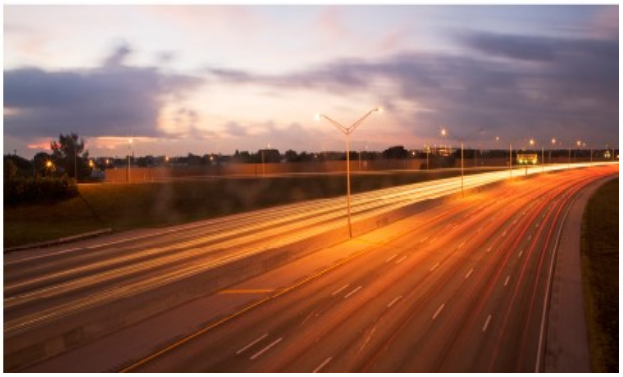
Waterman Moylan
Engineering Consultants



M&E Services Basis of Design Strategy for Clane Library

May 2022

Waterman Moylan Consulting Engineers Limited
Block S, Eastpoint Business Park, Alfie Byrne Road, Dublin D03 H3F4
www.waterman-moylan.ie

Waterman Moylan
Engineering Consultants

Client Name:	Kildare County Council
Document Reference:	21-106 M&E BOD
Project Number:	21-106

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
Information	13-05-22	A Cruise	K Farrell	N Coughlan
Information	23-05-22	A Cruise	K Farrell	N Coughlan

Comments

Waterman Moylan
Engineering Consultants

Disclaimer

This report has been prepared by Waterman Moylan, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the Client.

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report is confidential to the Client, and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Content

Tables

1. Introduction

Waterman Moylan have been commissioned by Kildare County Council to carry out the mechanical and electrical service design in respect to the proposed new library at unit 8/9 The Village Centre, Main Street Clane, Co. Kildare.

This document outlines the mechanical & electrical elements which will form the strategy intent for the mechanical and electrical service installation for the proposed development

2. Design Standards

2.1 Mechanical Systems

The Mechanical Services Installation shall be designed in accordance with the following standards and amendments thereof:

- CIBSE Guides, Codes and Technical Memoranda
- The Irish Building Regulations
- Fire Officers Recommendations
- The Health and Safety Authority - Safety, Health & Welfare at Work (Construction) Regulations 2013
- Irish, British and European Standard applicable and correct at the design stage
- ASHRAE Design Handbooks
- Institute of Plumbing, Plumbing Services Design Guide 1990
- Current local regulations and By Laws
- DW/144 Specification for Sheet Metal Ductwork including Addendum A
- DW/143 Practical Guide to Ductwork Leakage Testing
- DW/172 Kitchen Ventilation Systems
- BSRIA Guide and Technical Memorandum

2.2 External Design Conditions

- Location: Kildare, Ireland
- Summer: 28 C db/20 C wb
- Winter: -5 C db (100% saturated)

2.3 Internal Design Conditions

The following internal design conditions/standards will be used in the base building model to provide the necessary information to ensure that the building can be serviced efficiently. These parameters may change during detailed design.

Area	Winter Temp. db C	Summer Temp. db C	RH %
Communal Facilities & Offices (where mechanical ventilation/AC is required)	21°C ±2°	23°C ±2°	No Control
Communal Facilities & Offices (where Natural Ventilation is required)	21°C ±2°	No Control	No Control
General/Circulation	18 °C min	No Control	No Control

Table 1: Internal Design Conditions

2.4 Ventilation Services

2.4.1 Fresh Air Criteria

- Common amenity & office spaces, Multi-purpose, Offices, etc — 10l/s / person where required.
- Toilets — 6 ACH extract (make-up air at 80% of supply)
- Store — 3 AC extract
- Kitchen — Extract designed in accordance with DW172

2.4.2 Air Conditioning Services

- Common amenity & office spaces (gym, multi-purpose, office, cinema etc) — VRV Fan Coil Unit (FCU) systems where required
- AHU Coils — VFR/LPHW
- CHW Flow and Return Temps — N/A
- Heating Flow and Return Temps — 80°C/60°C Boiler 45°C/35°C Heat Pump

2.4.3 Air Conditioning Cooling Loads

- People — 75W/person sensible, 55W/person latent
- Lighting — 10W/m²
- Equipment — 20W/m²
- Solar Gain — As calculated by the modelling

2.5 Electrical Systems

The electrical services installations shall be designed in accordance with the listed specification and amendments thereof:

- Building Regulations
- 'National Rules for Electrical Installation Fifth Edition IS:10101, National Standards Authority of Ireland
- European Machinery Directive (Machinery Safety Regulations) 98/37/EEC and applicable parts of the standards EN 13241-1
- IS3218:2013+A1: 2019 Fire Detection requirements
- IS3217:2013+A1 2017 Emergency Lighting requirements
- IS EN 50131 Intruder Alarm Systems
- Code of Practice for the Design, Selection and Erection of Low Voltage Switchgear Assemblies
- IS EN 61439-2010 – Low Voltage Switchgear & Control gear Assemblies
- S.I. 44, 1993. Safety, Health and Welfare at Work (General Application) Regulations
- BS 8519:2010
- The Chartered Institution of Building Services Engineers (CIBSE) Guides and Technical Memoranda
- 2006/95/EC: The Low Voltage Directive
- 89/336/EEC – 92/31/EEC AND R&TTE Directive 1999/5/EEC: The Electromagnetic Compatibility Directive
- EN12464-1:2011 Lighting of workplaces – Part 1: Indoor workplaces
- Directive for industrial and commercial metering installations issued by the Electrical Supply Board
- BS 7430:1998 Code of practice for Earthing
- The Factories Act
- EN62305 – Code of Practice for Protection of Structures against Lightning.
- Safety, Health and Welfare Act 2005
- Procedures and Standards of C.I.B.S.E.
- Guides and Commissioning Codes of Practice

Area	Lighting Levels (Lux)
Corridors	100
Entrance Areas	200
General/Circulation	100 -150
Bathroom & toilets	100 - 150
Reading areas	500
Bookshelves	200
Office Rooms	300 - 500

Table 2: Required lighting levels per area as per BS EN 12464-1 2011 Lighting of workplaces.

3. Infrastructure M&E Services

3.1 Water

A new water main will be extended into the site and will be provided with a new water meter to monitor water usage within the development. The water main will be provided into first floor plant room where it will supply the necessary water storage tanks and pump station. The water meter will be connected to the central BMS system for ongoing monitoring.

3.2 Electricity Supply

A new ESB supply shall be provided and shall enter the building into an ESB cut-out located adjacent to the main meter panel within the entrance lobby of the building. The building will be designed as a single-metered building. E.S.B. metering will be carried out at 400 Volts within the Main electrical panel.

3.3 Communications Services

The development shall be provided with telecommunications route from the existing telecoms network within the vicinity of the development. The incoming comes network supply shall terminate in the main comms room.

It is intended that two high speed fibre/broadband connections will be provided for the building and these will be provided by OpenEir & Virgin Media.

4. Mechanical Services

As far as economically viable the buildings mechanical services installation shall be designed utilising sustainable principals.

The building / façade etc. shall be designed in accordance with the TGD Part L, 2021, to minimise the extent of mechanical ventilation and air conditioning required. Ultimately, the building use shall determine the ventilation and air conditioning needs, and this will form part of the building detailed design.

4.1 HVAC Strategy

The proposed strategy will be finalised at detailed design stage, and it is the intent to supply a combination of equipment to cater for the loads throughout the development. The requirements of TGD Part L 2021 will ultimately decide the detailed design proposal making sure the renewable targets are met meeting current Irish regulation standards.

Heat pumps will be installed to meet the heating load requirements of the development. It is envisaged that the heat pump will serve the requirements of the underfloor heating and radiators which will be provided throughout the building.

Where deemed necessary by operational reasons or to deal with specific ventilation/air conditioning needs, ventilation to specific rooms/areas will be provided by means of local heat recovery units located in the ceiling void of the area served.

The ventilation strategy will be to naturally ventilate all areas of the building in so far is as possible, taking account of building geometry, proposed use of spaces and expected internal gains.

The proposed building will be a mixed mode building with a combination of both mechanically ventilated/ air-conditioned spaces and naturally ventilated spaces. The mechanical installation shall be designed to ensure a comfortable environment for the building occupants while ensuring energy efficiency in its operation.

4.1.1 Mechanical Ventilation

The main library, multifunctional area, staff office & maker area of the building will be provided with tempered fresh air via heat recovery ventilation units, located in the plant zone on the roof of the building. The ventilation systems will be sized to provide the fresh air flowrates in accordance with the Part F Technical Guidance Document, and CIBSE Part B Ventilation. A minimum fresh air allowance will be provided in accordance with the following:

- 10 L/s/person

Fresh air will be tempered and filtered to ensure that the supply air is provided to the building space at a conditioned temperature in both winter and summer. Return air ductwork will be provided to extract stale air from the building via heat recovery units and extract fans.

