise the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current.

As the cost of PV reduces overtime it is slowly becoming a more attractive renewable technology. PV modules can be integrated into the building fabric, such as roofing material, and this cost offset can improve viability. At detailed design stage a full lifecycle cost assessment will be carried out for a PV installation which shall include maintenance and degradation of the panels over time. PV panels are high in embodied energy and this would need to be considered by the design team.

### **Conclusion**

While Centralised District Heating and Gas Boilers with Solar PV are both tried and tested technologies, they have a significant disadvantage in that they both use fossil fuel natural gas and have relatively high CO<sub>2</sub> emissions per kWh of heat produced. This is not ideal and is not future-proofed.

Both ASHP and EAHP options have a significant advantage in that they use electricity and convert each kWh of electricity into 3-4 kWh of usable heat. As the national grid currently uses high volumes of renewable energy and is likely to become carbon neutral in the future, by default, any dwelling heated using an electrically powered heat pump will also become carbon neutral.

Therefore, the proposed development will use Exhaust Air Heat Pumps. This approach will ensure that the dwellings are not only provided with a low emission heating system but are also future-proofed for future grid improvements.



## **5.0 SUSTAINABLE TRANSPORT LINKS**

Our Client and the Design Team recognise the importance of creating a sustainable development which interplays between good urban design, accessibility to sustainable modes of transportation, maximising the links between existing social and community infrastructure and the most efficient use of energy and natural resources.

The site is served by Dublin bus links (7, 7a, 7d), Aircoach services (703), and is within close proximity to DART services. Additionally, these will likely be supplemented by a proposed Bus Connects Corridor, with full details provided in the transport assessment that accompanies this application. Additionally, dedicated and secure cycle parking (1071 spaces) will be provided throughout the development in accordance with the Development Plan and Apartment Guidelines 2020. This accompanied by cycle paths will encourage the development users to consider sustainable modes of transport to and from the site.

## 6.0 ENERGY PERFORMANCE STRATEGY – RESIDENTIAL UNITS

The plan is to incorporate the following passive design measures for the proposed residential units where it is both technically and economically practical. These design measures will help with achieving compliance and sustainable development. These design parameters are the current targets and are subject to amendment during design development. As a minimum, all U-Values shall comply in full with TGD Part L 2021 (current edition for Dwellings).

Element	Performance Target
Roof U-Value	0.15 W/m <sup>2</sup> °K (target value).
Wall U-Value	0.18 W/m <sup>2</sup> °K (target value).
Floor U-Value	0.15 W/m <sup>2</sup> °K (target value).
Window U-Value	1.3 W/m <sup>2</sup> °K (target value including window frame).
Building Air Permeability	≤3.0 m <sup>3</sup> h <sup>-1</sup> m <sup>-2</sup> @50Pa (target value) All dwellings to be tested and certified
Thermal Bridging	Acceptable Construction Details to be specified and followed on site.
Lighting	LED Lighting Throughout
Ventilation	Mechanical Ventilation with Heat Recovery (MVHR) via plate heat exchanger

Table 6.1

## 7.0 ENERGY PERFORMANCE STRATEGY – COMMUNAL AREAS

The plan is to incorporate the following passive design measures for the proposed childcare facility where it is both technically and economically practical. These design measures will help with achieving compliance and sustainable development. Many of these target values also comply with the forthcoming TGD Part L 2021 specification for Buildings other than Dwellings.

These design parameters are the current targets and are subject to amendment during design development. As a minimum, all U-Values shall comply in full with TGD Part L 2021 (current edition for Buildings other than Dwellings).

