



**YGG Tregelles
New Build Primary School**

**Mechanical and Electrical
Engineering Systems**

MEP Strategy Report

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1. INTRODUCTION

This report has been prepared for Knox and Wells LTD (K&W) and represents the outline design principles at the end of the RIBA 2 stage. The MEP principles are to be developed in more details through the RIBA work stages.

K&W has an agreement with Neath Port Talbot Council to demolish an existing school block and construct a replacement block at Tregeles Primary School, Neath.

K&W will design and build a new primary school block consisting of the below:-

- 5no Classrooms
- Main Hall
- Group Rooms
- Staff Room
- Hygiene / WC facilities
- Ancillary spaces

The proposed location of the new replacement block will be behind the existing main school building on the adjacent field. The works will involve isolating the existing M&E incoming services to the existing block in preparation for the building to be demolished, with new / reconfiguration of the existing utility services to serve the new block. The existing main school building shall remain operational throughout the works.

The site shall also be provided with demountable units to provide a temporary staff room and an additional garden room during the construction period. It is proposed that the temporary staff room will be removed post-completion and that the additional external classroom shall be retained following the construction of the new teaching block. The temporary staff room and garden room shall be provided with new water, electric, fire alarm and intruder alarm supplies as part of the works.

2. REGULATIONS, CODES & STANDARDS

The Mechanical, electrical and Public Health (MEP) design shall comply with all relevant UK and European legal and statutory requirements including Town and Country Planning Regulations, Building Regulations, Construction Design and Management Regulations, Health and Safety at Work Act and the Environmental Protection Act unless otherwise agreed. Where items are not specifically covered by the relevant specialist documents reference will be made to the CIBSE publications and relevant British Standards and Codes of Practice.

The MEP design shall in accordance with, but not limited to, the following key documents and design standards and sources of reference:

- Chartered Institute of Building Services Engineering Guides (CIBSE).
- Building Regulations.
- Building Bulletins.
- Relevant British Standards.
- BS7671 Requirements for Electrical Installations.

- Electricity at Work Act.
- Health and Safety at Work Act.
- BS EN 806: Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – specification.
- BS EN 12056: Gravity drainage systems inside buildings
- CIBSE TM 13: Minimising the risk of Legionnaire’s disease.
- The Water Regulations

3. PLANNING, BUILDING REGULATIONS & SUSTAINABLE DESIGN

3.1. PLANNING

There will be a requirement to get local authority planning approval for all issues including MEP external louvres, MEP plant enclosures etc.

3.2. BUILDING REGULATIONS

The building shall be designed to comply with the latest Building Regulations Approved Documents.

3.3. SUSTAINABLE DESIGN

The development will be designed to reflect the demand for energy required to support the environmental services and additionally conserve and use energy to the maximum extent practicable.

The mechanical and electrical systems shall be designed where practicable using the latest techniques for 'active and passive' energy conservation and heat recovery. It is envisaged that inefficient MEP systems are to be replaced with high energy efficient plant to reduce energy usage and minimise CO₂ emissions.

A three-stage approach shall be adopted to the design of the building and its associated mechanical and electrical systems. These three stages are:

- Passive design - reduce the need for energy.
- Supply energy efficiently.
- Use of renewable technologies.

The passive design stage is critical to achieve a low energy building as it looks to reduce the need for energy to be generated in the first instance. During the initial stages of development close attention shall be paid to co-ordinating and integrating the design to:

- Consider orientation form and internal layout to optimize the design considering planning and operational requirements and the site constraints.
- Provide the potential for natural ventilation where practical (reducing requirement for mechanical services.
- Reduce direct solar gain to reduce the energy consumption for comfort cooling or air conditioning.
- Improve daylight factors in all areas.

Following the passive design stage, we will consider options to reduce the energy use and to use and recover energy efficiently, for example:

- Highly efficient lighting systems (including LED) and appropriate artificial lighting levels and lighting controls to increase efficiency.
- Building metering to monitor energy usage of MEP systems.
- MEP control strategies to improve the utilisation of plant and systems.
- Strategies to improve control and flexibility of the installations including provision of local user controls.
- Energy efficient equipment including the use of premium efficient motors with variable frequency drives where practical (e.g., fans, pumps etc.)
- High efficiency energy recovery for ventilation system where practical.
- Low velocity pipework and ductwork and low-pressure air filters to reduce fan and pump power consumption.

3.4. BREEAM

‘Red Six’ has been appointed to prepare the pre-assessment report to assess the maximum potential BREEAM score and rating for the proposed development at YGG Tregeles. The building has been targeted to achieve an overall BREEAM Rating of ‘Excellent’.

