



Bernard Smith
Consulting
Engineers

MEP Strategy Report
for the
Former Men's Hostel
at
18 Lady Lane, Waterford.

Document Control				
BSCE Project Ref:		24-063		
Project Name:		Former Men's Hostel, 18 Lady Lane, Waterford		
Client Name:		Waterford City Council		
Client Reference:		n/a		
Report Title:		MEP Strategy Report		
Document Status:		Private & Confidential		
Document File Ref.		24-063 MEP Strategy Report		
Issue No.	Author	Date	Approved by	Date
001	Marc Lennon	06/06/2025	Marc Lennon	06/06/2025
002	Marc Lennon	10/06/2025	Marc Lennon	10/06/2025
003	Marc Lennon	11/06/2025	Marc Lennon	11/06/2025
004	Marc Lennon	07/04/2026	Marc Lennon	07/04/2026

Table of Contents

1	Introduction	4
2	Basis of Design	5
3	Infrastructural Works	6
	3.1 Introduction	6
	3.2 ESB Supply	6
	3.3 Telecommunications	6
4	Mechanical Building Services	7
	4.1 Drainage Services	7
	4.2 Water Services	7
	4.3 Space Cooling	7
	4.4 Space Heating	8
	4.5 Ventilation	8
	4.6 Automatic Controls	8
5	Electrical Building Services	9
	5.1 LV Supply	9
	5.2 General Services and Telecommunication Services	9
	5.3 Lighting Services	9
	5.4 Fire Alarm Services	10
	5.5 Security Systems, CCTV and Access Control	10
	5.6 Disabled WC Call System and Refuge System	10
	5.7 Induction Loop	11
	5.8 Lightning Protection	11
	5.9 Power and Automatic Controls	11
6	Sustainability	12
	6.1 Approach and Limitations	12
	6.2 Energy Reduction Through Design – Use Less Resources	12
	6.3 Energy Reduction Through Design – Use Resources Efficiently	13
	6.4 Low and Zero Carbon Technologies	14

1 **INTRODUCTION**

This technical report will outline strategy for integrating the building services into the existing building and the proposed new extension.

It will also outline the design approach by which the proposed extension to the building, as well as the renovated existing building will meet the requirements of the current building regulations, maximise energy efficiency, enhance thermal comfort and minimise on-going running costs.

The aim of the services strategy will be to reduce energy consumption, improve comfort, and lower carbon emissions while respecting the building's architectural and historical integrity.

The repurposing of buildings of a historic or architectural importance presents unique challenges when it comes to implementing modern, energy efficient systems. The need to preserve these building's heritage can limit the use of conventional technologies.

However, with careful consideration of potential energy improvements of the existing building fabric, it is possible to improve the sustainability of these buildings while respecting their cultural and architectural significance.

It is intended that this report will explore how the mechanical and electrical systems can be integrated effectively into a historic building, addressing potential concerns and highlighting benefits.

2 **BASIS OF DESIGN**

All of the mechanical building services for the proposed building will be designed in accordance with all relevant Codes of Practice and Standards (EN/IS/BS), legislative and other requirements.

The Building Services will also be designed in accordance with all the relevant standards and guidance documents published by the Chartered Institution of Building Services Engineers (CIBSE) and Statutory Bodies such as Local Authorities and the most current Building Regulations

In addition, the design will follow the recommended procedures for developing a retrofit plan outlined in Irish Standard EN 16883: 2017: Conservation of cultural heritage – Guidelines for improving the energy performance of historic buildings and Improving Energy Efficiency in Traditional Buildings – Guidance for Specifiers & Installers published by the Department of Housing, Local Government and Heritage in 2024.

3 **INFRASTRUCTURAL WORKS**

3.1 **Introduction**

The works will involve all necessary attendance for the new power supply and communications provider during the installation of their new service.

3.2 **ESB Supply**

The new ESB supply to the building will terminate in the new main distribution board located in the electrical cabinet. The building will be supplied with a new three phase power supply from the local ESB network.

