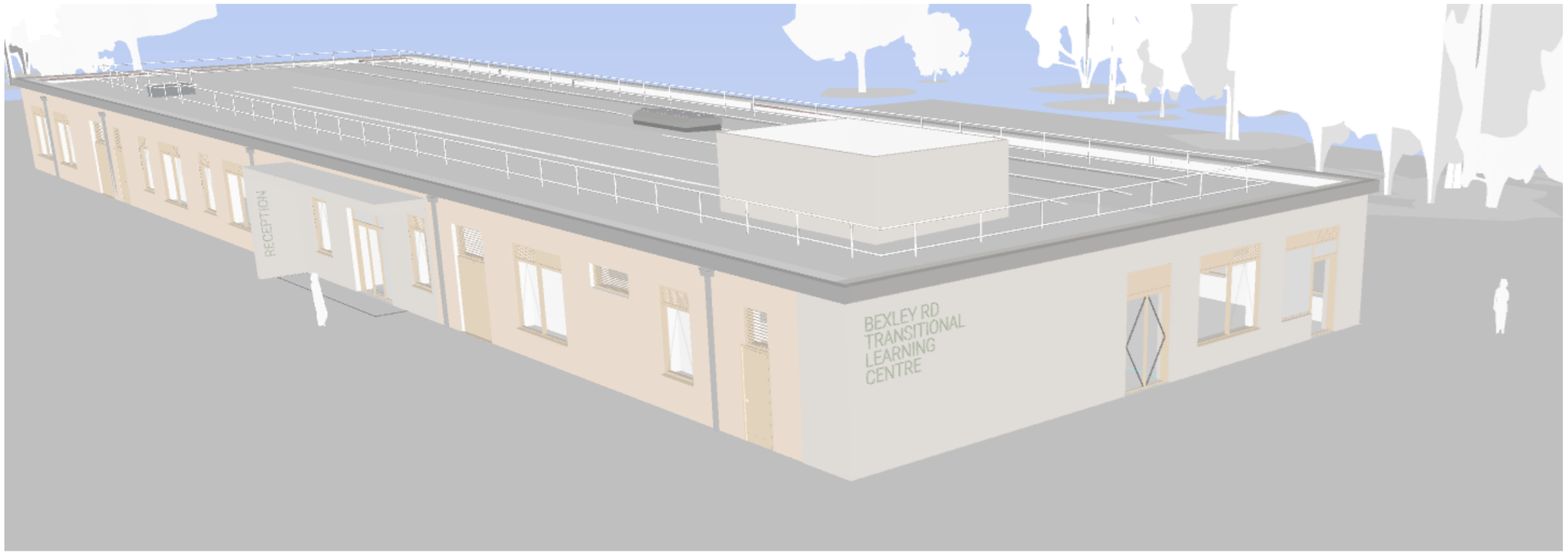

Bexley Road Transitional Learning Centre

RIBA Stage Report

BTLC-MEP-XX-XX-RP-ME-3005

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List of Content

1. Executive Summary

This report is provided to give an overview of the MEP Services to serve the new Bexley Road Transitional Learning Centre. The proposed development is on a brownfield site at 77 Bexley Road, Greenwich, London.

The report shall be read in conjunction with the MEP drawings, associated reports, and other design team documents, including but not limited to, architects, civil and structural engineers, landscaping, catering specialist, acoustics, FF&E etc.

2. Standards & Regulations

All installation works carried out in association with the building services shall as minimum conform to all statutory regulations and the local bylaws in the vicinity of this project.

All relevant authorities and/or governing bodies shall be notified in accordance with their clauses and obtain any required approvals/certification for the project installation.

Ensure that all requirements of the Local Building Control Officer and local fire officer are complied with.

All equipment designed and installed shall be done so to the current amendments of the relevant standards and regulations, the equipment and plant supplied shall as a minimum achieve the specified design conditions. Compatibility shall exist between systems and all other systems installed with the same location.