The table below has been extracted by from Red Six’s Design Stage Report issued on 18/02/2026 which indicates the current targeted potential and achieved scores for the project based on the provisional target BREEAM rating and score agreed. *Note, the report hasn’t been updated since the initial calculations:*

Environmental Section	Credits Targeted	Credits Targeted (%)	Potential Credits	Potential Credits (%)	Credits Achieved	Achieved Score (%)
Management	20	10.48	20	10.48	0.00	0.00
Health & Wellbeing	14	10.89	14	10.89	0.00	0.00
Energy	17	12.95	19	14.48	0.00	0.00
Transport	6	5.00	7	5.83	0.00	0.00
Water	6	5.25	6	5.25	0.00	0.00
Materials	12	12.86	14	15.00	0.00	0.00
Waste	8	4.80	9	5.40	0.00	0.00
Land Use & Ecology	5	5.00	6	6.00	0.00	0.00
Pollution	11	7.33	11	7.33	0.00	0.00
Innovation	2	2.00	4	4.00	0.00	0.00
TOTAL	101	76.56	110	84.66	0.00	0.00

Table 1- BREEAM Score Summary Table (extracted from Red Six’s Design Stage Report)

3.5. ENERGY METERING

Energy metering shall be provided as required by the Building Regulations and arranged to provide individual readings for all major energy sources in accordance with Approved Document Part L2 Wales.

All energy sub-meters shall have an output facility to enable connection to the Building Energy Management System (BEMS).

BMS controllers shall be provided to the main plant areas to allow for connection to a site wide and remote BMS system. The BMS shall be used to monitor, record and store energy metering data for the following:

- Mains Water Usage & Leak Detection
- Hot Water Generation
- Space heating/cooling
- Mechanical Ventilation
- Lighting
- Small Power

3.6. THERMAL MODELLING

A thermal model of the building will be produced by Red Six using IES Virtual Environmental Software. The preparation of the thermal model input data shall consist of the following:

- Specification of building location and weather data.
- Specification of building element data (properties of building fabric)
- Zoning of the building.
- Specification of room data.
- Specification of HVAC systems for particular zones.

The main aim of the thermal modelling simulation is to provide an initial idea of the level of compliance about Approved Document Part L of the UK Building Regulations at the preliminary stage of design.

The thermal model will also aid with conducting the BREEAM assessment for the project for energy related credits and calculating energy demand loads for the building.

4. INCOMING SUPPLIES

4.1. GAS

The site is currently provided with a natural gas supply serving 2No. gas-fired boilers within the external boiler house, adjacent to the existing main school building.

This system will be retained as part of the works, to continue providing the heating demand to the existing building. Consideration has been made to remove the boilers and heat the existing and proposed teaching block via air source heat pumps, however it has been decided by the Client that this will be excluded at this stage.

Should the existing gas installations within the building be removed the gas meter would also be removed and the supply to the site disconnected.

4.2. WATER

The mains cold water supply to the site currently enters the existing main school building within the childcare WC room behind an accessible Integrated Plumbing System (IPS) where it serves all mains cold water outlets and electric hot-water storage heaters for the existing main school building and existing teaching block.

It is proposed to retain this water supply to continue serving the existing main school building, however as part of the demolition works, the trenched supply to the existing teaching block shall be isolated, drained and removed.

Additional branched supplies shall be provided to serve the proposed new teaching block, temporary demountable staff room and garden room. The new branched water supplies will need to be trenched to each building. Following the completion of the works, the temporary supplies to the demountable staff room will be removed.

4.3. ELECTRICITY

National Grid (NG) is the local network operator. They have recently upgraded the existing school supply to 160A / 110kVA Three Phase, the work was carried out as part of the existing school’s kitchen upgrade in 2023.

The incoming supply from NG terminates in the existing boiler house which contains the meter and Cut-Out.

It is proposed to retain the existing incoming supply and split the outgoing supply to the existing school Panelboard to serve the existing school and new classroom block.

4.4. TELECOMMUNICATIONS

An existing telecommunication service enters the existing building within Classroom 3. Within this classroom there are 2no data cabinets.

It is proposed that the existing comms link will remain with a Fibre optic link into a new data cabinet within the new teaching block.

5. MECHANICAL & PUBLIC HEALTH ENGINEERING SYSTEMS
5.1. MECHANICAL SERVICES DESIGN CRITERIA

The key design criteria for the Mechanical Services are listed below:

External Design Criteria

External design criteria shall be based on recorded data for the nearest area to the site.

Summer

External Summer Design Conditions

Parameter	Temperature
Fresh air temperature/fabric gains	30.3°C (db), 20.8°C (wb)
Maximum Air temperature for condensers	35°C (db)

Winter

External Winter Design Conditions

Parameter	Temperature
External winter design temperature	-5.0°C (db), -5.0°C (wb)

Fresh Air Criteria

Minimum Fresh Air Requirements

Paramater	Minimum Flow Rate	Reference
Fresh Air	5 l/s/person 8 l/s/person (purge only)	CIBSE Guide B Building Bulletin 101

Internal Design Criteria

Room environmental criteria shall be in accordance with the table below, Building Regulations and BB101.