All ventilation ducts that pass thought fire resistant construction will be fitted with fire dampers activated by actuated dampers in accordance with current regulations.

The following areas will be mechanically ventilated:

- Main Library – Supply & Extract Ventilation
- Multifunctional Area - Supply & Extract via Heat Recovery

Ventilation

Staff Office - Supply & Extract via Heat Recovery Ventilation

- Managers Office - Supply Only
- Changing Place – Extract Only
- Staff Room - Supply & Extract Ventilation
- Maker Area - Supply & Extract via Heat Recovery Ventilation
- Toilets – Extract Only
- Comms Room – Air Conditioned
- Bin Store – Natural Ventilation
- Cleaners Rooms – Extract Only
- Kitchen – Extract via Canopy & Supply Air AHU

4.1.2 Air Conditioning

All comms rooms shall be cooled via a dedicated cooling system served from individual DX condensing units. This will depend on the detailed tenant design.

4.1.3 Heating

The building heating requirement shall be provided by heat pumps.

The primary heating plant will be located in a dedicated plantroom. The Heat Pump shall provide

Low Temperature Hot Water throughout the following systems.

- Underfloor Heating System
- Radiator circuits

The LTHW system shall be designed in zones with each floor dedicated as a single zone. Each zone will be operated and controlled via the central BMS system. Each zone will be provided with automatic isolation valves to enable each zone with remote isolation if required. The LTHW will be distributed throughout the building via vertical mechanical service risers, horizontal distribution through ceiling voids and pipework will be distributed to the UFH manifolds at various locations

4.2 Domestic Water System

Mains Water Installation

The buildings domestic water requirement shall be designed and installed in accordance with local authority requirements and building regulations. The mains water will be provided from the local authority water main and fed into the building. The incoming water supply shall be metered in accordance with KCC requirements. From the plant room the mains water shall be boosted via a format 30 break tank and distributed throughout the building to provide potable mains water

Cold Water Installation

The cold-water services installation shall be designed in accordance with Irish Water regulations. The cold-water storage requirements for the building shall be designed based on 24-hour storage for the building population providing 6 litres per person (public) & 45 litres per person (staff). The bulk storage will be provided at first floor level and will be stored in pre-insulated GRP tanks which conform to the Bye Law 30 requirements. The cold-water installation shall be distributed throughout the building to service all sanitary fittings.

Hot Water Installation

The hot water requirement for the building shall be provided by central hot water storage cylinders which will be located within the heating plant area at first floor level. The central storage cylinders shall be provided with a boosted cold-water supply from the cold-water storage tanks. The hot water storage will be designed based on the recommendations from the Plumbers Guide and CIBSE and will meet the building population.

A 1 litre per person (public) and 5 litres per person (staff) hot water storage requirement is recommended and it is the intent to use heat pumps and storage vessels. The hot water installation shall be distributed throughout the building to service all sanitary fittings.

4.3 Above Ground Soils & Waste System

The Soils and Waste services installation shall be provided throughout the development requiring drainage, including HVAC condensate requirements.

The main stacks shall connect into up stands provided as part of the below ground soils and waste network which will be connected to the local authority system. Ventilation stacks will be provided as required to the roof and will be located in areas away from fresh air intakes to the ventilation systems.

The installation shall be installed in uPVC within the building and acoustically insulated and cast iron within the ceiling space of the retail/restaurant units.

4.4 Building Management System / Motor Control Centre

A complete Building Energy Management System shall be provided as part of the development. The BEMS system shall be provided to manage the automatic operation of all mechanical plant and time control. The system will also be provided to manage the building energy consumption of the individual areas/sub let's recording all energy data from the various energy monitoring centres.

The BEMS shall be network linked and shall be connected to a dedicated front-end PC with the capability to be web based if required.

4.5 Insulation and Labelling

- All supply and return ductwork shall be insulated with Class 'O' foil back insulation and clearly labelled.
- All extract ductwork to be clearly labelled.
- All domestic water pipework to be insulated with class 'O' foil back insulation and clearly labelled.
- All LTHW water pipework to be insulated with class 'O' foil back insulation and clearly labelled

5. Electrical Services

5.1 Electrical System

The electrical services will comprise of the following systems:

- Electrical Switchgear & Distribution
- Containment systems
- General Services Power
- Power to HVAC equipment
- LAN cabling and termination
- General and Emergency Lighting
- Earthing & Bonding
- Fire Alarm
- Security Systems (Access control & CCTV)
- Open Library System
- Lightning Protection (If required, to be determined by the risk assessment at detail design stage.)
- Electric Car Charging

5.2 General Information

All electrical systems and equipment shall be designed, manufactured, installed, tested and commissioned in accordance with the latest versions and amendments of all relevant Irish, British, European and International Standards, Regulations, Rules, Codes of Practice.

