PROJECT: FORT DUNREE

MECHANICAL AND ELECTRICAL SERVICES: PLANNING REPORT

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Revision History

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8.1 INTRODUCTION

This report outlines the M&E and Sustainability Design approach which has been progressed for the for the proposed works at Fort Dunree Project.

The report will provide an overview of the proposed M&E strategies of the individual systems for each of the project areas / elements, with particular focus on the primary HVAC plant, operation, and solutions that we have explored and deem are most appropriate for the project to meet the requirements of the current building regulations, maximise energy efficiency and minimise on-going running costs.

8.2 INFRASTRUCTURE WORKS

8.2.1 WATER SUPPLY

The water supply shall be extended from the local Irish Water supply that serves the existing site.

8.2.2 ELECTRICITY SUPPLY

The existing ESB supply will be upgraded to serve the additional requirements of the site. The new supply will be taken form the existing ESBN overhead lines and pole mounted transformer at the rear of the existing Office building and terminate in a new main switchboard to be located at the front of the Office Building.
Electrical services to the various buildings throughout the site will emanate from the main switchboard via new 125mm (RED) underground ducts to the buildings throughout the site.

8.2.3 TELECOMMUNICATIONS SERVICES SUPPLY

Incoming underground communication system services will be provided to the data communication cabinet to be located in the Ticket Office from the existing EIR Network by means of underground pipe ducts and high-level cable tray.
All the WIFI and telephone cables will be connected back to the data communications cabinet via an underground duct system.

8.2.4 EXTERNAL LIGHTING

New external lighting shall be provided to the walkway and car park area as indicated on drawing no. 22150-E601.
Further details of the external lighting can be found in section 8.4.

8.3 MECHANICAL SERVICES INSTALLATION

The Mechanical Services Installation shall consist of the following.

I. Heating Centre to serve the Ticket Office and Café.
II. L.T.H.W. Heating Installation
III. Water Services Installation
IV. Sanitary Wear Installation
V. Above Floor Drainage Installation
VI. Ventilation Installation.

8.3.1 HEATING CENTRE INSTALLATIONS

Two local plant rooms will serve as the main heating and hot water centre for the new Ticket Office and Café. The heating system will be designed to accommodate all pump sets, primary control valves, control panel etc.

The space heating shall be by a suitably sized **Commercial Air Source Heat Pump.**

The heat pump shall cater for the buildings space heating and hot water demands. The heat pump will need to be located externally and be treated with by gold suitable for saline environment. A new buffer vessel, pumps and control centre will be located internally.

The heat pump reliably provides sufficiently hot water in all facilities requiring larger quantities of hot water. At certain design set points, the heat pump delivers more than 53 kW of heating capacity and is thus equal to a particularly demanding hot water requirement.
The maximum temperature of 65 °C also offers effective protection against Legionella.

8.3.2 HEATING SERVICES INSTALLATIONS

The heating system will be a low-pressure hot water system with medium grade black M.S tube and under floor heating systems throughout ground and first floor.
Temperature sensors shall be provided to each space to enable zoning.
Under heating system pairs well with Air Source Heat Pump technology due to the temperatures required to provide space heating through the under-floor heating circuits.
Due to the nature of the building and location, it is good practice to keep the walls free from obstruction as they would be less prone to gathering sand and damage.

8.3.3 WATER SERVICES INSTALLATIONS

The incoming mains water supply will be installed to enter the Ticket Office, Toilet facilities and Café, at a suitable point of entry and a stopcock shall be installed. The mains water supply shall be extended to serve the buildings cold water and hot water systems.

A cold-water storage shall be installed to cater for high demand from toilets / showers and ensure continuity of supply.

Hot and Cold-water services distribution will be by a pressurized system.

Anti-scald blending valves will be fitted on the hot water supplies to all wash-hand basins and sink units. The dead leg distribution pipe to all outlets will be kept to a minimum in accordance with current industry standards.

The hot water will be generated by the Commercial Air Source Heat Pump and stored in tanks located in the plant room.