Area/Room	Min. Winter Temperature (°C)	Max. Summer Temperature (°C)	Noise Level (NR)	Reference
Classrooms	19 - 21	21 -25	30	CIBSE Guide A & B Building Bulletin 93 & 101
Office/Admin Areas	19 - 21	21 -25	35	
Main Hall	19 - 21	21 -25	45	
WC/ Hygiene Rooms	19 - 21	Uncontrolled	45	
Circulation Spaces	19 - 21	Uncontrolled	35 - 45	
IT Server Room	18 - 23	18 - 23	35	
Plant Room	10	Uncontrolled	65	
Stores	16 - 18	Uncontrolled	50	

Public Health Design Criteria

The public health services will be designed in accordance with, but not limited to, the following design standards and sources of reference:

- The Building Regulations.
- The Local Authority Requirements.
- BS EN standards.
- The Model Water Supply Byelaws.
- BS EN 806: Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages - specification.
- BS EN 12056: Gravity drainage systems inside buildings.
- CIBSE TM 13: Minimising the risk of Legionnaire’s disease.
- The Water Regulations.

5.2. ENABLING WORKS - MECHANICAL

The contractor shall allow to isolate and remove the existing incoming services to the existing teaching block that is being proposed for demolition:

- Incoming mains water supply
- LTHW circuit from external plant room

The contractor shall allow for new water supplies to the temporary staff room and garden room.

5.3. ABOVE GROUND DRAINAGE

New below ground drainage connections will be required across the site to provide new above ground drainage to the new teaching block, temporary staff room and garden room. Above ground drainage shall be designed and provided under the primary ventilated system method, in accordance with BS EN 12056-2. Ventilated stacks shall be grouped where feasible and extended to the roof with a suitable roof cowl, to limit the number of penetrations through the roof.

The sanitary plumbing system shall be arranged so that is accessible and maintainable with minimum disruption to the running of the building.

All items of mechanical plant and condensate from ventilation systems and heating/ cooling systems shall be connected to the above ground drainage system.

Foul drainage shall be routed throughout the building by gravity utilising a series of horizontal and vertical soil and vent pipes. Vertical soil and ventilation pipework shall generally be routed in service risers, integrated plumbing systems or boxed out service voids and connect to the below slab drainage system.

Drainage shall be routed to avoid running about the MRI RF cage as water leakage can cause considerable damage to the integrity of the cage.

5.4. DOMESTIC WATER SERVICES

The existing main school building is currently provided with a mains water supply entering the building within the Childcare WC area. It is proposed that a new supply shall be provided to the new teaching block, temporary staff room and garden room. The new water connections shall be trenched from the existing external main water meter to each building, in line with the NJUG Guidelines on the Positioning and Colour Coding of ‘Underground Utilities’ Apparatus and Dwr Cymru Welsh Water Guidelines for new water connections.

The new mains water supply shall enter each building in the following location:

- New Teaching Block – Plant Room
- Temporary Staff Room – Kitchenette
- Garden Room – Entrance Lobby

There will also be an additional supply from the incoming mains water pipe to serve an external bib tap located in the external bin store. The pipework shall be trenched over to the bin store from the new teaching block where the pipework shall be trace heated. The new connection will be supplied to a CAT 5 break tank located within the bin store to provide wash down facilities.

Currently, it is assumed that the mains water pressure and flow rate to the site currently is sufficient to accommodate the new teaching block, temporary staff room and garden room. However, it is

recommended that a mains water pressure test is conducted to determine whether a mains water storage tank is required for the site.

The mains water supply to the new teaching block and garden room be provided with a pulse meter to monitor water consumption, trigger alerts for major leaks and track usage. The pulse meter shall connect to the Building Management System (BMS). The mains water supply shall also branch off to serve the external CAT5 tank within the external refuse store to provide wash down facilities. The mains water supply shall also connect into a CAT5 tank and booster within the plantroom that shall provide the CAT5 water services system to serve all external bib taps for external play purpose. The number of external bib taps shall be agreed with the Client during RIBA Stage 4 design works.

The domestic hot water system for the new teaching block, temporary staff room and garden room shall consist of localised electric hot water storage heaters as the primary method of heat generation. The system shall store the water at 60°C, and ensure water is distributed and provided to the outlets at 55°C. These shall be located within integrated plumbing systems, service voids or within cupboards to serve all hot water outlets. To ensure correct operation of the system, temperature sensors shall be provided within the storage heaters where they will be monitored and alarmed by the BMS.

Electric showers shall be used within hygiene spaces, which shall allow for close temperature control via thermostatic mixing valves.

The hot water system shall be provided with thermostatic mixing valves to ensure the water temperature at point of use does not present a scalding hazard. Outlet temperatures shall be limited to 43°C.