3.3 **Telecommunications**

The telecommunication supplies will consist of a fibre optic link from the Open Eir fibre broadband network. The connection will be extended from the existing Open Eir chamber, in the footpath, on the public road. A new 100mm underground duct will run from the chamber to the basement and be extended to the comms room.

The comms room will contain the fibre network termination unit and the main patch panel hub for the building. Data and phone cables will route back to these panels.

4 **MECHANICAL BUILDING SERVICES**

4.1 **Drainage Services**

A fully ventilated single pipe system of uPVC pipework, in compliance with BS EN 12056, shall be provided throughout the building, for the removal of soils & waste matter from all sanitary fittings and sinks. Rodding points for maintaining and cleaning the soils & waste systems shall be provided throughout.

Vent pipes shall pass up through the building to terminate above the parapet in locations agreed with the Architect. Vent pipes shall be complete with weathering sleeve and vermin guard.

4.2 **Water Services**

The incoming water mains shall be extended from the building isolation valve, to supply the cold water storage tank and potable water supply in the kitchen. The incoming service shall be fitted with a meter in compliance with Local Authority requirements and be pressurised via a booster pump-set complete with break tank.

The design of the water services and storage tanks for cold water shall be in accordance with ISEN806. The design shall conform to the Irish Water Guidelines.

A total of 24-hours water storage shall be provided for the building. This shall be stored within a dedicated tank within the attic plant area. The storage shall be calculated on the basis of 45 litres per permanent occupant, an allowance for sanitary requirement flushing for visitors and an allowance for the Cafe.

The CWS storage tank shall be one piece in construction and manufactured as a "Format 30" tank. Cold water shall be taken to the sanitary fittings from the CWS storage tank, by means of a gravity fed supply. Hot water shall be provided to the wash hand basins and sinks via local point of use electric water heaters.

All new water fittings will utilise low-volume tanks including dual-flush toilets, and efficient fittings for washing.

4.3 **Space Cooling**

The Comms Room shall be served by a dedicated high wall air conditioning unit c/w matching outdoor condenser unit located externally on the roof. No duty/standby facility shall be provided.

4.4 Space Heating

The space heating shall be provided by local electric heaters in each space.

4.5 Ventilation

To determine the most optimum solution, a dynamic simulation on the building in the form of a CIBSE TM52 Overheating Analysis will be completed for the building. The purpose of the assessment will be to determine the internal temperature range of the building and the potential impact that the glazed and internal gains will have on the comfort levels using a passive design solution. This will determine the level of ventilation required to maintain the building within the design temperature range.

The design intent proposed for the basement spaces shall be based on a passive stack system with the air intake via roof lights in the basement area and a stack adjacent to the lift shaft.

The building will be provided with a dedicated extract air system from the toilets and the kitchenette area. Un-tempered fresh air makeup air will be provided to all spaces with local exhausts.

4.6 Automatic Controls

A dedicated control panel (MCC) shall be provided to serve the heating & ventilation plant – providing time-clock, energy metering, frost protection, weather compensation, temperature control and alarm functions.

The Mechanical Services' Plant and Equipment will be controlled and monitored by a complete system of electronic and electrically operated Equipment to provide full environmental control from direct digital controllers.

The Building Management System will ensure that the plant operates only when required, thus minimizing Energy Consumption. The Controls and Energy Monitoring will assist with trending Energy Consumption within the Building in specific Areas to be closely controlled to avoid unnecessary Energy Usage and allowing the building to operate efficiently and identify any peaks in Energy Consumption quickly and efficiently.

The Building Management System will also include its own Energy Management Software for logging and monitoring all power meters, heat meters and water meters within the Building. Sub-Metering of the Main Plant, Power and Lighting will be included.

The entire Building Management System will be cloud based with associated Graphics. Alarms such as plant trip or over temperature will be reported on the screen. It will be possible to log temperatures within the building over periods of time for subsequent recall in graph form. In addition, SMS Notification for critical alarms will be provided.

5 **ELECTRICAL BUILDING SERVICES**

5.1 **LV Supply**

The Electrical Intake shall be a 400V supply through a new meter panel and main switchboard located in electrical distribution cupboard. Final circuit wiring shall be carried out in conduit and trunking where exposed in the space.

