
ST. JAMES HOSPITAL ELECTRICAL INFRASTRUCTURE UPGRADES

Electrical Specification – Phase 1 Descriptive Specification

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1. GENERAL REQUIREMENTS

1.1 Introduction

Currently there are several LV support generators across the SJH campus providing backup to critical services. Local support generators provide backup while the main campus generators run up to speed and lock into service. Some third-party tenants on site provide stand-alone backup, which relieves the stress on the main campus generators when required to operate.

The 2No. existing SJH main campus 2.2MVA generators were upgraded in line with site load demand in 2004. The current site demand has grown to beyond 80% of the generator capacity and with further developments planned, there is a greater risk of generator failure when called in to service. A separate electrical infrastructure upgrade project currently on site includes increasing the backup capacity by providing an additional generator rated at 2.8MVA.

The age and condition of the 2No. existing generators are also a concern, with some major service requirements needed. The best practice for support generators would be to have a N+1 arrangement, this allows for servicing while still providing 100% support. The current arrangement requires 100% of the installed generation for support. The existing two generators shall therefore be replaced on a phased basis as part of this project.

Supply, install, and commission all electrical distribution systems in accordance with the National Rules for Electrical Installations NSAI I.S. 10101.

Use latest edition of each standard referenced, containing all revisions available at the time that the project was issued for tender. Where a European or international standard has been modified or appended for use in Ireland, the modified or appended version shall apply.

1.2 Scope of Works

MV Switchgear Upgrades

The electrical works shall comprise the replacement of the existing Burns (S3) substation Ring main unit: Merlin Gerin RM6 four-way unit, and the Mortuary/CPL (S7) Ring main unit: ABB Uniair four-way primary units on the St. James Hospital Campus. Both date from 2001.

Include for the dis-connection, removal, and safe disposal of existing ring main units to be replaced. Refer to the attached map for the locations of these.

Include for the temporary hire and installation of 1.0MVA temporary generators to include all temporary flexible cabling for the duration of the works to power the LV switchboards fed from these ring main units via the transformers. All power outages/shutdowns required must be agreed in advance via method statements with SJH Facilities Department.

Main LV Switchgear Upgrade

This project comprises the upgrade of the existing main SJH Energy Centre LV switchboard and general works to the main Switchroom.

A survey of existing main board to be carried out before the above dates to include labelling of all sub-mains and outgoing circuits prior to work commencing.

10kV – 400V Transformer Upgrade

The electrical works shall comprise the replacement of the existing main Energy Centre (S1) and Phase 1C Courtyard (S4) 10/20kV – 400V oil-filled transformers on the St. James Hospital Campus. Include for the dis-connection, removal, and safe disposal of existing transformers replaced. Refer to the attached map for the locations of these transformers.

Include for the temporary hire and installation of 1.0MVA temporary generators to include all temporary flexible cabling for the duration of the works to power the LV switchboards fed from these transformers. All power outages/shutdowns required must be agreed in advance via method statements with SJH Facilities Department.

Backup Generator Upgrades

The works shall include the phased de-commissioning, disconnecting, removal and replacement of the 2No. existing 2.2MVA FG Wilson generators in the existing Energy Centre Generator Room to increase the backup capacity available to the campus on a phased basis. The existing generators shall be upgraded to 2.8MVA units to further increase the backup capacity and resilience available to the campus.

A new 6300A rated LV off-loader distribution board is currently being installed as part of the other 3rd Generator project will have the provision to take the supply from the two new 2.8MVA replaced generators as well as the 3rd generator.

Several existing backup generators are located on site, providing power backup for critical medical/ICT infrastructure. These will be retained. The contractor shall be required to configure the start time delays for the existing generators and shall configure the new primary backup generator by setting the delay time with existing generators and new primary backup generator, the existing generators will need to provide backup to the critical services.

A survey of existing main boards to be carried out before the above dates to include labelling of all sub-mains and outgoing circuits prior to work commencing.

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The contractor shall allow for a full discrimination study on the proposed switchgear which is to be submitted to the engineer and client for approval prior to ordering of equipment.

The contractor shall include for to liaising and co-ordinating with SJH Facilities to disconnect and re-connect LV supplies via approved method statements.

The contractor shall allow for liaison with ESB during implementation of the project.

The contractor will allow for strip-out and removal from site all existing redundant generator equipment, cabling and electrical services in the Generator room as indicated on the electrical drawings.

The locations of the various elements outlined above are as indicated on the Site Location Map included in Appendix A of this specification.

1.3 Works Contract

The electrical contractor shall act as the main contractor for this project. Any associated building/civil works contract works shall be carried out as a domestic sub-contract to the electrical contract.

The electrical contractor must therefore include for all administration, overheads, and attendances required.

The form of contract for this project shall be PW-CF5.

1.4 Site Restrictions and project programme

Due to the nature of the site, restrictions will apply to when downtime, road closures and certain construction activities will be permissible.

The contractor will be required to submit a detailed project program to the client and design team for approval prior to commencement of works.

Due to regular deliveries on site, road closures will need to be limited and clearly scheduled and communicated with the client and design team. Works inhibiting the flow of traffic will need to be limited in duration.

No electrical outages can occur without prior written agreement with SJH Estates agreement and approval. Electrical outages and changeovers shall be scheduled for after hours or weekends to reduce service interruptions.

1.5 Labelling of Plant and Systems

Labelling shall be provided on all switchgear, distribution boards, electrical plant and accessories with both function and circuit designation. All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced.

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Plant labels shall include the area of the building served by the unit in addition to the unit reference numbers. All labelling shall be robust and securely fixed, designed to have a lifespan of at least 15 years.

Labels shall be provided for all outgoing sub-mains cabling with ivory/traffolyte labels fixed to the sub-mains cables with securely tethered cable ties at either end of the sub-mains. Additionally, sub-mains cables shall be labelled as described here within sections of the building where access can be gained to primary distribution routes including all manholes.

1.6 Circuit Allocation

The Contractor shall be responsible for ensuring the lighting, general services and small power circuits are evenly balanced across the L1, L2, and L3 phases within each three-phase distribution board.

1.7 Site Dimensions

Check dimensions on site prior to ordering any equipment and confirm equipment and proposed fit within the space available and can be delivered to the spaces required. Any equipment delivered to site which do not fit, cannot be moved to the required location, or does not have adequate maintenance provision shall be replaced without cost to the project.

2. COMMISSIONING

2.1 General Requirements

Commissioning certificates shall be provided for the following prior to substantial completion. This is not necessarily a comprehensive list and all certificates referred to within the specification shall be provided:

Certificate	Notes
LV Switchgear Test Certificates	EN 61439 Switchgear Protection Certificate
LV Generator Commissioning Certificates	
MV Switchgear Commissioning Certificate	
MV Switchroom Earthing Test Certificates	
10kV / 400V Transformer Test Certificates	
IS 10101 Completion Certificate for the Fixed Electrical Installation	
IS 3217 Emergency Lighting Completion Certification	Each Certificate must be on individual Company's Headed Paper: Annex C2 (Design) Annex C3 (Installation) Annex C4 (Commissioning) C5 (Handover)
IS 3218 Fire Detection & Alarm Completion Certification	Each Certificate must be on individual Company's Headed Paper: Annex C1 (Design) Annex C2 (Installation) Annex C3 (Commissioning) C6 (Handover)

2.2 Demonstrations

Provide the Client with full training and demonstrations of all systems and record the training provided. Refer to the project preliminaries for further details of the training requirements.

An allowance shall be included for initially demonstrating the systems to the Design Team before they are formally demonstrated to the Client.

3. ELECTRICAL SUPPLY & ELECTRICITY CENTRE

3.1 10/20kV Switchgear

The following MV ring main units require replacement to ensure their continued operation;

- Burns substation Ring main unit: Merlin Gerin RM6 four-way unit, dating from 2001.
- Mortuary/CPL Ring main unit: ABB Uniair four-way primary unit, dating from 2001.