5.5. HEATING SYSTEMS

New Teaching Block

Space Heating within the new teaching block shall be generated via external Air Source Heat Pumps (ASHP’s). The location of the ASHP’s shall be determined following the landscaping design of the car park/ entrance to the site and confirmation of roof design. The ASHP’s shall be located as close to the plant room as possible and to be secured within a lockable enclosure.

The ASHP’s shall be arranged in a cascade configuration, where the units will modulate depending on the heat load required for the building. The ASHP’s shall be located at the rear of the building within the ‘service yard’ where units shall be mounted on the plantroom/ classroom wall. ASHP’s shall be double-stacked to save space within the service yard.

The ASHP Low Temperature Hot Water (LTHW) circuit shall feed into a buffer vessel within the plant room to prevent short cycling of the ASHP system, provide hydraulic separation, facilitate defrost cycles and maintain minimum system volume for the heating system to operate efficiently. The systems shall be linked back to the BMS for fault and monitoring purposes.

The buffer vessel shall be provided with multiple ports to provide the LTHW circuit that will connect into the proposed Mechanical Ventilation Heat Recovery (MVHR) units and multiple underfloor heating manifolds across the building. These manifolds will typically be located within storerooms/ plant areas.

Once the heat losses have been calculated from the thermal model, it is proposed that the majority or all the heating demand can be met by the underfloor heating system, however, MVHR units serving classrooms and the main hall shall be provided with an LTHW coil temper the incoming air to further raise the supply temperature if there is a shortfall from the underfloor heating system.

The underfloor heating manifolds will have independent controls dedicated to their respective zones, that will be linked to individual floor sensors per room served, which will allow the manifold to adjust its heat output. The thermostats are to be pre-programmed, where the temperature ranges are to be set and can only be altered by approved personnel. It is proposed that '5/2' programming is utilised meaning that the temperature requirements can be set differently at weekend. The thermostat shall be tamperproof, either locked behind Perspex casing or integrated as part of the controller itself.

The thermostats can be connected to a master controller that controls the pump and actuators/valves at the manifolds. The master controller also gives an on/off signal to the air source heat pumps, so that air source heat pumps can modulate down to the required temperature range.

Overdoor heaters shall be provided on the scheme, where external doors may be used frequently throughout the day, such as classroom doors leading into external play areas and entrance/ exit doors at each end of the corridors and main hall external doors, to stop cold draughts entering the building. The main entrance doorways to the building will require a door air curtain. Overdoor heaters shall come complete with a built-in tamperproof thermostat set on installation. In addition, the overdoor heater shall be fitted with a simple door sensor or compatible PIR sensor to provide energy savings in line with usage patterns. The overdoor heater will also be provided with a run-on facility to give an additional heating period to counter any cold air introduced through the door when opened. The door air curtains will be complete with thermostatic controller, including connection to the BMS for fault diagnostics and temperature set point adjustment.

Temporary Staff Room & Garden Room

Space Heating within the temporary staff room and garden room shall be generated via electric panel heaters. The panels heaters shall be provided with:

- Electronic thermostat
- 7-day programmable user timer
- LED display
- BMS Compatibility
- App Controllability

The heat load within these units will also be supplemented via the MVHR units. Electric heater batteries shall be provided to temper the incoming air and re-heat the air on the supply duct.

5.6. COOLING SYSTEMS

Once heating and cooling loads from the thermal model have been calculated, it is anticipated that there will be very minimal cooling required for the new teaching block, temporary staff room and garden room.

It is anticipated however that cooling may be required for the new IT Server Room within the new teaching block to offset IT and equipment gains. To try and mitigate the need for cooling systems, it is proposed that the IT room could be provided with dedicated extract ventilation to purge the room of heat when temperatures start to rise above acceptable levels. Failing this, an independent cooling system shall be provided to the IT Server room via an external condenser unit which shall provide cool air through ceiling mounted cassette or wall-mounted units. The systems shall be linked back to the BMS for fault and monitoring purposes. This will be developed during RIBA Stage 4 following a review of anticipated IT equipment loads.

5.7. VENTILATION SYSTEMS

Classrooms, Staff Rooms and Group Rooms

The proposed method of ventilation for the new classrooms, staff rooms and group rooms is via localised Mechanical Ventilation Heat Recovery (MVHR) units. The MVHR units will be concealed within the ceiling void local to the space in which they serve. The MVHR units shall extract air containing CO₂, moisture, and pollutants from the classroom through ceiling grilles, recover the heat from the extract warm air as it passes through a heat exchanger, where the heat is transferred to the incoming air stream without mixing the two air flows, to recover approximately 80-85% of the thermal energy and then be provided back into the room via supply diffusers.

With regards to the classrooms, each MVHR unit shall be provided with CO₂ sensors that shall increase the air flow rate to the space to ensure CO₂ levels are compliant with BB101 criteria.