5.2 **General Services and Telecommunication Services**

The general services shall include all power requirements to sockets within the exhibition spaces, power requirements to kitchenette equipment, and power requirements to mechanical plant.

The telecommunications services shall include all voice and data requirements and shall be wired back to the comms room. All exhibition spaces will be provided with dedicated data points, and Wi-fi signal will be provided to the premises.

5.3 **Lighting Services**

A complete General Lighting Installation will be provided throughout the building. The Lighting Installation within the buildings will be provided in accordance with the Chartered Institute of Building Services Engineers (CIBSE) Lighting Guides and EN 12464 and other relevant Standards and Regulations as well as the guidance set out in the Architectural Heritage Protection Guidelines for Planning Authorities document..

Lighting will be provided by a Energy Efficient LED Luminaires throughout the Building. All Lighting Levels and Glare Indices will be in accordance with EN 12464.

An Energy Efficient Lighting Installation will be provided in all Areas as practical with the selection of lamps made with Energy Conservation and the minimisation of whole-life costs as a primary objective.

All Luminaires will be supplied and installed in position and will be integrated with the Architectural requirements for the buildings.

Light switching will be arranged to provide flexibility of operation and to minimize running costs. Presence detection and absence detection will be provided where feasible in all Public Areas to enable lighting to automatically adjust to patterns of occupancy, ensuring safety whilst minimizing energy usage.

External lighting will comprise low level lighting on the terrace area. External lighting shall be controlled from a 7-day 24-hour timeclock and photocell wired in series and will include any considerations required due to inputs from ecology reports.

The emergency lighting system shall comprise maintained LED IP65 vandal resistant exit signs, internal non-maintained self-contained LED fittings and external non-maintained self-contained LED fittings. The system shall be installed and commissioned in accordance with IS3217: 2023.

5.4 Fire Alarm Services

An addressable fire alarm system shall be installed throughout the unit comprising a fire alarm panel, smoke and heat detectors, manual call points, sounders, etc. A hard wired data point shall be installed to allow remote monitoring of the fire and intruder alarm systems. The system shall be installed and commissioned in accordance with IS3218: 2024.

5.5 Security Systems, CCTV and Access Control

The intruder alarm system shall include contacts and inertia sensors on windows and doors and PIR sensors in internal corridors, keypads shall be installed at the main entrance doors.

All external and internal staff doors shall be controlled with electronic locking system operated from a central panel in the comms room. All access control doors will be linked to the fire alarm system such that they release in the event of fire.

A system of CCTV cameras will be included within both the internal public areas and the external areas surrounding the building. These will feed back to the CCTV panel and recorder within the comms room.

5.6 Disabled WC Call System and Refuge System

A Disable Toilet Alarm Call System will be provided where required. The System will comprise of Power Supply Unit, Ceiling Pull Cord Switch, Combined Re-Set Unit and Re-Assurance Lamp in the Toilet and Combined Indicating Lamp and Buzzer located outside the Toilet.

Disable WC Alarms will be relayed to a Main Indicating Panel located at the Reception. The Fire Alarm will be interlinked to the Disable Alarm System and upon operation of the System a signal will be sent to the Fire Alarm System generating a silent Alarm.

A Disable Refuge System will be provided for communication between Disable Persons and the Fire Services in the event of an Emergency in the Buildings.

Two-way call points will be provided within the Disable Refuge locations and calls relayed to a Central Communication Panel in the Reception Area.

The Disable Refuge System provided will be fully in accordance with BS 5839: Part 9.

5.7 Induction Loop

A Induction Loop System will be provided at the Main Reception Area.

5.8 Lightning Protection

A risk assessment shall be completed in accordance with IS EN 62305 and an appropriate lightning protection system will be provided.

5.9 Power and Automatic Controls

The cabling and connecting of all items of Mechanical Plant and the supply, installation, cabling, connecting and commissioning of all automatic controls will be provided under the scope of the Electrical Installations.