This includes, National and international codes and standards published by the NSAI, BSI, CENELEC, IEC and ISO.

Where there is a conflict between standards, standards shall take precedence in the following order: Irish, European, International, British.

Where there is a conflict between NSAI and IET rules and regulations, NSAI regulations shall take precedence.

5.3 Electrical Switchgear & Distribution

A new ESB supply shall be provided to the premises main LV switchgear located within in the main entrance lobby in accordance with the ESB code of practice, NSAI rules and Guide to the Safety, Health and Welfare at Work.

The main LV distribution panel will be fully type tested and in compliance with BS61439 to a minimum rating of Form 4b Type 7.

It is proposed that the outgoing ways from the main LV distribution panel will use MCCBs, with ACBs provided for any particularly large loads. The outgoing ways from LV distribution panel will be arranged to balance the loads

5.4 Sub Distribution Boards

Lighting and Power sub distribution boards shall be custom-built low voltage switchgear assemblies manufactured to Form 3b located within their defined zone.

The Lighting and Power Boards will be located within electrical services cupboards or dedicated electrical rooms. Sub Mains Distribution will be by means of XLPE insulated, steel wire armoured, LSZH cables on cable tray.

All protective devices for final sub-circuits shall be din-rail mounted. All lighting circuits shall be protected by 10A type 'C' SP RCBO's. Sockets, etc. shall be protected by means of 20A x 30mA SP & N type 'A' RCBOs. Security equipment and miscellaneous power supplies shall be protected by 20A type 'C' SP MCBs. Contractors shall be DIN rail mounting and shall have an AC 23 duty rating.

All lighting distribution board sections will be provided with an emergency lighting interface unit of enough capacity to control each lighting circuit with emergency lighting.

5.5 Containment Systems

A vertical and horizontal cable management system shall be provided throughout the building. Dedicated containment shall run in ceiling and floor voids and in dedicated vertical risers. A separate containment system shall be provided for the following services:

- LV Cable tray for sub-mains cables distribution.
- ELV Cable tray fire alarm cables.
- LV Cable trunking for lighting and small power cabling.
- Cable basket for the structured cabling systems.

5.6 Electrical Services to Mechanical Plant

Electrical power shall be provided throughout to all mechanical services. The electrical power shall emanate from sub distribution boards and motor control centres throughout the building.

The BMS system shall be installed as described in the mechanical section of this document.

Multifunction meters will be provided to each section of the distribution board, and these shall be wired to the BMS to provide real time and historical consumption data.

5.7 General Lighting

The lighting installation to the building will be designed in compliance with the “Society of Light and Lighting SLL Code for Lighting” as issued by the Chartered Institute of Building Services Engineers (CIBSE), BS EN 12464-1 2011 Lighting of workplaces in door and BS EN 12464-1 2012 Lighting of workplaces outdoor.

The installation will utilise energy efficient LED luminaires utilising presence detectors, photocells and variable dimming where appropriate. Luminaires in public areas shall be controlled by PIR lighting control systems divided into individual switching groups.

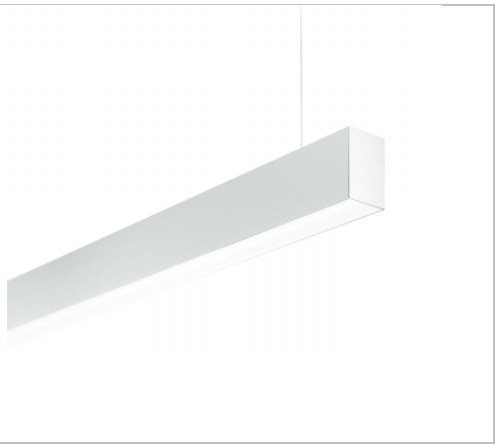
The lamp colour temperatures and associated colour rendering quality will be selected to suit the function of each space.

Additional external lighting will be provided along the pathway in front of the existing shop units towards the new library entrance.

External lighting will be provided to the front seating area are rear garden of the proposed library.