Each MVHR unit shall also be provided with LTHW coils to utilise the proposed LTHW system in the building to further temper the air before reaching the room.

The arrangement of the components within the air-handling unit will ensure that the exhaust system will not contaminate the incoming supply air.

The MVHR units will have the following components:

- Motorised Intake, Exhaust, Supply and Extract
- G4 Panel Filters.
- Electric/ LTHW Frost Coil to protect the filters.
- LTHW Heating Coil
- Plate heat exchanger
- Direct drive fans.
- F7 Bag filters
- Duct mounted attenuators to reduce noise, where required.

Intake and Exhaust air to and from the MVHR units shall be through ductwork suitably selected to connect to external, wall mounted louvres. Supply and Extract ductwork shall be distributed from the MVHR units within the ceiling void to ceiling/wall mounted diffusers and grilles.

Ventilation rates for teaching spaces are to be in accordance with Building Bulletin 101, Part F of the Building Regulations and CIBSE guidance.

All MVHR units shall be linked back to the BMS for fault and monitoring purposes.

Main Hall - Air Handling Unit

The proposed method of ventilation to the main hall shall consist of a centralised Air Handling Unit located adjacent to the main hall externally in a secure ‘service yard’.

The air handling unit shall extract air containing CO₂, moisture, and pollutants from the main hall through duct-mounted extract grilles located approximately 5.5m within the hall and recover the heat from the extract warm air as it passes through a heat exchanger, where the heat is transferred to the incoming air stream without mixing the two air flows, to recover approximately 80-85% of the thermal energy and then be provided back into the room via supply diffusers.

The air handling unit shall be provided with CO₂ sensors that shall increase the air flow rate to the space to ensure CO₂ levels are compliant with BB101 criteria.

The air handling unit shall also be provided with LTHW coils to utilise the proposed LTHW system in the building to further temper the air before reaching the hall.

The arrangement of the components within the air-handling unit will ensure that the exhaust system will not contaminate the incoming supply air.

The MVHR units will have the following components:

- Motorised Intake, Exhaust, Supply and Extract
- G4 Panel Filters.
- Electric/ LTHW Frost Coil to protect the filters.
- LTHW Heating Coil
- Plate heat exchanger or thermal wheel
- Direct drive fans.
- F7 Bag filters
- Duct mounted attenuators to reduce noise, where required.

WC and Hygiene Rooms - Extract Fans

WC and hygiene rooms shall be provided with local extract ventilation systems. The extract fans are to be located within the ceiling voids, local to the space in which it serves. Stale air will be extract from the space via extract grilles/ disc valves and shall be ducted to the external façade and out to atmosphere via external weather louvres.

The extract fans shall run to provide continuous background extract ventilation and shall also be linked to the lighting PIR/ occupancy sensor to provide boost ventilation when the space is in use. The extract fans shall be linked back to the BMS for fault and monitoring purposes.

6. ELECTRICAL ENGINEERING SYSTEMS

6.1. ELECTRICAL WORKS

The design criteria for the electrical services shall be in accordance with the latest edition (including all amendments) of the following design standards and sources of reference:

- The Building Regulations
- The Local Authority Requirements
- The Local Utility Company Requirements
- IEE wiring regulations (BS 7671)
- All relevant British Standards
- All relevant CIBSE Guides
- Building Bulletins

6.2. ENABLING WORKS - ELECTRICAL

The contractor shall allow to isolate and remove the existing incoming services within the existing block to be demolished:

- Incoming Power Supply (Fed from existing LV Panelboard within Existing main school building)
- Comms connections back to existing cabinet within Main school building
- Fire Alarm connection with existing main block

The contractor shall allow for new Power and Comms to temporary Classroom and staff room.

- 80A SPN supply to each building fed via existing MCCB Panelboard within main existing school building
- New ductwork for comms and fire alarm connection from existing main school block to temporary buildings

6.3. MAINS POWER

The existing school is supplied via a 160A Three Phase supply located within the existing boiler house. A load assessment has been undertaken for the existing school with the addition of the new block. The Load assessment shows that the required capacity for site will be 140A / 98kVA, this will leave circa 12.5% Spare capacity.

It is proposed that the existing 160A supply located within the existing boiler room shall be used to serve the new school block. The existing submain to the existing school Panelboard shall be terminated into a new 250A busbar chamber located within the existing boiler room.

The New busbar chamber will serve the following:

- Existing School Panelboard
- New School block Panelboard
- Sprinklers

- Surge protection

A new incoming 250A MCCB panel board (MDP) shall be provided to supply services within the new classroom block.

This new Panelboard will be in the Plantroom and feed:

- DBLP1 Classroom split load Lighting & Small Power Distribution Board
- DBLP2 Admin / Hall split load Lighting & Small Power Distribution Board
- Mechanical Distribution Board
- External Lighting & Power Distribution Board
- Comms Room Distribution Board
- Fire Alarm Panel
- PV Supply
- Surge protection

An allowance of 25% spare for future shall be allowed on all boards the panel board in terms of spare outgoing ways. All outgoing ways on the main panel board shall be provided with energy metering in line with building regulations.