Element	Performance Target
Roof U-Value	0.15 W/m <sup>2</sup> °K (target value).
Wall U-Value	0.18 W/m <sup>2</sup> °K (target value).
Floor U-Value	0.15 W/m <sup>2</sup> °K (target value).
Window U-Value	1.3 W/m <sup>2</sup> °K (target value including window frame).
Window G-Value to EN410	0.30 - 0.35 (target range). This will help to reduce unwanted solar gain and in turn reduce cooling plant loads.
Light Transmittance	0.65 - 0.71 (target range) – the highest value possible shall be specified where feasible.
Building Air Permeability	≤3.0 m <sup>3</sup> h <sup>-1</sup> m <sup>-2</sup> @50Pa (target value) All units and communal areas to be tested and certified
Lighting	LED Throughout with PIR sensors in communal hallways to reduce electricity consumption.

Table 7.1

By implementing these passive design measures energy consumption associated with heating and lighting will be reduced considerably at source.

## 8.0 WATER CONSUMPTION

Our Client and the Design Team is committed to identify opportunities to reduce potable water consumption for this project. Water saving solutions proposed for this project include dual-flush toilets, shower aeration devices, and rainwater harvesting.



Figure 8.1 Examples of proposed sanitary ware fixtures and fittings to reduce potable water consumption for this project.

## 9.0 BLUE ROOF

A blue roof will be provided for the majority of roof areas as outlined in the Architectural and Landscape Plans. Consideration will be given to the structural viability, uniformity and local character. A blue roof is a purposely fitted or cultivated roof with vegetation and a stormwater storage and drainage system. There are many different types of blue roofs and they provide many different benefits which include;



Figure 9.1 Blue Roof Solutions

### **Reducing energy use**

Blue roofs have been shown to impact positively on a building's energy consumption by improving its thermal performance, although the amount of difference this makes varies depending on daily and seasonal weather.

### **Climate change mitigation**

Residential and commercial buildings account for 55% of total CO<sub>2</sub> emissions and represent the biggest possible opportunity for CO<sub>2</sub> abatement in Dublin (Source: Dublin City Sustainability Energy Action Plan 2010-2020). A high proportion of these emissions are from heating and cooling the internal environment. Reducing the energy consumption of Dublin's buildings will reduce their impact on climate change. Blue roofs can significantly reduce the cooling load of a building and may have a positive effect on the heating load.

### **Lessening the urban heat island effect**

The urban heat island effect is the temperature disparity between urbanised areas and surrounding rural areas. Urban landscapes have a much higher proportion of tough, impermeable, darker surfaces (typified by conventional roof surfaces) which favour the retention of heat. Urban surfaces can convert up to 95% of the net incoming solar radiation into heat and in large cities this can result in a 4 °C variation between the city and surrounding areas, usually experienced at night. The urban heat island effect will increase as summer temperatures increase and will therefore become even more of a problem in Dublin in the future. Blue roofs have very different evaporative, thermal and albedo (reflectivity) qualities from conventional roof types. Specifying a blue roof over a bitumen roof effectively modifies the contribution of several factors key to the impact of the urban heat island effect; evaporating surfaces are increased, storage of heat within the building fabric is reduced, and the local albedo is positively altered.

### **Improving local air and water quality**

The urban heat island effect exacerbates ground-level ozone production, which is formed by a reaction between volatile organic compounds and nitrous oxides catalysed by heat and sunlight. It is classified as a pollutant and is the foremost component of smog. Through mitigating the urban heat island effect, as well as producing oxygen, blue roofs can thus improve local air quality. Having a blue roof can also help to remove airborne particles, heavy metals and volatile organic compounds from the local atmosphere. As these contaminants are retained by the blue roof itself, their infiltration of the water system through surface runoff is lessened, in turn improving local water quality.

## 10.0 ELECTRIC CAR CHARGING POINTS

It is the plan provide provision in line with TGD Part L 2021 and DLRCC Developmental Plan section 12.4.11 for 1 operational electric car charging point per every 5 spaces, with electrical infrastructure provided to all parking spaces for the future upgrade to electric charging.

Electric cars offer a real opportunity to reduce the carbon output of the transport sector, as they emit zero exhaust pipe emissions. Providing electric car charging points will encourage the buildings users towards this sustainable mode of transport.



Figure 10.1 Electric Car Charging Points