Product Name	**Roma**	
Manufacturer	Prelux	
Product Number		
Reference		
Preferred Supplier	ECI Lighting	
Notes	Recessed LED Downlight (30W Version) (Fire Rated to 60 mins) **Dali version**	
Area	Lobby, Hallways, Toilets, etc.	
Product Name	**Iplan**	
Manufacturer	iGuzzini	
Product Number	Iplan	
Reference		
Preferred Supplier	General Lighting	
Notes	600 x 600 mm Surface Mounted LED. 26W. IP20	
Area	Offices/Staff Rooms	
Product Name	**Pure 3**	
Manufacturer	Planlicht	
Product Number	P33E228-9016E1840H3S, P33E284-9016E1830H3S, P33E424-9016E1840H3S	
Reference		
Preferred Supplier	General Lighting	
Notes	Surface Mounted Linear Luminaire **Dali Version.** 56W IP40	
Area	Meeting rooms	

Product Name	**Pure 3**
Manufacturer	Planlicht
Product Number	P33H284-9016E2840H3S
Reference	
Preferred Supplier	General Lighting
Notes	Suspended Linear LED Pendent Fitting. 36W IP40
Area	Main Library



Product Name	**Ledia**
Manufacturer	Hess
Product Number	LL OD
Reference	
Preferred Supplier	Hess
Notes	Lamp: 10W White LED warm white (3000K) IP67
Accessories for H	24V DC allow for transformers c/w IP67 rated housing
Area	Ground mounted in exterior

Product Name	**iWay Round**
Manufacturer	iGuzzini
Product Number	iWay
Reference	
Preferred Supplier	General Lighting
Notes	External LED Bollard. IP66 21W
Area	External

5.8 Emergency Lighting

Emergency lighting will be provided throughout the building in accordance with IS 3217+A1 2017 Code of Practice for Emergency Lighting. The emergency lighting system will provide a safe means of escape from the building in the event of an emergency and failure of the normal lighting system. Escape lighting will be provided to all primary exit routes, both internally and externally.

The emergency lighting system consisting of LED emergency fittings will be installed to meet the requirement of IS 3217 + A1 2017. In the event of mains power failure, standalone emergency shall provide adequate lighting for the safe escape of the building for 3 hours.

Each sub-distribution board shall be fitted with an Emergency Lighting test unit from which the relevant emergency lighting circuits are wired.

5.9 LAN/Structure Cabling

A structured cabling installation shall be designed for cat 6A UTP.

The main comms room and LAN access point will be at ground floor level.

Cat 6A cables shall be installed across the whole building. All video, CCTV, voice and data shall be transmitted over an internal IP network.

All active equipment shall be included as part of the FFE specification.

5.10 Fire Alarm

A fully Addressable Fire Alarm System providing L1 coverage in full accordance with I.S. 3218+A1 2019 and the Fire Safety Certificate will be provided throughout the building, including automatic detection in Plantrooms, and Stores. The system will comprise manual break glass units situated at all exit routes, alarm sounders, analogue addressable automatic smoke and heat detectors in corridors, kitchens, lobbies, and staircases and will be complete with an independent battery and charger unit. A central control and indicating panel will be provided adjacent to the Receptionists Desk at the entrance to the Ground Floor of the premises with repeater panels located as required.

Cabling will be by means of fire-resistant copper conductor cables throughout in accordance with the Regulations.

5.11 Security Systems

CCTV System

A fully integrated IP CCTV system which will incorporate fixed dome colour cameras, LCD monitors and digital recorders will be provided.

The extent of coverage would include entrance and exit points, and any vulnerable areas.

Access Control Installation

The access control system will be radio frequency proximity identification (RFID) system with keypad provision. All access control doors will be hard wired. The access control system will be interfaced with the fire alarm system in the form of a volt-free contact to automatically unlock all doors on Fire Alarm Activation

5.12 Open Library System

Clane Public Library Service will be provided with an integrated and fully supported system to provide access to services and deliver automated self-service for members of the public outside of staffed hours.

The Open Library technical solution will include hardware and software to control the entrance/s, security equipment, loudspeaker announcements, lighting, ventilation and heating and a range of equipment in the library including self-service stations and PCs. The system will have functionality to enable the library staff to schedule when the library is staffed, opened without staff and closed.

5.13 Lightning Protection System

A complete lightning protection system will be provided in accordance with EN 62305 if required on completion of a risk assessment at detail design stage.

5.14 Electric Vehicle Charging

Electrical vehicle charging facilities will be provided in the externally in the existing carpark. A total of 2no active EV charging points will be provided for this development.

UK and Ireland Office Locations