Surge protection will be provided in all areas where electrical distribution feed external services.

6.4. CONTAINMENT

Segregated containment systems shall be provided for each of the following systems with the appropriate wiring system as indicated.

Systems	Containment Type	Wiring System
Mains and sub mains distribution	Galvanised steel tray	XLPE/SWA/LS0H
Small power & lighting final circuits	Galvanised steel basket feeding conduit to outlet positions	6491B LS0H Cabling
Telecommunications	Galvanised steel basket feeding conduit to outlet positions	Cat 6 cabling
ELV Systems (Security/BMS/CCTV)	Galvanised steel basket feeding conduit to outlet positions	As system requirements
Fire Alarm	Galvanised steel tray or clipped direct as appropriate	Soft skinned enhanced as defined by BS5839

6.5. EARTHING & BONDING

A complete earthing and bonding network shall be provided to comply with BS 7430 and the IEE Wiring Regulations (BS 7671).

Main earth bars shall be installed in Plantroom adjacent to the LV Panel board.

The earthing system shall also comprise circuit protective conductors, equipotential bonding to all incoming services, bonding to all extraneous metalwork, ventilation ducts and mechanical services pipework, UPS system earth, bonding to the lightning protection system and earth electrode pits.

6.6. SMALL POWER

General small power and ancillary services will be provided to suit the room function and user requirements. Final numbers of outlets are to be agreed with the users and clarified on small power strategy drawing.

Generally, all accessories are to be of a metal finish in plant areas and Main Hall with charcoal plastic finish in Classrooms / Admin Areas.

6.7. LIGHTING

The installation shall generally use high efficiency LED technology and PIR detectors, photocells and variable output drivers where appropriate. The lamp colour temperatures and associated colour rendering quality shall be selected to suit the function of the space.

General illumination and emergency lighting levels shall be provided as recommended by CIBSE with colour corrected lamps used where required. Artificial lighting shall be selected and designed to control glare.

The lighting installation shall be designed to be functional in use, to aid safe movement around the building. Where possible the artificial lighting shall be designed in conjunction with the available natural daylight to provide comfortable, warm and welcoming spaces that minimise energy consumption.

Emergency lighting shall be provided throughout the building. The emergency lighting system shall provide a safe means of escape from the building in the event of an emergency and failure of the normal lighting system. Escape lighting shall be provided to all primary exit routes, both internally and externally.

Self-contained emergency LED luminaires shall be used complete with integral 3-hour battery packs.

Generally, the lighting will be based on the following table and the strategy drawings.

	Lighting					Lighting Control				Emergency
	Lux Level	Recessed Downlight	Recessed modular	Surface batten	High bay	On/OFF manual	Dimmable	Presence detection	Absence detection	Lux Level
Classroom	300		☐			☐	☐		☐	0.5
Group Room	300		☐			☐	☐		☐	0.5
WC's	200	☐						☐		0.5
Hall	300				☐	☐	☐		☐	0.5
Office	300		☐			☐	☐		☐	0.5
Staffroom	300		☐			☐	☐		☐	0.5
Circulation	100	☐						☐		1
Plantroom	200			☐		☐				15
Store	100			☐				☐		0.5
Hygiene Room	200	☐						☐		0.5
Server Room	200	☐						☐		0.5

Dimmable lighting is to be provided in the classrooms. Override Switches must be located adjacent to the teacher’s desk and entrance door.

All lighting shall be based on Thorn or equal and approved.

6.8. EXTERNAL LIGHTING & CONTROLS

External perimeter lighting shall provide a good level of ambient lighting particularly around external entrances for security purposes. The external lighting shall be controlled via photocells and time switches. Light pollution will be minimised.

In general, external lighting shall consist of building mounted circular bulkhead luminaires with restricted upward light emission. The external lighting shall be designed in accordance with the confines of the existing site restrictions and limitations.

The carpark shall be provided with LED lighting columns controlled via integral photocells and presence detection. All lighting columns shall be linked so they are switched as a group. They shall be provided with the ability to be overridden via a hand held controller.

All external lighting shall be 2700k to minimise impact to wildlife.

6.9. TELECOMMUNICATIONS

The existing data cabinets are located within classroom 3 within the existing building. The contractor shall allow for 2x 8 Core OM3 fibre optic cables from the existing cabinet to a new 800x600 42u Data cabinet located within the new server room with the new classroom block.

The new data cabinet will be provided with an 8-module power supply unit and complete with vertical and horizontal cable management system with strain relief every 150mm. The cabinet shall contain 8no 24 way 1u patch panels with cable management after every second patch panel.

ICT distribution to outlet locations shall be via Cat 6 cabling to RJ45 outlets at appropriate locations.