New MV switchgear shall be 4-way secondary modular air-insulated vacuum SF6-free fixed type, rated 24kV, 630A current rating, 20kA breaking capacity, and shall comply with IEC 62271-200, as Schneider SM AirSeT Active range, with 24-7 connected condition monitoring, or equivalent.

Locking arrangements shall be provided so that the 24kV circuit-breaker can be mechanically locked in the "ISOLATED" position and the 24kV cable earthing disconnect can be mechanically locked in either "ON" or "OFF" positions. A suitable clasp shall be provided for a maintenance "lockout" padlock. In addition, there shall be a mechanical interlock to prevent the following:-

- Racking the 24 kV circuit-breaker into the "IN-SERVICE" position while the earthing switch is closed.
- Closure of the earthing switch, while the 24kV circuit breaker is in the "IN-SERVICE" position.

Each circuit-breaker cubicle shall be equipped with a flush-mounted digital, multi-function, power monitoring meter to display the following electrical parameters:-

- a) Current for each line
- b) kilowatts
- c) kVA
- d) kilovars
- e) kilowatt-hours
- f) Thermal demand values for kW, kVA, kVar, & current (15 minute integrated)
- g) Power Factor
- h) Voltage and current unbalance
- i) Frequency
- j) Harmonics, THDI%, and THDV%
- k) Modbus output for connection to BMS

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The MV switchgear shall be provided a remote switching function, to allow switching of all sections, from a hand-held plug-in unit with a 5.0 metre flexible lead.

The switchgear shall include all necessary current & voltage transformers to comply with EN 60044-1 and EN 60044-2.

Covers to busbar chambers shall be fitted with engraved plastic labels, with 15 mm black letters on a yellow background as follows:-

DANGER LIVE BUSBARS 10,000 VOLTS ⚡

A spare set of labels shall be provided as follows:-

DANGER LIVE BUSBARS 20,000 VOLTS ⚡

Protection relays shall be of microprocessor-based type and suitable for 48V dc operation, to comply with EN 60255. Phase-fault and earth-fault relays shall provide maximum possible discrimination between faulty and functional circuits, and shall not operate due to transient phenomena, including transformer energisation in-rush current, which may arise due to switching or faults outside their zone of protection.

An automatic battery charger shall be furnished as part of unit. The charger, complete with indicating and control devices, shall operate from a 230V, single phase, 50 Hz source. The charger shall contain MCB's, with alarm trip contact, for mains and d.c. circuits; a control switch for trickle and automatic boost facilities; separate alarm LED's for mains failure, MCB trip, under-voltage, over-voltage, dc circuit earth-fault. A common alarm volt-free contact shall be provided for connection to a remote BMS alarm.

The charger shall be provided with current limiting circuitry to automatically limit the current output to 125% of the rated charger output at maximum voltage. The design of the charger shall be co-ordinated so that the overload protection will not operate under current limiting conditions, and normal operation shall resume automatically once the overload or short circuit has been removed.

The MV switchgear, Transformers, and main LV Switchboard shall be linked to the main critical systems BMS to indicate status and fault alarm.

A full electrical calculation to confirm discrimination & fault level study and ensure the main distribution system fully protected based on the specific site conditions and particular circuit breaker characteristics of the proposed switchgear shall be provided. This calculation shall be carried out on electrical design software such as Trimble ProDesign or Electrical OM.

3.2 10kV – 400V Transformer

The electrical specialist shall carry out the following work associated with the new transformer installation:

- a) Supply and install single-core XLPE/AWA/PVC LS0H conductors in trefoil per phase & neutral from the MV switchboard to the main LV switchboard via the step-down transformers.
- b) Supply, install and terminate all control, monitoring and protection cables and cable containment systems associated with the transformer installation.
- c) Supply and install all the cable rack and all the galvanised structural steel supports necessary to install the main 400V / 10kV cables, earthing, and control cables associated with the transformer installation.
- d) For each transformer, supply and install 2No. 4-core 2.5sq.mm XLPE/SWA/LS0H cables and cable support systems, from the associated BMS junction box to the temperature and gas pressure protective devices on the transformer.
- e) Supply and install the earthing cables for the transformers.

The transformers shall be 10/20kV – 400V, 1.0MVA for Phase 1C Courtyard (S4) and 1.6MVA for the Energy Centre (S1), both Oil-Filled type.

The following information shall be provided on a stainless-steel nameplate on the transformer and the enclosure;

- a) Country of origin
- b) Manufacturer's name
- c) Manufacturer's Serial No.
- d) Year of manufacture
- e) Rated Primary & Secondary Voltages
- f) Rated Continuous Naturally Cooled Output (kVA)
- g) Rated Continuous Fan Cooled Output (kVA)
- h) Impedance at AN Rating (%)
- i) Impedance at AF Rating (%)
- j) No Load losses, Watts
- k) Load Losses at AN rating, Watts
- l) Load Losses at AF rating, Watts

Each transformer shall be tested at the transformer manufacturer's facility in accordance with the requirements of EN 60076 and shall comply with Ecodesign regulations EU 548-2014.

Transformers shall be mounted on anti-vibration pads.

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Quantity:	2No.
Rated Continuous Output:	1.0/1.6MVA oil cooled
Type of Transformer:	Mineral oil immersed 50Hz 3-phase distribution transformer
Enclosure IP Rating:	Anti-corrosion surface treatment; corrosivity category class C3. IP54 LV cable termination box
Colour:	RAL 7033
Type of Cooling:	ONAN
Sound Power Level:	68 dB(A)
Frequency:	50 Hz
Impedance:	6%, based on AN rating of 1.0/1.6MVA
High-voltage side:	10,440V and 20,880V at “mid” tap changer position
Low-Voltage side:	420V (Off-load)
High-Voltage Connections:	Delta
Low-Voltage Connections:	Star (Wye), with neutral point fully rated and insulated.
Phase Relationship:	Dyn11
HV Cable:	Bottom-entry MV cable entry with terminals suitable for the connection of 3 No. 1 core 240 mm ² XLPE/AWA/PVC cables with copper conductors, rated 12,700/22,000V.
LV Cable:	Top-exit LV connections arranged to connect with 3 phase and neutral busbars for coupling to the main incoming breaker in the 400V switchboard.
Tappings:	10,440V and 20,880V principal tap positions, with off-circuit tap changer on the primary windings, all taps fully rated and insulated. Four 2.5 percent (two

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	above and two below the principle tapping).
Winding:	Double wound, uniformly insulated, copper conductors.
Load:	Healthcare, motive power and lighting load with a large number of electronic variable-speed-drives.
Standards:	IEC 60076, EN 50541-1

The new Transformers shall be as Schneider Electric Minera Ecodesign range or equivalent. The existing CB2 trip relays shall also be replaced with Schneider Electric MiCOM Px30 series protection relays.

A full electrical calculation to confirm discrimination & fault level study and ensure the main distribution system fully protected based on the specific site conditions and particular circuit breaker characteristics of the proposed switchgear shall be provided. This calculation shall be carried out on electrical design software such as Trimble ProDesign or Electrical OM.

3.3 Main Distribution Board

Supply and install new LV switchgear. Refer to the schematic drawing for details of the new main switchgear. Distribution boards shall be constructed and tested in accordance with IS EN 61439, IEC 439 and the current IS 10101 Regulations, including any amendments.

Multi-function modbus metering (MFM) tied into the existing SJH Campus BMS shall be provided on all main supplies to SDBs as per CIBSE TM: 39. KWh check-meters tied into BMS shall also be provided on all SDB power sections to comply with BS EN15193 Energy Performance of Buildings. MFMs will also be provided on all loads over 5kW in accordance with CIBSE Guide M Table 6.2 & TM39.

The board shall incorporate a generator connection point interlocked to the main incomer for future maintenance. Supporting the outgoing services from the main DB during replacement will be critical to the hospital services. The medical air plant located at the energy centre has an independent generator tie-in point already available for this process.