6 **SUSTAINABILITY**

6.1 **Approach and Limitations**

The building at 18 Lady Lane, dating from 1725, is a highly significant early Georgian townhouse that retains a substantial amount of its original fabric, including historic plasterwork, joinery, and overall construction integrity.

As such, it is not suitable for a standard modern energy upgrade approach, where invasive interventions—such as extensive insulation, replacement of original elements, or major building services alterations—could result in the loss of historic material and negatively impact the building's character.

In accordance with EN 16883:2017 Conservation of cultural heritage, a fabric-first, conservation-led strategy is proposed, prioritising the retention and performance of the existing building envelope.

This includes targeted, minimally invasive measures such as improving air tightness, repairing and maintaining original windows, and enhancing thermal performance where possible without damaging historic materials.

Energy efficiency improvements will be further supported through the integration of low-impact systems, including the use of high-efficiency LED lighting, which reduces energy demand while avoiding significant intervention in the building fabric.

This balanced approach ensures that energy performance is improved in a sensitive and sustainable manner, fully respecting the building's heritage significance

The basis of the sustainability strategy shall follow the accepted energy hierarchy. These steps or "Energy Hierarchy" promote the reduction of the annual energy consumption by using less resources through sensible design of the building, before using resources efficiently through the use of energy efficient Building services, and finally using renewable resources that perform at maximum potential due to the sensible design.

6.2 **Energy Reduction Through Design – Use Less Resources**

The ethos of the plan is that by minimising the energy demand prior to the inclusion of any low or zero carbon technologies will ease the burden on renewable technologies and CO₂ emissions from non-renewable energy sources.

The following measures are proposed for the building to help minimise the energy consumption of the building:

Low Energy Measure:	Achieved by:
Low U-values	The new extension will be provided with high insulation levels in floors, walls and roof and high energy performance windows and doors. The existing building fabric will be upgraded where possible to comply with current building regulations.
High level of air-tightness	External air infiltration through the building will be minimised by ensuring all unwanted opes, gaps and cracks are reduced. This helps reduce heating costs and maximise workforce thermal comfort.
Passive design measures	Windows will be specified to minimise the risk of overheating, thereby reducing or eliminating air-conditioning or mechanical ventilation where possible
Maximise Natural Ventilation	Openable windows will be provided throughout the building to allow for natural ventilation.
Natural Daylighting	Windows will maximise natural daylight where possible and reduce reliance on artificial light

Table 6.1 - Schedule of Low Energy Measures

6.3 Energy Reduction Through Design – Use Resources Efficiently

To maximise the effectiveness of resources, it is important that energy sources within the building are used as efficiently as possible.

The following systems are proposed to utilise the energy most efficiently:

Energy Saving Measure	Potential Energy Reduction
Energy efficient LED lighting	LED lighting is up to 80% more efficient than fluorescent lighting
Enhanced lighting controls	Presence or absence detection can achieve up to 50% further reductions in energy usage. Daylight sensors in offices will further improve energy usage.
Variable speed pumps	Variable speed pumps are 60% more efficient than fixed speed
Building Energy Management System (BEMS)	BEMS can help manage and reduce energy use by up to 25%

Table 6.2 - Energy Saving Measures

6.4 Low and Zero Carbon Technologies

As part of the Climate Action and Sustainability assessment of the proposed building a number of low to zero carbon and renewable energy technologies were assessed for suitability for integration into the building. Each technology represented a specific cost, planning, design and long term ownership and operation implications.

Due to the restricted and protected nature of the site it is not possible to incorporate any renewable technologies. The anticipation is that the future electrical grid will become green via the uptake of green centralised systems.

The following section outlines the potential technologies reviewed and outlines the difficulties in incorporating same.

6.4.1 Solar Panels

Solar panels convert sunlight into usable energy for a building. Photovoltaic (PV) panels generate electricity by converting daylight into direct current (DC) power, which is then converted to alternating current (AC) by an inverter for use within the building.