All electronic switches, fibre switches and Wi-Fi shall be provided by NPT IT Department and will be installed by the contractor. All patch cabling to be carried out by NPT IT Department.

6.10. FIRE ALARM

A new Advanced MX Pro 5 fire alarm system will be provided throughout the new classroom block.

The fire alarm system shall be an analogue addressable fire alarm system, which shall be designed to comply with BS5839: Part 1 and Building Control.

The system shall be as defined in BS 5839: Part 1 to category L2. A new panel will be located at the entrance to the building as you enter through the main entrance doors.

Fire detection will be by means of smoke and heat detectors in conjunction with manual break glass units. These will be in the rooms, ceiling voids and other areas as appropriate. To reduce unwanted fire signals, detectors will have multi-state capability.

Sounders and visual indicators shall be provided to all public areas.

Manual call points are to be provided in accordance with BS 5839 and will be positioned adjacent to all external doors with additional call points located along escape routes and open plan areas to comply with BS 5839 i.e., travel distance of 30m. Flip covers are to be provided.

Fire doors on corridors that are on fire compartment lines shall be held open on automatic door releases, interfaced with the fire alarm system to facilitate closure in the event of an alarm. These doors shall also be provided with local manual door closer at each door. In the event of a fire alarm, the fire system shall take automatic control over the plant to shut them down if necessary or desired.

The following ancillary functions to operate in the event of a fire alarm:

- Shut down mechanical ventilation plant.
- Shut smoke dampers.
- Operate other interfaces as required.

- Release hold open doors.
- Release Access Control

Wiring for the fire alarm installation to be in ‘enhanced’ fire resistant grade insulated cable run on cable basket and clipped directly with fire rated clips as defined in BS5839.

Batteries and battery chargers will be sized to provide sufficient power to provide 24-hour quiescent operation and thereafter to maintain the systems continuous alarm with all sounders in operation for 30 minutes.

Ceiling void detection will be provided where voids exceed 800mm as per BS 5839. A quantitative risk assessment shall be conducted and agreed by all parties to omit ceiling void protection.

The system shall be interfaced with the Fire Alarm system within the existing main school building. The existing school main building fire alarm system is an Menvier MF9308 system which is no longer supported by the manufacturer. The system appears to be an analogue addressable system which uses previous “conventional” systems wiring.

The Client has confirmed that parts are still available for the existing fire alarm system, the incumbent fire alarm contactor shall be employed to carryout any works involving the existing system.

6.11. INTRUDER ALARMS

The existing building intruder alarm is based on a Galaxy (G60) Panel which is now obsolete.

A new Intruder alarm system shall be provided within the existing school and the new classroom block which shall be capable of being set/unset from the main entrance door(s). The system shall include door contacts at each external door. Ground floor rooms with windows shall be fitted with dual tech PIR detection.

The new system shall be based on a Texecon premier elite 640 range and shall be of a grade 2 standard.

Dedicated keypads will be provided in each plant room. The buildings should be zoned so the main hall can be used outside of hours within the new classroom block, and the Nursery can be armed / disarmed within the existing building without effecting the remainder of the building.

The system shall link to an external alarm receiving centre via GSM card and shall be provided with the necessary equipment and connections to be externally monitored by a third party who will respond to alarms.

6.12. DISABLED ALARM

A disabled alarm system will be provided within the new teaching block to the Hygiene room and disabled WC. The disabled alarm shall be in accordance with Part M of the building regulations.

The Disabled alarm system shall be provided with the following:

- Pull Cord
- Reset Button
- Reassurance light inside toilet
- Flashing light & Sounder outside toilet
- Power supply
- Link to main school reception

6.13. CCTV

A new IP CCTV system shall be installed within the new classroom block. The system will expand on the existing schools system which is based on Alhua Dahua Technology which is located with a data cabinet within the existing school reception area.

The CCTV will cover the following areas:

- Main entrances (New & Existing School)
- The building external perimeter
- Car Park
- Main Barrier to Car Park
- Pedestrian Gates into Yards

A CCTV monitor and controller will be provided at the reception desk and main managers office.

The CCTV system will be a standalone digital CCTV system with fixed digital cameras and sufficient capacity for 30-day digital recording. The digital recorder will be installed into the existing school IT Cabinet.

The system shall be linked to the intruder and access control systems to provide viewing and recording in response to intruder / access control events.

6.14. ACCESS CONTROL

Access control within the new classroom block shall be provided via an IP based access control system based on Videx or Paxton.

The system shall consist of the following.

- Main External access doors shall be provided with Maglocks and Intercom with Keypad
- Electronic Strike locks on pedestrian access gates to site
- The car park barrier shall be provided within Intercom and Keypad

Intercoms shall be linked back to the main reception within the existing school building.