New switchgear shall comply with the following schedules:

MAIN LV SWITCHBOARD	
Item	Details
Switchgear type:	a) Sheet steel cubicle b) Busbars as per main Breaker capacity
Voltage:	400/230V, 3 phase
Assembly:	a) Floor Mounted b) Bottom Entry, Top Exit c) All panel sections providing direct access to live assemblies shall be openable only with a special tool d) All panel sections accessing shrouded MCB's shall be provided with a handle for opening
Switchboard Classification:	Form 4a Type 2 compartmentalised in accordance with BS EN 61439-2
Circuit Breakers:	LSI Relays
Generator Changeover:	Manual Interlock Transfer Switch
Enclosure Protection:	IP 41
Fault Level:	65kA for 1.0 second

Unless otherwise specified, RCD units shall be the thermal/magnetic protection as Type 1,2,3,4 as specified, rated at 30mA with a short circuit breaking capacity of 9kA, and shall be combined with the final sub-circuit MCB as an MCB/RCD (RCBO) protective device. All RCD units shall be equipped with a test button to simulate operation of the device. All RCBO's shall be B or C type as appropriate.

25% spare capacity for future expansion including circuit breakers shall be provided on the main and sub-distribution switchboards.

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Adequately sized trunking/cable carrier headers shall be provided at each switchgear position above and to the side of the switchgear.

Contactors required for switching of emergency luminaires, and external luminaires shall be provided in all switchgear.

A survey of existing main board to be carried out before the works commence to include labelling of all sub-mains and outgoing circuits prior to work commencing.

Strip-out and remove from site all existing redundant switchgear.

Install new main distribution board and re-instate disconnected sub-mains and sub-circuits.

The Contractor shall then reconnect the remaining sub-circuits and verify that all sub-circuits are working normally. This will include checking that the supplies to all buildings on the campus are operational and that any alarms activated as a result of the disconnection are re-set and operational.

Carry out general upgrade to the Switchroom as detailed in Sections 8-10 of the specification.

The above works shall be completed over a weekend on a date to be pre-agreed with the SJH Facilities via method statements.

4. ELECTRICAL CONTAINMENT SYSTEMS

4.1 General Requirements

A system of galvanised steel cable tray/ladder and trunking/conduit shall be installed to distribute all mains, sub-mains, general and emergency lighting, power, and fire alarm. Separate wiring systems shall be segregated in accordance with the National Rules for Electrical Installations.

All mains & sub-mains circuits installed on heavy duty galvanised steel cable tray to comply with BS EN 50085.1.

Circuits within trunking, cable tray or conduit systems shall be grouped together with tie tags and circuit identification levels at all outlets, switches, terminations and at appropriate locations along the length of the trunking / tray to allow circuit identification.

Containment routes shown on the electrical services drawings are indicative only, the Contractor shall provide all bends, tees and cross-overs that are required to meet the current IS 10101 standards. The routes indicated are main distribution routes only. The Contractor shall be responsible for the provision of all tray, trunking and containment systems to ensure mechanical protection of all cabling. All containment systems shall facilitate 35% empty space upon completion of the installation. The total cross-sectional area of all the cables within conduit/trunking including spare capacity in trunkings must not be greater than 65% of the cross sectional area of the conduit/trunking.

4.2 Conduit

Final run outs to all devices, including fire alarm, lighting, general services, security, mechanical wiring etc. from main containment routes shall be installed in 20/25mm Class 4 galvanised steel conduit with brass bushings.

Cables shall not be inserted until the conduit and boxes are fixed and the plastering complete and no pull greater than 15 kg shall be exerted. Socketed and screwed brass bushes shall be used on all ends through which cables or wire are moved in either direction.

Conduits will be fixed by means of spacer bar saddles fixed at 1,000mm horizontally and 1,200mm vertically.

Where flexible conduit is used, it shall be armoured LS0H sheathed flexible metal conduit as "Marshall Tufflex MT Supertube" or equivalent. Flexible conduit shall be in accordance with BS EN 50086.

4.3 Cable Tray

Cable tray shall be manufactured in accordance with EN 61537. The appropriate corrosion protection will be determined by reference to EN ISO 12944.

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In general, cable tray installed internally shall be galvanised to EN 10346. Cable trays installed externally and in internal areas of high humidity and corrosion shall be galvanised to EN ISO 1461.

- Cable trays shall be medium duty with a sidewall of a minimum of 105mm.
- Cable trays installed externally shall be fitted with covers.

All accessories (bends, tees, intersections, internal and external risers, offsets, and reducers etc.) shall be supplied by the manufacturer.

Cable trays shall be supported at span distances not greater than 1.5m or as specified by the manufacturer. The deflection conditions of EN 61537 must be met at all times. Additional supports will be positioned no further than 150mm from accessories. Only support brackets with load capacities tested in accordance with EN 61537 will be used.

Cable trays will have adequate space to allow for the correct installation and fixing of all cables plus 30% spare capacity for future use.

Any cuts will be treated to return the cable tray to the condition of manufacture.

Cable trays will meet the following minimum requirements:

- Interlocking ends with self-locking couplers that do not require additional bolting. As OBO Bettermann or equivalent.
- Electrical continuity without additional earth bonding.
- Magnetic shield insulation without cover 20dB, with cover 50dB.
- Electromagnetic compatibility to VDE 0870-1.
- Transfer impedance without cover 1.14mΩ/m, with cover 0.71mΩ/m.
- Embedded perforations in the base of the cable tray for increased ventilation and simplified connection to the support system.
- Both lengthways and crossways perforation slots in the base of the cable tray.
- Continuous side perforation slots 7 x 20mm.
- The facility to fit snap-in segregation strips into the base of the cable tray.
- Covers will be supplied with pre-installed turnbuckles.

Sprung steel clips will be manufactured from stainless steel.

Separate tray/trunking shall be provided for data and fire alarm cabling to provide segregation in accordance with the IS 10101 National Rules for Electrical Installations.

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The Contractor shall provide labels for all outgoing sub-mains cabling with ivory/traffolyte labels fixed to the sub-mains cables with securely tethered cable ties at either end of the sub-mains. Additionally, sub-mains cables shall be labelled as described here within sections of the building where access can be gained to primary distribution routes including all manholes.

4.4 Fire Stopping

After routing electrical cables through a wall, the integrity of firestop walls must, without exception, be restored using a firestop product that offers at least the same level of protection as the original walls. Firestop products will comply with the description and performance levels described below. The recommended product is EZ-Path® sold by CABLOFIL® or equivalent.

The firestop product must consist of a metal case, pre-installed intumescent foam and finishing plates. The intumescent part of the product must take the form of two convex foam slats positioned in such a way within the module as to apply constant pressure to the cables, however many there may be.

It must be possible to route cables at a later time without affecting the integrity of the firestop installation.

The module must ensure the electrical continuity of the installation. To this end, it must have a facility for connecting the earthing cable.

The intumescent part of the product must act as a barrier in the event of fire.

The product must be certified as a firestop in accordance with the following standards:

- European standard: EN1366-3
- British standard: BS 476: Part 20

5. CABLING

5.1 General Requirements

The total allowable design volt drop from the main switchboard position to the final equipment or socket outlet shall be in accordance with the principles described within the IS10101 National Rules for Electrical Installations.

All cables shall be adequately supported and clipped to within 200mm of the cable glands at both ends. Cables shall be neatly installed on tray/rack avoiding unnecessary crossovers. Kinks are unacceptable. Where cables are run on tray/rack, cable ties and cleats/clamps shall be used at intervals as follows:-

Maximum Spacing of Clips/Cleats/Tie-Wraps

Overall Diameter of Cable		Non-armoured Cable		Armoured cable	
		Horizontal	Vertical	Horizontal	Vertical
Mm		Mm	mm	mm	mm
<=10		250	400	-	-
>10	<=16	300	400	350	450
>16	<=25	350	450	400	550
>25	<=50	400	550	450	600
	>=50	800	800	800	800

5.2 Mains & Sub-Mains Cabling

LV sub-mains cables and sub-distribution cables shall be 4-Core LS0H Cu-PVC XLPE SWA with separate CPC's for cables over 16.0sq.mm, and 5-Core LS0H Cu-PVC SWA for cables of 16.0sq.mm or less. Cables sizes included in the cable schedule shall be the minimum size to be provided.