The thermostatic blending valves to be provided on all hot water outlets to limit the temperature to 43°C.

8.3.5 SANITARY WEAR INSTALLATIONS

Sanitary wear will be provided to all toilet facilities.

8.3.6 ABOVE FLOOR DRAINAGE INSTALLATIONS

The soils and wastes pipework systems, above ground level will be installed in uPVC pipe tube and include for vents, anti–syphon and traps.

All underground systems, including upstands at ground floor level are under the Civil Engineers discipline.

The Mechanical Services shall include connection from the trap outlets and the installation of all above ground pipework systems, including vents, with connection to up-stands at ground floor slab level.

8.3.7 VENTILATION SERVICES

The general accommodation blocks will be ventilated with natural ventilation.
General ventilation will be provided in the Ticket Office to encourage fresh air introduction through openable windows and trickle vents.
Mechanical Extract Ventilation in toilet and Kitchen areas is by way wall and duct mounted inline fans, terminating in wall mounted external louvres.

8.4 ELECTRICAL SERVICES INSTALLATION

The Electrical Services Installation shall consist of the following.

I. Main Distribution Installation.
II. General Services Socket Outlet Installation.
III. General, Emergency and External Lighting Installation.
IV. Communications Services Installation.
V. Mechanical Services Installation.
VI. Security Services Installation.
VII. Fire Services Installation.
VIII. Protective Services Installation.
IX. EV Chargers Installation.

8.4.1 MAIN DISTRIBUTION INSTALLATION

A new main switchboard will be provided in the new electrical switch room located at the front of the Office building.

The general sub-distribution centres will be provided via external mini pillars.

Primary distribution routes will be provided for all electrical services, concealed at high level in ceiling voids utilising galvanised cable trays and trunkings.

Final circuit cable containment will be provided from the primary distribution route for all electrical services, utilising concealed galvanised steel conduit.

Earthing and bonding will be provided in accordance with current NSAI ET1 0101:2020 National Rules for Electrical Installations.

8.4.2 GENERAL SERVICES SOCKET OUTLET INSTALLATIONS

General services sockets and small power services will be wired in LSZH single core cables in concealed galvanised steel trunking and conduit.

8.4.3 GENERAL, EMERGENCY AND EXTERNAL LIGHTING INSTALLATION

Lighting services will be carried out in LSF cable in concealed conduit and trunking. Luminaries will be generally surface mounted, ceiling or wall mounted fittings throughout.

Lighting services and lighting levels will be following the requirements of the standard Lighting Guidelines. All luminaires will comprise LED light sources.

Lighting controls shall be installed to limit energy usage on lighting and maximize the use of natural daylighting.

Emergency lighting services will be installed in to comply with IS 3217+A1:2017 and with the current EN and Building Regulations.

External lighting will be provided on access routes, at entrances to provide safe passage around the building. Where possible these lights will be wall mounted LED type fittings.

The external lighting scheme will consist of

I. Wall mounted bulkhead type fittings to illuminate the pedestrian walkway.
II. Post mounted luminaires to illuminate the carpark areas on 8m columns.
III. Ground mounted bollard type luminaires to illuminate the centre of the main carpark.

Light Spill, Dark Skies and Light Pollution

Light Spill or obtrusive light is light which spills out of the carpark / walkways and impacts on the surrounding landscape or the darkness of the night sky. Even when lighting scheme is designed to avoid sky glow, intrusion, and glare, there still exists the possibility of significant impact on dark skies, sensitive landscapes and wildlife due to the mere presence of the lights. This is a natural occurrence which cannot be avoided but can be minimized using a professional lighting design programme such as “Lighting Reality” and the appropriate location and aiming of lighting columns.

Column placement, column and type of luminaire mounting heights are crucial to minimize intrusion and glare both at the design and installation stages.

The guidelines setting out the minimum lux level permitted for each environment can be obtained from BS EN13201-2-2015 Table 3-Class P4 (Pedestrians and Pedal Cyclists). The minimum lux level required from the above table is 5lux.