Push to exit buttons and emergency override break glass will be provided on the secure side of each door. Fire alarm interfaces will be provided to release the doors in the event of a fire alarm activation.

6.15. LIGHTNING PROTECTION SYSTEMS

A lightning protection risk assessment shall be undertaken during the next stage of design to confirm level of coverage required.

The system shall be designed in accordance with BSEN 62305 and shall include:

- Roof perimeter Tape / bond onto roof
- Down conductors / connection onto steelwork
- Earth Pit
- Surge Protection to incoming services

6.16. PHOTOVOLTAIC SYSTEM

The new classroom block will be provided with a photovoltaic system sized in compliance with:

- Part L Requirements
- Targeted BREEAM ENE 01 credits
- Targeted EPC rating
- Whole life carbon criteria

The system shall be a roof mounted system located on the lower roof and predominantly facing south.

The specialist supplier shall liaise with National Grid and undertake a G99 application for connection on the grid upon completion.

The contractor shall provide an OFGEM compliant energy generation meter with half hourly readings.

The system shall be based on SolarEdge or equal and shall have a link to the fire alarm system for shutdown along with a manual override switch adjacent to the fire alarm panel within the main entrance.

All Inverters shall be located within the main plantroom; the system shall be linked into the BMS system and shall graphically indicate the following information.

- Instantaneous kW Output
- Cumulative kW Output
- Cumulative equivalent Carbon Saving in kg

6.17. OTHER

Class Change

A class change system shall be installed throughout the new classroom block. This will be linked to a controller located within the existing school main reception.

Audio/Visual

All classrooms and main hall shall be provided with a 50-inch LED smart TV. This shall be linked via a HDMI cable outlet located at the teacher’s desk / agreed location within the Hall.

Hall Stage Lighting & Sound

A simple stage lighting and sound system shall be provided within the assembly hall. The system shall be based on the following.

- Based on movable desk type system
- Fixed speakers at side of stage
- 4no Microphones
- Lighting Bar with 4no RGB Floods

7. BUILDING MANAGEMENT SYTEM (BMS)

A standalone Building Management System (BMS) will be provided with a head end terminal in plant room to control, monitor and record the building’s energy, air handling/conditioning units, heating and cooling plant and electrical systems.

The contractor shall employ an approved specialist to design, procure, install, test and commission the controls and BMS. Both text and dynamic graphics will be available on a web browser-based display for remote access in additional to the static workstation.

The BMS will allow optimum plant performance, energy usage, help to minimise energy consumption, provide the stated environmental conditions and monitor faults. The BMS system shall be a TREND system to match the Council’s current system.

The supervisor shall be provided with the BMS software, and a graphic user interface as approved by the Client end user. Sample dynamic graphic shall be provided for review at least two months prior to completion of the installation. A suitable PC shall be provided together with a local printer.

Mechanical / Electrical systems connected to the BMS will include but is not limited to the following:

- Incoming electrical supply meter
- PV Generation
- Incoming mains water pulsed water meter
- Air Handling Units
- MVHR Units
- Extract Fans
- Air Source Heat Pumps
- LTHW Buffer Vessel
- Cold Water Tanks and Boosters (if required)
- Electric hot water storage heaters

8. TESTING & COMMISSIONING

Testing & commissioning is a critical stage of the construction process and shall be conducted in a methodical & logical fashion. The various MEP systems shall be tested individually at component level and then the systems level, leading up to the main integrated systems test for the entire installation.

The contractor shall adhere to the client site procedures, critical works authorisation requests, work permit applications, site restrictions, site licences, etc. to allow the appropriate level of monitoring and sign off for all the site works.

The contractor shall complete all testing and commissioning and provide a full operational installation at handover. Testing shall include planning, resourcing, co-ordination and implantation, together with the provision of all test equipment.

The contractor shall appoint a separate commissioning manager to execute this element of works.

The contractor shall include for attendance by all relevant specialist, suppliers and manufacturer for each stage of the testing and commission and provide comprehensive testing reports including all test results and system data captures (BEMS)

The individual plant, equipment and system tests shall be based upon the current BSRIA and CIBSE guidelines. Details of test procedures shall be submitted for approval.

The contractor shall keep an active log of the status of each level of testing, which shall form the basis of the index of this section in the O&M manuals.

Operate all system, and equipment to the extent required for the final installation, adjust and calibrate controls and instruments and resolve all faults. When the system is operating satisfactorily, submit a copy of the test results on the standard test forms. The forms shall be typed and incorporated within the Operation and Maintenance manual.

Ensure that all instruments have been calibrated by an independent certified testing authority within 6 months of the date of use and a current calibration certificate is available for inspection.

Instruments shall not be used to measure quantities which are outside their accurate measure range. If there is reasonable doubt as to the accuracy of an instrument, the instrument shall be re-calibrated or alternatively, quantities measured with the disputed instrument shall be re-measured with another approved instrument.

END OF REPORT