When serving large loads, single core LV mains cables shall be used. Single core cables shall be LS0H Cu-PVC XLPE AWA. Single core cables shall be installed in a Trefoil arrangement.

All main & sub-mains cables shall be BASEC approved.

A separate CPC shall be installed with each sub-mains feed and shall be of the size detailed on the drawings, or a minimum of 0.5 times the CSA of the sub-mains cable. The armour of the cable shall also be bonded at both ends to the distribution equipment by means of a nut and bolt through a tab linked to the earth bar.

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The LV cabling between the Energy Centre Transformer being replaced and the main LV switchboard shall also be upgraded as part of this project to cater for the larger transformer size to: 15x3x300mm XLPE + 3x300mm Neutral.

5.3 Medium voltage cables

Medium voltage cables shall be Medium-Voltage Single-Core Copper Armoured XLPE/LS0H/AWA /LS0H: Voltage rating of 12700/22,000 V constructed to BS6622 as follows: compact circular stranded copper conductor complying with BS6360 Class 2; extruded semi-conducting compound conductor screen bonded to the insulation; extruded cross-linked polyethylene (XLPE) insulation suitable for operation at a conductor temperature of 90°C; insulation screen of extruded semi-conducting layer; metallic screen of copper tapes applied overlapping to provide an earth fault current path; three cores laid up with polypropylene string fillers to form a compact circular cable, and bound with tape; bedding sheath of extruded black LS0H compound; single layer of galvanised circular steel wire armour; oversheath of red LS0H compound.

Cable insulation shall have a minimum average thickness of 5.5 mm and shall be capable of withstanding an impulse test of 125 kV, a partial discharge test of 19.1kV and an applied voltage of 30 kV RMS at 50 Hz for 5 minutes. Conductivity shall meet the requirements of BS6360.

5.4 Construction Products Regulations

All cable supplied and installed for this project shall conform to the EU Construction Product Regulation EN 50575 and shall be CE marked to the appropriate EU Classification. The manufacturer shall supply a Declaration of Performance as part of the equipment submittal documentation.

All cables shall be a minimum of: Cca – S₁, d₂, a₁.

6. STANDBY GENERATOR

6.1 General Requirements

Supply, install & commission 2No. 2.8MVA Class A rated (Prime Rated – operating at the rated load for a period of 12 consecutive hours inclusive of an overload of 10% for 1 hour continuous), 3-phase standby diesel generator sets complete with self-contained emergency diesel generator, synchronization (G10) panel and full controls system upgrade.

The generators shall be HTM-06-01 Class A Category 2 – 80% Load Acceptance.

Include for an appropriate stainless steel flue system to above roof level if installed internally or within an internal courtyard.

The complete packaged diesel generator set shall be designed, manufactured, assembled, tested and CE certified at a single manufacturing facility. Generator sets,

control systems and sound attenuated containers from separate suppliers will not be acceptable.

The following vendor requirements shall be provided.

1. Vendor must have experience of at least five HSE Hospital or similar large live site generator projects in the last 3 years to the value of €500k or over.
2. Vendor must have a full 24/7 service operation and callout service.
3. Vendor must be located within 20km of the site.
4. Vendor must have represented the manufacturers brand they propose for at least 10 years in Ireland.
5. Vendor must have at least 15 full time, permanently directly employed, factory trained service engineers.
6. Vendor must carry at least €500k of spare parts at their works in Ireland.
7. Vendor must have a minimum turnover of €5 million for previous 5 years.

The diesel generator associated ventilation and other equipment shall be designed to operate under the following environmental conditions:

Ambient Temperature	:	40° C max. 30° C average over 24hrs
Relative Humidity	:	50% at +. 30° C max
Altitude	:	Below 1000m
Location	:	Plant Room

Generator Set Details

The generators shall be equipped with automatic mains failure changeover facility.

Access to the control panel end & on both sides for maintenance shall be required.

The generator shall be designed for bottom entry single-core flexible power cables.

Metalwork & Finish Requirements

- Cut using high precision laser technology
- Modular Assembly with bolted assembly after painting
- Phosphate priming with durable polyester powder paint finish coat
- Flexible weatherproof seals on all joints

GENERATOR SET DETAILS	
Output rating: (0.8 power factor)	2500kVA Prime 2800kVA Standby to BS 5514 & BS 7698 / ISO 8528 / BS 5410-3
Fuel:	Diesel
Duty Type:	Standby
Operation Sequence: Automatic mains failure control panel and automatic mains supply restoration after time delay of 5 minutes and generator run-on, capable of supplying the full rated power within 20 seconds from the initiation of the starting sequence. The time delay will be adjusted by coordinating with the existing generators and new proposed generator shall be treated as primary backup generator. Remote indicator panel for common alarm with sounder and sounder mute Electronic governor on generator output Battery charging - engine driven alternator and mains operated trickle charger Engine jacket water heater (230V) Panel Heater Link to BMS for Fault / Run Status	

If the generator supplier cannot exactly match the above output rating specification, the next larger standard size generator shall be included for.

Standards and codes

The diesel generator shall comply with the latest editions of the following standards:

EU directives 89/392/EU, 91/368/EU and 93/44/EU.

Electrical Wiring Rules IS 10101.

Safety, Health and Welfare at Work Regulations 1993 (SI No. 44 of 1993).

British Standards.

IEC Standards.

Requirements of the local Fire Services Department.

BS 7698/ISO8528 G2.

EU directives 89/392/EU, 91/368/EU and 93/44/EU.

Electro Technical Council of Ireland (ETCI) Regulations.

Safety, Health and Welfare at Work Regulations 1993 (SI No. 44 of 1993).

BS 4999-0.

BS EN IEC 60034-5.

BS 4999-140.

BS 4999-142.

BS EN ISO 3046-1

BS ISO 8528-1 to 6.

BS ISO 8528 – 9 & 10.

BS EN IEC 60034-1.

BS EN IEC 60034-22.

ISO 12000.

BS EN 953.

BS EN12601.

BDP.

BS EN 61000-6-3 & -4.

BS EN 61000-1 & -2.

BS EN 60204-1.

BS EN 60439-1.

BS EN60529.

IEC Standards.

Requirements of the local Fire Services Department.

EU Stage 2 emissions.

6.2 Engine

General

Engines shall be of the water cooled 'In-Line' or 'Vee' type, pressure charged, intercooled diesel four stroke cycle to comply with ISO8528 - 1.

The engine shall be compliant with EU Stage II Emission Legislation.

The type of fuel to be used shall be 35-sec gas oil - diesel.

A heavy flywheel shall be fixed to the engine to ensure smooth running under all load conditions, and it shall be provided with an approved flywheel guard.

The following equipment shall be provided on the engine:

- Fuel oil filters of the 'full flow' type to adequately handle the flow, pressures and temperatures involved and to provide the required filtration for optimum engine performance.
- Lubricating oil filters of the 'by-pass' type to provide maximum oil lift and protection against contamination.
- An approved lubricating oil cooler.
- An engine mounted instrument panel with fuel pressure gauge (kg/cm²), water temperature gauge (°C) and lubricating oil pressure gauge (kg/cm²).
- Danger levels shall be indicated in red on all gauges. Gauges shall be of the electric type.
- Self-priming gear driven pumps for lubricating oil, coolant and fuel injection.
- Special precautions shall be taken to ensure that all harmful vibrations are fully damped out and approved type torsional vibration dampers shall be fitted to the free end of the crankshaft.
- The engine shall be capable of starting up in adequate time to allow the alternator to develop full load within **5 seconds** under the worst climatic conditions.

BDP.

- The engine and alternator shall be of unit construction, rigidly secured to a common heavy duty mild steel underbase. The engine and alternator shall be directly coupled using semi-rigid couplings. Approved pattern resilient anti-vibration mountings shall be fixed to the underbase and each unit shall be rigidly fixed to the floor. Adequate means shall be provided for lifting and transporting the complete assembly without undue difficulty.
- All moving and rotating parts shall be adequately and effectively guarded so as to afford the maximum protection to personnel working on or near the engine. All guards shall be readily removable for maintenance and shall be simple and easy to re-install.