The lighting circuits will be controlled via timer, photocell, and presence detection sensors. This will ensure no unnecessary of the areas during the hours when the facility is not in use.

The lighting design has been designed to meet existing standards considering the dark skies requirements, the wider landscape and to minimise light pollution. All the proposed light fittings have been selected because they have been accessed and meet the requirements for the approval of the International Dark Sky Association.

The column mounted fittings will have an 8m mounting height and shall have a zero-degree upward tilt and main beam aiming angel of 60 degrees forward from the front glass and lamps shall be double asymmetric type which will reduce glare to the surrounding areas.

The main carpark and the overflow carpark will be wired on two different circuits to allow for separate control of the lighting in both areas.

Drawing 22150-E601 shows the proposed external lighting.

8.4.4 COMMUNICATIONS SYSTEMS INSTALLATIONS

A new cable and WIFI network, cabinet, patch panels and network routers will be supplied and installed. Cables will be Cat 6 installed on concealed cable tray and in underground PVC ducts and galvanised steel conduit.

8.4.5 WIRING OF MECHANICAL SERVICES INSTALLATIONS

Power and control wiring associated with mechanical services will be completed under the electrical installation to provide automated control of the HVAC systems in the new extension.

8.4.6 SECURITY SERVICES INSTALLATIONS

An Intruder Alarm System will be provided to control access to some buildings where required.

Door entry/access control system will be linked to the fire alarm system and will de-energise releasing the doors on activation of the fire alarm.

Access control barriers shall be provided at entrance points to the site.

An emergency call system will be provided to any disabled and user assisted toilet areas.

8.4.7 PROTECTIVE SERVICES INSTALLATIONS

A fully automatic addressable fire alarm system will be provided, it shall comply with IS 3218-2013+A1:2019 this shall be linked to the Intruder Alarm System for out of hours monitoring purposes.

It shall be an addressable system and shall comprise central control panel located at the entrance to the Ticket Office, smoke detectors, heat detectors and break glass points throughout the site buildings.

8.4.8 ELECTRIC VEHICLE CHARGERS

Electric Vehicle Charging Points will be provided in carpark areas at locations indicated in drawing no. 22150-E601.

8.5 SUSTAINABILITY

This project involves the preservation of several historical buildings that were originally constructed over 100 years ago and the protected structure of the lighthouse that are exempt from any requirement to comply with Part L of the Building Regulations.

There is no requirement for these buildings to achieve an NZEB Classification as they would come under protection, as part of a designated environment because of their special architectural and historical merit, therefore, in so far as compliance with certain minimum energy performance requirements would unacceptably have their special character or appearance altered.

Having considered the implication of above we would endeavour to ensure where practical that all products or equipment included in the Mechanical and Electrical Services design and installations are products that are included in the Sustainable Energy Authority Ireland (SEAI) Triple E Products Register as a benchmark of energy efficient products.

We will provide for:

a) The installation of discretely positioned energy efficient temperature controlled (frost Protection) electric panel heaters to preserve the fabric of the historic buildings together with the use of LED energy efficient lighting to minimise the visual and environmental impact of the Mechanical and Electrical Services in the preserved buildings.
b) Air Source Heat Pumps are provided to the serve the heating needs of the Ticket Office, Café, and welfare facilities.
c) Sensor controlled water taps in all welfare facilities to reduce the unnecessary use of water.
d) The use of LED lighting and presence controls to reduce energy consumption in all buildings.
e) Presence control sensors to control Audio Visual systems to eliminate constant use of energy when there are no visitors.
f) The external lighting will be designed using energy efficient LED fittings that will give a directional downward light output to reduce light pollution and preserve as far as possible the natural habitat of the nocturnal animals that share the space. Lighting controls would be installed to control the on/off period for the external lighting to reduce energy consumption.
g) Consideration will be given to the installation of some Photo Voltaic Panels in discrete locations to help reduce energy consumption.