The ideal application area for Solar Panels is the Roof, however this is deemed unsuitable for the following reasons;

- The building is a Protected Structure located within a Conservation Area. Installing solar panels on the roof would have a visual impact on the character and appearance of the building and is therefore not recommended.
- The overall roof profile is M-shaped, with a concealed valley at the centre. While this concealed valley could accommodate solar panels, it should be noted that only the south facing side of the valley is suitable for application. The available area is very limited (approximately 20 m²) and would generate only a small fraction of the building's overall energy demand. As a result, the installation of solar panels would largely be seen as symbolic only and is therefore not recommended.

6.4.2 Air-to-Water Heat Pumps

Air-to-water heat pumps require external units with sufficient clearance to ensure adequate airflow and safe maintenance access. These units also generate operational noise and can have a negative visual impact, particularly in sensitive locations.

There are two potential application areas for the location of Air to Water Heat Pumps. The first area of application is the Terrace. The installation of air-to-water heat pumps on the terrace is not recommended for the following reasons:

- The terrace is intended to function as an al fresco dining area for the café and as an outdoor spill-out space for the museum. The introduction of air-to-water heat pump units would compromise the quality of the terrace in terms of visual appearance, usable space, and noise levels.
- The terrace and adjacent City Wall are also clearly visible from Spring Garden Alley and are located within a Conservation Area. The installation of plant equipment in this location would adversely affect the visual character of the area and is therefore not suitable for Planning and Conservation reasons.

The second available application area for the heat pumps is the Roof Valley. The installation of air-to-water heat pumps within the roof valley is not feasible due to the limited space available, which does not allow for adequate maintenance clearance around the units.

6.4.3 Biomass Boiler

Biomass systems require significant space for the boiler, buffer tanks, fuel storage, and associated equipment. Biomass systems also require larger flues than gas boilers due to higher particulate content and lower flue gas temperatures.

The ideal application area for the Biomass System would be in the Basement. To facilitate the installation much of the available space in the basement would need to be occupied by plant space, storage space and equipment. This would have a detrimental impact on the operation of the museum in terms of flow and available programme. Routing a suitably sized flue through the Protected Structure, along with fire implications meant that Biomass was deemed impractical.

6.4.4 Combined Heat and Power (CHP)

CHP is a system that generates electricity and useful heat at the same time from a single fuel source (typically natural gas, biogas or diesel). It captures the waste heat that would normally be lost and reuses that heat for space heating, hot water, or processes within the building.

The ideal application area for the CHP would be in the Basement. After consideration CHP was considered inappropriate for the following reasons:

- CHP works best in buildings with constant heat demand. The proposed museum is unlikely to meet the required base load for the system to operate efficiently.
- Much of the available space in the basement would need to be occupied by plant. This would have a detrimental impact on the operation of the museum in terms of flow and available programme.

6.4.5 Geothermal Heat Pumps

A geothermal heat pump (also known as a ground-source heat pump) is a heating and cooling system that transfers heat to or from the ground. It takes advantage of the relatively stable underground temperatures (typically 10–12°C year-round) to provide highly efficient climate control for buildings.

The ideal application area for the Geothermal Heat Pumps would be in the Basement with the boreholes located below the new extension. The application of deep vertical bore holes adjacent to the City Wall introduces risk to the wall via undermining and vibrations. The garden area is also limited in size and therefore multiple bore holes would be required in close proximity to one another, thus exacerbating the risk to the wall.

6.4.6 Summary

Due to the restricted and protected nature of the site it is not possible to incorporate any renewable technologies. The anticipation is that the future electrical grid will become green via the uptake of green centralised systems.

The following table outlines the potential technologies reviewed and outlines the difficulties in incorporating same.

Energy Saving Measure	Observations
PV Panels	Due to demand profile of the building and limited space available on the existing roof, this form of renewable would not be recommended.
Solar Thermal Heating	Along with the reasons noted for PV Panels due to the demand profile of the building this form of renewable would not be recommended.
Air to Water Heat Pumps	Noise generated by heat pumps would prohibit usage of the terrace and thus the operation of the museum.
Biomass Boilers	Large Plant which is not suitable for restricted site
Combined Heat and Power	Limited Space available for plant. Would require a base load to be effective.
Geothermal Heat Pumps	Limited space available, proximity to medieval city wall could introduce significant risk