6.3 Governor

A governor shall be provided on the engine. It shall be of the electronic type capable of maintaining the rated speed at any load from no load to 10% overload and meet the accuracy requirements of class G2 to ISO8528.

6.4 Electrical System

- The engine shall be supplied with energised to run shutdown solenoid for fail safe operation. Oil pressure switches and water temperature switches. Oil pressure and water temperature senders shall be supplied.
- Audible and visible indication along with automatic shut-down of the generator shall be provided for the following as a minimum requirement:
 - Low lubricating oil pressure
 - High coolant temperature
 - High lubricating oil temperature
 - Cooling system malfunction
 - Failure to start automatically
 - Main alternator circuit breaker or restricted earth fault tripped
 - EPO Button activated or not reset
 - Common alarm volt free contact interfaced with the fire alarm system
- The starting system shall be of the electric type utilising an axial type starter motor as follows:
 - Power for the starting motor or motors shall be derived from 24V batteries.
 - The batteries shall be so sized that they are capable of starting the set successfully not less than six (6 No.) times from cold (-10°C) without recharging and shall on each occasion maintain effective cranking speed for a period of 30 sec
 - The type of batteries to be used shall be of the heavy-duty lead acid type.
 - Recharging of the batteries shall be provided using a two-rate (trickle/boost) charger. The charger and all associated equipment shall be located in the generator control panel. Each trickle and boost indication, battery level indication with low level alarm and charger fault indication with alarm.
- The supplier shall supply and install the batteries complete with all necessary battery leads. They shall be mounted in a rigid steel frame fixed to the engine underbase. All cable and connections shall be covered with a protective coating of grease to prevent corrosion.

6.5 Cooling System

- Cooling of the engine shall be provided by an engine mounted radiator complete with directly coupled fan. The radiator and fan shall be sized to maintain safe operation at the maximum ambient temperature.
- The engine cooling system shall be filled with an approved anti-freeze in a concentration recommended by the manufacturers for the climatic conditions of the site – worst case conditions of -20°C.
- The radiator and cooling fan shall be complete with protection guards.
- A low coolant level alarm shall be fitted.
- A thermostatically controlled electric water heater shall be provided for the radiator and engine cooling jacket.
- A thermostatically controlled electric heater shall be provided for the engine lubricating oil.

6.6 Engine filtration system

Cartridge type dry air filters, cartridge type fuel filters and full flow lube oil filters shall be supplied.

6.7 Exhaust System

A heavy-duty capacity exhaust silencer system shall be supplied to reduce the noise level. The exhaust system shall comprise the following:

- Industrial capacity exhaust silencer system with air cooled manifold and all mating flanges, flexible connectors, expansion bellows, gaskets, etc.
- The exhaust system shall be supplied as standard with mounting brackets for fitting on the generator set and shall have condensate drain points and thermal insulation to manifold and all exposed exhaust pipe runs
- The exhaust system shall be so designed that the exhaust back pressure does not exceed the maximum limitations laid down by the engine manufacturer.
- The exhaust flue shall be a stainless steel, twin wall insulated type suitable for installation in an internal service duct. A rain flap shall be fitted at the discharge point at roof level.
- All exposed elements of the exhaust shall be thermally insulated to prevent skin burn from touch or radiation.

6.8 Electrical System

The starting system shall be of the electric type utilising an axial type starter motor as follows:

- Power for the starting motor or motors shall be derived from 24V batteries. The batteries shall be so sized that they are capable of starting the set successfully not less than six (6 No.) times from cold (-10°C) without recharging and shall on each occasion maintain effective cranking speed for a period of 30 sec.

BDP.

- The type of batteries to be used shall be of the heavy-duty lead acid type.
- Recharging of the batteries shall be provided from the engine alternator.
- The supplier shall supply and install the batteries complete with all necessary battery leads. They shall be mounted in a rigid steel frame fixed to the engine under base. All cable and connections shall be covered with a protective coating of grease to prevent corrosion.

6.9 Alternator

General

The alternator shall be brushless, screen protected and drip-proof, separately excited by means of a permanent magnet, self regulating with fully interconnected damper windings and sealed-for-life bearings.

Insulation system

The insulation system is Class H. All windings are impregnated in either a triple dip thermo-setting moisture, oil and acid resisting polyester varnish or vacuum pressure impregnated with a special polyester resin. A heavy coat of anti-tracking varnish for additional protection against moisture or condensation shall be included.

Electrical Characteristics

The alternator shall be in accordance with BS5000 part 99, IEC34-1, VDE0530, UTE51100, NEMW MG-122

Automatic Voltage Regulator

The fully sealed automatic voltage regulator shall monitor all three phases and maintain the voltage within the limits of $\pm 1.5\%$ from no load to full load including cold to hot variations at any power factor between 0.8 lagging and unity and inclusive of speed variation of 4.5%.

Nominal adjustment by means of a trimmer incorporated in the AVR shall be included.

Waveform Distortion, THF and TIF Factors

The total distortion of the voltage waveform with open circuit between phases or phase and neutral shall be in the order of 2. On a 3-phase balanced harmonic-free load the total distortion shall be in the order of 3.5%. The alternator shall be designed to have a THF better than 2% and a TIF better than 50. The alternator shall have a 2/3 pitch factor.

Radio Interference

Suppression shall be in line with the provisions of BS800 and BDE class G and N.

Motor Starting

An overload capacity equivalent to 300% of full load impedance at zero power factor shall be sustained for 10 seconds.

6.10 Mounting Arrangement- Safety Features

Baseframe

The complete generator shall be mounted, as a whole, on a heavy duty fabricated and welded steel baseframe constructed from folded channel sections. The baseframe shall incorporate specially designed crane lifting devices.

Coupling

The engine and alternator shall be directly coupled by means of an SAE flange so that there is no possibility of misalignment after prolonged use. The engine flywheel shall be flexibly coupled to the alternator rotor and a full torsional analysis has been carried out to guarantee no harmful vibration will occur in the assembly.

Anti-Vibration Mounting Pads

Anti-vibration pads shall be supplied.

6.11 Control System

General

The existing G10 protection and control systems are currently being replaced as part of the 3rd generator installation project to ensure proper synchronization equipment for all three generators, allowing seamless parallel operation and incorporate automatic control systems to balance load sharing between generators. The new controls system shall be compatible with the proposed replaced generator set as well as the new 3rd generator unit.

The control panel shall be for set mounting and shall contain the means of starting and stopping the generator, monitoring its operation and output, and automatically shutting it down in the event of a critical condition arising such as a low oil pressure or high engine coolant temperature. It shall also be capable of synchronising the generators with each other and the utility supply for the purposes of peak shaving and peak lopping.

Protection/ instrumentation

The control panel shall incorporate a microprocessor bases load control and engine management system which shall carry out all the functions necessary for engine control, synchronising, real (kW) control, reactive (kVAR) control and automatic generator sequencing.

The following generator parameters shall be displayed digitally by means of alphanumeric LCD display.

BDP.

- Engine coolant temperature.
- Engine oil pressure.
- Battery voltage.
- Engine RPM.
- Genset KW-hrs.
- Genset run time.
- 3 x Phase / phase volts.
- 3 x Phase currents.
- Generator power factor.
- Generator KW.
- Load status.
- 3 x Phase/neutral volts.
- 3 x Phase kW.
- 3 x Phase kVar.
- 3 x Phase kVA.
- Slip frequency.
- Phase angle difference.
- Voltage differential.
- Mains/bus selection.
- Dead bus.
- Synchroniser status.
- Generator voltage.
- Mains/bus voltage.
- Number of unacknowledged faults.
- Listing of up to eight most recent faults.

Engine Control

OFF/AUTO/TEST/RUN control switch.

Emergency stop pushbutton (latching).

Multiple attempt crank timer.

Multiple crank repeat setpoint.

Crank repeat timer.

BDP.

Crank fail alarm/shutdown.

Crank cutout.

Automatic cooldown timer.

Circuit Breaker

A 3-pole moulded case circuit breaker shall be mounted on the generator in a vibration isolated sheet steel cubicle with adequate access for incoming and outgoing cables.

Remote Monitoring

The control panel shall be equipped with a means of remote monitoring by means of Modbus protocol.

A serial communications port shall be provided (RS-422 or RS-485) for remote communications and control functions.

A full function remote monitoring panel is currently being installed as part of the 3rd generator replacement works. Include for connecting the replaced generators to this new control and monitoring system.

A common alarm **battery backed** up Xenon beacon and electronic sounder shall be fixed external to the generator housing and shall provide a common alarm to all protective circuits which form part of the generator installation. Signage detailing call out procedures shall be fitted adjacent to the beacon and sounder up Xenon beacon and electronic sounder shall be fixed external to the generator housing and shall provide a common alarm to all protective circuits which form part of the generator installation. Signage detailing call out procedures shall be fitted adjacent to the beacon and sounder.

Documentation

A full set of operation and maintenance manuals, circuit wiring diagrams, commissioning/fault finding instruction leaflets shall be supplied.

General Arrangement

The generator shall be designed and constructed for installation in a weatherproof enclosure for outdoor location.

Factory Tests

The generator set shall be load tested before dispatch from the manufacturers works.

Factory tests shall be witnessed by three client representatives and all costs associated with the provision of client witness testing shall be included for in the tender price.

BDP.

The Specialist Supplier shall give notice of 3 weeks to the Electrical Contractor and Client Representative prior to the date of tests.

All faults, control functions and site load conditions shall be simulated and the generator and its systems checked and proved. A test certificate shall be provided.

Electrical Works

Include for all associated 12-core SWA control cabling between the main switchboard auto-changeover unit, generator control panel and the generators.

Approved Generator Suppliers

The following generator suppliers/manufacturers are approved;

- Diesel Engines Ireland Limited/Kohler-SDMO
- Edina Limited
- FG Wilson Limited
- Caterpillar

Safety

The following safety features must be incorporated;

- Lockable hinged doors
- Glazed control panel door with acoustic seal
- External Emergency Lock-Stop Button
- Safety guards over exhaust manifolds & turbochargers
- Lagging jackets on all internal exhaust pipe work
- Internally mounted exhaust silencers

Testing & Commissioning

The standby generation system supplier shall test and certify the completed installation and such costs are to be included in the tender amount. The Electrical Specialist shall include for attendance on the generator supplier and for the testing of all elements of his associated works. All costs associated with supplying adequate diesel for a 24-hour running test at full load must be included in the commissioning costs.

The complete diesel generator set shall be tested, including lubrication oil, cooling system, indication and alarm systems, and engine vibration tests. The speed governor and the emergency over-speed governor shall be tested and adjusted. Tests shall be carried out in accordance with current standards.

Testing shall be subject to witnessing by the Engineer. The tests shall include:-

Running the engine at:-

- 100% load for 3 hours

BDP.

- 75% load for 15 minutes
- 50% load for 15 minutes

The following parameters shall be recorded every 15 minutes for the duration of the load tests:-

- Load kW
- Engine temperature
- Load current
- Line voltage
- Frequency

A top-up of the fuel oil tank with the specified grade of fuel oil shall also be included in the tender price.

The contractor/service provider shall provide a full set of operational and maintenance manuals and “As Fitted” drawings.

Spare Parts

Provide a schedule of all spare parts required with costs.

The generator supplier shall include in his bid for the supply of one complete set of spare filters. The filters shall be handed over to the Client when the generator is fully commissioned.

Warranty

The generator supplier shall guarantee the generator set and all associated equipment and systems for a minimum period of 12 months from the date of hand-over on site, and completion of the electrical installation.

Maintenance Proposal

Provide maintenance proposal for a 1-year period commencing at the beginning of the warranty period and providing preventive maintenance in accordance with the recommendations of the assembly manufacturers.

Tender Information

The Tenderer shall provide the following details with his tender in addition to full brochures and technical back-up details.

GENERATOR SYSTEM – SUPPLIER DETAILS	
Enclosure max. dimensions	(mm) (mm)
Oil Storage tank dimensions	(mm) (mm) (mm) (mm)
Assembly total weight	Kg.
Engine make & model	No.
No. of cylinders	cc.
Cubic capacity	
Compression ratio	
Aspiration	rpm
Engine speed	kW
Max. continuous power at fly wheel	kPA
BMEP	1/hy (cu.m/hr)
Fuel consumption	m ³ /min
Cooling air flow	DbA
Noise output @ 1m	
Deviations from specifications:	YES/NO

	Details
	YES/NO

- Safety, Health and Welfare at Work (general application) Regulations 2006.
- Irish / Harmonised European Standards
- IEC Publications
- British Standards
- CE marking directives
- European Safety Directives

The following shall be included as part of the tender submittal;

- Pre-delivery Inspection
- First fill of Lubrication oil
- First fill of Diesel oil
- First fill of Anti-freeze
- First fill of Lead-Acid into batteries
- Connection of batteries to engine starter
- Supply and fitting pipe work from oil storage tank to generator
- Delivery & Commissioning
- Delivery to site of generator
- Operator instruction on day of commissioning

Generator remote monitoring and starting function shall be provided as part of this contract.

6.12 Fuel Storage System

A new separate twin-walled fuel tank with leak detection is being provided in the adjacent Break Tank Plant Room as part of the separate 3rd Generator installation project. Include for providing new oil pipework etc. from this pipe to the new generators as required.

7. EARTHING

7.1 General Requirements

The objective of the system is to provide an effective system to minimise danger to life and equipment arising from:

- Faults between line conductors and non-current carrying metal work
- Accumulation of static charges

The design parameters are defined within the National Rules for Electrical Installations IS 10101.

Earthing connectors to pipes etc. shall be done in a neat manner and shall be aesthetically acceptable, preferably in an area where student access is restricted.

Earthing connectors shall be located where visual inspection and easy access is available. In doing so the Contractor shall take account of other services or disciplines which can influence earthing connector locations.

The Contractor shall provide driven rods for the earthing system to depth that will provide sufficient earth connectivity. Consideration shall be given to soil conditions. One or more electrodes shall be selected, depending on the soil condition and the maximum permissible value of impedance to earth. Specific reference shall be made to ET 101 section 542 on earthing arrangements.

These rods shall be driven a minimum of 10 metres away from the Main LV Switch room and within a maximum of 20 metres from the LV Switch rooms. A minimum of 120mm² cross sectional area G/Y cable shall be provided from the main earth bar within the LV switch-rooms to each of the driven earth rods outside.

The Contractor shall provide Insulated Matting / Carpet in front of all main and all sub-distribution boards to comply with the International Standard IEC 1111 cei env 6111 (Class 3) in conformity with ENEL Specification EA 0362. Matting shall be nominal thickness of 3mm, and have a maximum operating voltage of 26,500V. The Contractor shall include for a wooden trim around the perimeter of the matting to avoid the material lifting in the future, this perimeter trim detail shall be finished in bright yellow.

8. POWER DISTRIBUTION SERVICES

8.1 General Requirements

The objective of the system is to provide an efficient and effective system for the distribution and support of small power requirements.

The system requirements are as shown on the system drawings.

Final circuits shall be fed from local sub-distribution boards, as indicated on the system drawings.

8.2 General Services

Final circuits shall be wired in 20A radial circuits using 4.0mm² PVC singles enclosed in galvanised steel conduit and/or trunking. All circuits supplying socket outlets shall be individually protected by a 30 mA RCD and controlled via contactors. Type B MCB's shall feed final lighting and power circuits, with RCD protection on all socket outlets, all power and lighting circuits within bathroom/toilet areas and on all external lighting circuits. All final circuits leaving the building, either underground or via overhead shall be XLPE insulated, steel wire armoured, LS0H sheathed, BASEC approved cable.

No more than 4No. twin socket outlets shall be supplied from one 20A circuit. General services socket outlets shall be twin 13 Amp 2-pole and earth, and must comply with Part M of the Building Regulations with respect to visual contrast as well as all other requirements.

General services socket outlets shall be twin 13 Amp 2-pole and earth, and must comply with Part M of the Building Regulations. Unless otherwise stated, socket outlets shall have integral double pole switches incorporated together with interlocking shutters, separated isolation switches to avoid unintended selection of adjacent switch, and visual indication to highlight when switched on, as Legrand Synergy range or equivalent.

Socket outlets installed in plant or back of house areas shall be Metalclad finish.

Fused spur outlets shall be selected to match socket outlet finishes specified above and be provided at the rating indicated on the drawings, or as suited to the load being served.

9. LIGHTING SERVICES

9.1 General Requirements

The contractor shall include for replacing the lighting in the Switch / Transformer Rooms as part of the upgrade works.

Wiring for the general lighting installation shall consist of 3 x 2.5sq.mm LS0H PVC singles enclosed in galvanised steel conduit and/or trunking, from a 10A MCB in the local distribution board serving the area.

9.2 Lighting Specification

Luminaires shall be;

Internal

21-Watt surface mounted IP66 LED as Thorn Aquaforce Pro AQFPRO S LED2900-840 PC WB HF or equivalent.

External

15-Watt, IP65, IK10 vandal resistant wall mounting luminaire in anthracite (RAL 7016) with less than 2.5% ULOR. In polycarbonate body & cast aluminium back-plate as Thorn Piazza II LED or equivalent.

9.3 Emergency Lighting

The objective of the system is to provide an efficient and effective emergency lighting system meeting the requirements of IS 3217.

The emergency lighting shall consist of a combination of self-contained, non-maintained standalone LED luminaires, combined with maintained LED exit signs, as indicated on the system drawings. In the event of circuit power failure to the building the relevant switching circuits shall illuminate each emergency fitting for a min period of 3 hours. Exit signs shall stay maintained for a min period of 3 hours during power failure.

All lighting circuits shall have a switched live supply and an un-switched emergency supply with test facility emanating from the relevant distribution board concerned. Maintained exit luminaires shall be supplied via an un-switched emergency supply with test facility emanating from the relevant distribution board concerned.

Each emergency luminaire shall have a switching unit which shall automatically switch the luminaire to the emergency circuit in the event of local or mains power failure.

Where applicable wiring between emergency packs and luminaires must be in fire resistant PH120 enhanced rated cable.

BDP.

Emergency exit signs shall be "Type 1" Emergency Exit Signs when being installed within a new project. In the event that the project is an addition/extension to either an existing building or a campus, the emergency exit signs shall conform to those already installed throughout the building/campus.

The Contractor shall perform a 3-hour duration test on the emergency luminaires and provide the Engineer with at least 5 working days' notice of this test. A test/commissioning certificate in the format of the IS 3217 Model Form, must be submitted to the Engineer. A copy of the signed commissioning certificate and a copy of a client log book (The client log book must include all information as per model within I.S. 3217 Appendix D and E) must also be included in all O&M manuals.

To ensure appropriate servicing of the emergency lighting system is carried out from handover, the first year of servicing of the system is included within the scope of works in the tender package and that it is the responsibility of the Main Contractor to provide this service for the first year. After one year from practical handover the Client must exercise its responsibility to ensure a contract is in place for the servicing and maintenance of this life safety system.

9.4 External Lighting

The objective of the system is to provide sufficient lighting for safe movement of people outdoors.

All building perimeter lighting and local external lighting contained within the footpath surrounding the building shall be supplied from the main distribution board with Hand/Off/Auto control switching located in the LV switch room. All external lighting mounted below 2.8m AFFL shall be supplied via 10amp RCBO's in accordance with IS10101 Regulations.

9.5 Commissioning

The Lighting system shall be commissioned, tested, and demonstrated to the Design team and the employer. Test and Commissioning sheets for all rooms shall be issued to the employer's representative detailing that each and every area has been commissioned to the required parameters and the settings installed prior to handing over the building.

10. FIRE DETECTION AND ALARM SYSTEMS

10.1 General Requirements

BDP.

The design parameters for the equipment and cabling are those defined within IS 3218. The existing fire alarm system on the campus is a Masterfire system. Devices in any area being worked on shall be covered during the works and the loop serving that area shall be re-commissioned by the incumbent SJH Fire Alarm Specialist.

The fire alarm system must be fully compliant with EN54-13 as well as all other individual EN54 standards.

The fire alarm installation shall comply with the latest version of I.S. 3218, protection level L1.

All new fire alarm cabling shall be installed in the same manner throughout i.e. fire alarm cable tied to cable tray/trunking using non-combustible clips. All runs to devices shall be enclosed in galvanised steel conduit complete with brass bushings, connectors, glands, etc. All vertical fire alarm cable drops shall be installed in galvanised steel conduit and terminated at back boxes.

Wiring to device and sounder circuits shall be in 2-core 1.5 mm² PH120 enhanced rated cable, as Pirelli FP 200 Enhanced or equivalent cable to BS5839 Part 1.

Sounder beacon bases shall be provided in all rooms in which a separate wall mounted sounder is not shown on the services drawings. The electrical specialist shall make all allowances for the number of devices per loop in this regard.

To ensure appropriate servicing of the Fire Detection & Alarm system is carried out from handover, the first year of servicing of the system is included within the scope of works in the tender package and that it is the responsibility of the Main Contractor to provide this service for the first year. After one year from practical handover the Client must exercise its responsibility to ensure a contract is in place for the servicing and maintenance of this life safety system.

11. BUILDER'S WORKS

11.1 General

BDP.

The Contractor shall provide all builders work associated with the new and existing building services installation necessary for a functionally complete installation, including but not limited to; openings in structure, holes, penetrations, bases, plinths, support steelwork, and trenches etc.

The Contractor shall ensure that all new a new and existing penetrations into the switch room are made good, sealed and watertight to prevent water ingress.

The Contractor shall allow for a new rubber matting to be installed in front of the new main LV switchboard.

The Contractor shall provide a new reinforcing earthed steel mesh cover for the floor trench.

The Contractor shall clean out and remove all dirt and debris from the rooms.

The Contractor shall supply and install a new ESB type galvanised steel door set with louvres and door frame in the existing MV switchrooms.

The switchroom internal walls and ceiling shall be coated with a polybond sealer prior to painting with two coats of white emulsion paint.

The floor shall be painted with a red or grey coloured moisture curing polyurethane coating for sealing and dust proofing the floor.

11.2 Water Ingress Protection

The Contractor shall provide a cable sealing system for all new and existing external duct chambers to prevent water ingress.

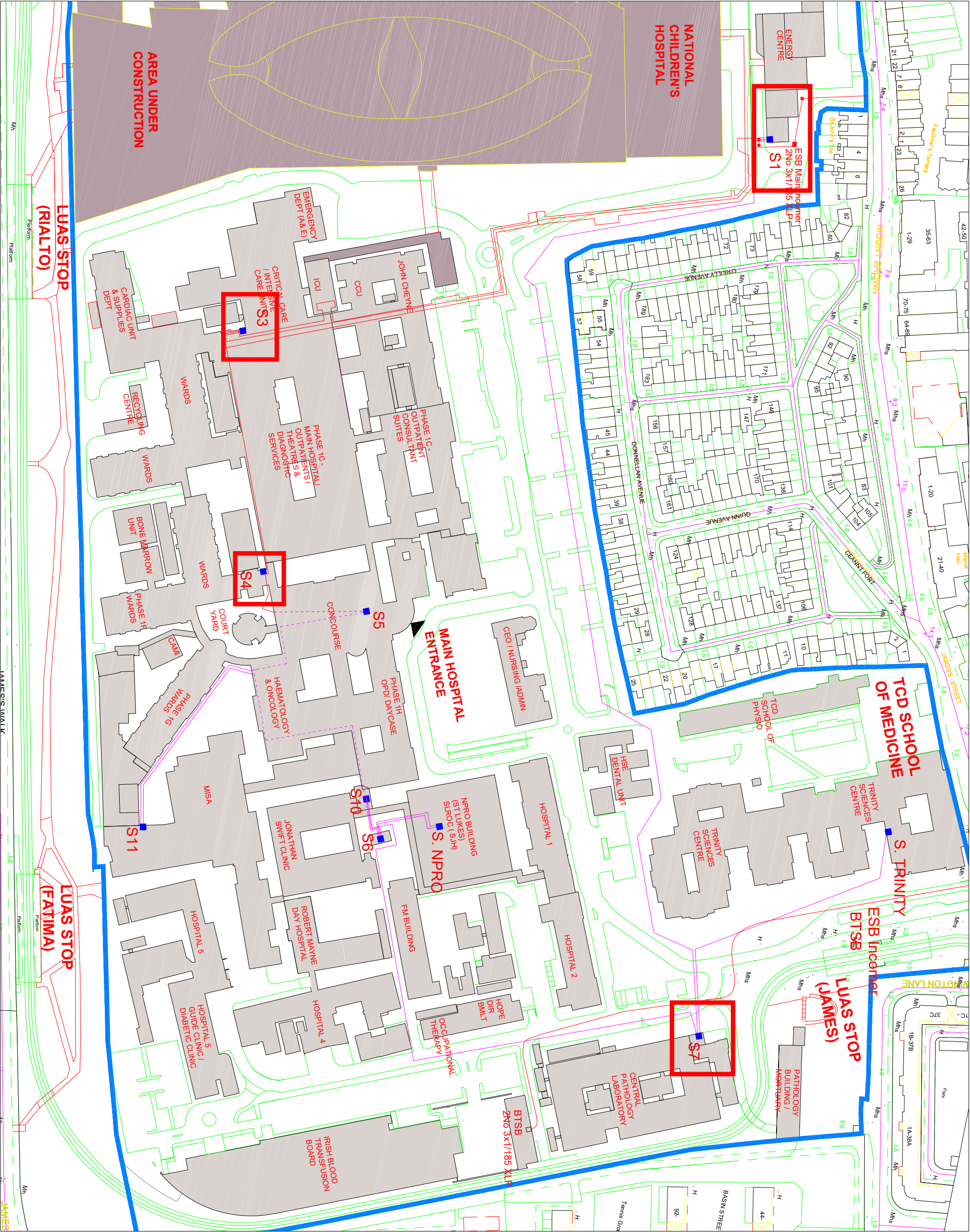
The cable sealing system shall be by Roxtec or equivalent as per the image below.



Appendix A – Site Location map

- NOTES:
1. ALL DIMENSIONS TO BE CHECKED ON SITE. WORK TO BE COMPLETED WITHIN THE SPECIFIED TIME FRAME.
 2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND DISSEMINATING ALL DISSEMINATIONS TO THE CAPITAL PROJECTS OFFICE.
 3. PROPRIETARY ITEMS SHALL BE FIXED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF STRUCTURE, FINISHES AND SERVICES.

SITE LOCATIONS



INFORMATION

SH CAPITAL PROJECTS OFFICE
ST. JAMES'S HOSPITAL
DUBLIN 8

CLIENT: THE BOARD OF ST. JAMES'S HOSPITAL

PROJECT: DEVELOPMENT CONTROL PLAN
EXISTING CAMPUS SERVICES

DRAWING: EXISTING MV ELECTRICAL NETWORK
SITE CAMPUS PLAN

STATUS	JOB NO.	SCALE	REVISION
S2	102251	1:1000@A1	P01

DRAWING NUMBER: DCP-INF-ZZZ-L00-DR-S-JH-PM-0001

FILE NAME: C:\Users\159871\Documents\Documents\102251\

Appendix B – LV Switchboard Main Schematic

NOTES

ALL INFORMATION WITHIN THESE DRAWINGS IS THE INTELLECTUAL THE PROPERTY OF BDP AND SHALL ONLY BE USED FOR THE PROJECTS AND PROJECT STAGES WITH APPROVAL FROM BDP.

DO NOT SCALE FROM THIS DRAWING WITHOUT CONFIRMING WITH BDP. CHECK ALL DIMENSIONS ON SITE AND ENSURE EQUIPMENT FITS PRIOR TO ORDERING.

THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTATION. INCLUDING DRAWINGS FROM OTHER PROFESSIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THE MECHANICAL AND ELECTRICAL SERVICES AND THEIR CO-ORDINATION WITH ALL OTHER BUILDING ELEMENTS.

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTATION

2. CO-ORDINATE MECHANICAL AND ELECTRICAL SERVICES AND THEIR CO-ORDINATION WITH ALL OTHER BUILDING ELEMENTS PRIOR TO INSTALLATION

3. MAIN INCOMING ACB/MCCB SHALL HAVE A RATED PROSPECTIVE SHORT CIRCUIT CURRENT OF NOT LESS THAN 40 KA AT A POWER FACTOR OF 0.2, AND SHALL BE TESTED TO P2 CATEGORY IEC157-1

4. MAIN INCOMING ACB TO BE 4 POLE WITHDRAWABLE ACB - TYPE ABB SACE EMAX WITH PR111 MICROPROCESSOR TRIP UNIT, OR EQUAL AND APPROVED. SUB-FEEDERS TO BE 4 POLE MCCB'S - TYPE ACC SACE ISOMAX S WITH THERMOMAGNETIC RELAYS (T ADJUSTABLE, M FIXED 5 X ITH), OR EQUAL AND APPROVED

5. BUSBARS SHALL BE HDHC COPPER OF UNIFORM CROSS SECTION AND SHALL COMPLY FULLY WITH BS 159. THE BUSBAR SYSTEM SHALL BE TYPE TESTED IN ACCORDANCE WITH IEC 439 AND BE CAPABLE OF CARRYING THE CONTINUOUS LOAD CURRENT AS SPECIFIED ELSEWHERE IN THE DOCUMENT

6. BUSBAR CONNECTIONS UP TO 63 AMP MAY BE EFFECTED BY MEANS OF CABLE, BRACED AND SUPPORTED AS NECESSARY. WHEREAS CONNECTIONS ABOVE 63 AMP SHALL BE MADE BY MEANS OF HDHC RECTANGULAR SECTION COPPER BUSBAR, INSULATED AND SUPPORTED AS NECESSARY.

7. TIME SWITCHES SHALL BE 7 DAY, 24 HOUR TYPE. COMPLETE WITH DAY OMISSION AND 36 HOUR SPRING RESERVE.

8. INSTALLATION RADII ON MEDIUM VOLTAGE CABLING SHALL BE AS LARGE AS POSSIBLE AND SHALL IN NO INSTANCE BE LESS THAN 18 TIMES THE OVERALL CABLE DIAMETER.

9. APPROVAL/COMMENT /VERIFICATION OF WORKING OR MANUFACTURING DRAWINGS SUBMITTED BY THE CONTRACTOR SHALL NOT IN ANY WAY RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITY IN RESPECT OF THE ACCURACY OF ALL SUCH DRAWINGS NOR FROM THEIR RESPONSIBILITY FOR PROVIDING EQUIPMENT SUITABLE IN DIMENSIONS, CONSTRUCTION AND FINISH FOR THE LOCATION IN WHICH IT IS TO BE INSTALLED

	EARTH PIT
	AIR CIRCUIT BREAKER
	FUSE
	MCCB
	CT METER
	LAMP
	VOLTAGE TRANSFORMER
	MULTIFUNCTION METER, DIRIS A40 COMPLETE WITH MODBUS COMMUNICATION

T01	DRAFT - TENDER ISSUE	LVS	BMG	24/03/2025
2A	STAGE 2A RE-ISSUE	LVS	BMG	14/02/2025
2A	STAGE 2A ISSUE	LVS	BMG	31/01/2025
REVISION	DESCRIPTION	DRAWN	CHECKED	DATE

Blackhall Green
Dublin 7
Ireland
T +353 (0)1 474 0600
www.bdp.com

BDP.

PROJECT TITLE
ST. JAME'S HOSPITAL ELECTRICAL INFRASTRUCTURE UPGRADE

DRAWING TITLE ENERGY CENTER DB REPLACEMENT	SCALE @ A1 NTS
DATE MAY 06	

PROJECT NUMBER P3004408	DRAWING NO. (6-)E001	REVISION T01
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