The standards and regulations shall be adhered to for the works, these include, but not limited to the following (any planned deviations from these documents shall be clearly identified and agreed with the Client or other relevant party):

- Planning permission conditions.
- British Standards specifications and Codes of Practice.
- European Standards where appropriate.
- Building Regulations and all current amendments as at the date of tender return.
- Water Regulations and all current amendments as at the date of tender return.
- Gas Safety (Installation and Use) Regulations and all current amendments as at the date of tender return.
- Health and Safety at Work Act 1974 and all associated legislation and regulations.
- Electricity at Work Regulations 1989.
- Electricity Acts.
- Personal Protective Equipment at Work Regulations 1992.
- Workplace (Health, Safety & Welfare) Regulations 1992.
- The requirements of the local utility companies.
- HVCA Standards, Guides & Specifications.

- Requirements of Building Control and Fire Officer.
- Control of Pollution act 1974.
- BS 7671 – The 18th Edition amendment two IET Wiring Regulations.
- BS 5839 – Fire Alarm & Detection
- BS 8519 – Selection & Installation of fire-resistant cables
- BS 5266 – Emergency Lighting
- BS EN 62305 – Lightning Protection
- BS 9999 – Fire Safety in the Design, Management and Use of Buildings
- BS 8300 – Design of an Accessible and Inclusive Built Environment
- All Associated CIBSE Codes, Guides and Technical Memoranda.
- Conservation of Fuel and Power Part L2
- DDA Codes of Practice.
- Construction (Design & Management) Regulations 2015.
- Electrical Equipment Safety Regulations 2016.
- Local Authority Bylaws.
- Control of Substances Hazardous to Health (COSHH) Regulations 2002.
- Building Bulletins and associated documentation.
- BSRIA commissioning guides
- EEC Legislation
- HSE ACOP L8 Legionella Disease
- Water Supply (Water Fittings) Regulations 1999
- All relevant Department for Education Output Specifications, in particular:
- Technical annex 2E: daylight and electric lighting
- Technical annex 2E: daylight and electric lighting
- Technical annex 2G: electrical services, communications, fire and security systems
- Technical annex 2H: energy
- Technical annex 2I: controls, and
- Technical annex 2J: sustainability
- The London Plan Policy
- BREEAM UK New Construction 2018 Excellent Rating
- Equality Act 2010
- All other safety regulations applicable to construction

3. Environmental Strategy/Design Approach

The Engineering Services for the project will be developed through consultation with the wider team and our extensive experience of delivering education projects. In general, the proposed services provisions follow the principles of the latest DfE S21 Output Specifications, relevant Building Bulletins and will be compliant with all statutory requirements, including the 2021 Building Regulations.

In particular the relevant Annexes of the Output Specification will be considered, namely Annex 2C, 2E, 2F, 2G, 2H and 2J when designing the MEP services in relation to the Energy and Sustainability aspects of the project.

This particular design will be tailored to meet the requirements and aspirations of the Client and those of the End User. The primary aim has been to provide an appropriate and pleasant learning environment for the Children and Staff of the school, while maintaining sustainability and providing an environmentally conscious development. By way of example, the energy consumption of the properties will be reduced by cohesive use of sustainability and sound design principles, which will also allowed for an improvement, to the level of comfort experienced within a building.

The services design strategy employed aims are to mitigate the difficulties of competing requirements, such as site restrictions, orientation, operational needs, acoustic treatment and ICT demands, by using passive building elements where possible. While providing a factor of sustainability, these elements simultaneously offer an opportunity to reduce the requirement for mechanical and electrical systems within the build and therefore reducing the amount of energy the building uses.

The Engineering Services strategy will be developed through integration with space planning, architecture, structure, facilities management and construction. The solution will aim to balance the needs of the schools, visitors, staff and pupils, while proposing installation of safe, reliable and efficient systems.

4. Energy Strategy

The reduction of greenhouse gas emissions is a key element in the construction of new build projects. In building design this can be achieved by 1) reducing demands, 2) improving the energy efficiency of the building and by 3) selecting energy sources/energy generating technologies that produce low or no levels of carbon dioxide.

The two most cost effective and viable options of NZC (Net Zero Carbon) technologies for improving the CO2 emission reductions considered for this project, were Photovoltaics (PV's) and an Air Sourced Heat Pumps (ASHP's).

As part of the early design considerations, Ground Source Heat pumps (GSHP's) were looked at, however, there is significant costs and risks associated with providing a GSHP solution.

From early discussions with the wider design team, we would anticipate the baseline building to obtain a reasonable carbon dioxide reduction over Part L2A 2021.

The Part L and Energy demands will be reviewed in conjunction with the ongoing development of the designs.

Refer to the Energy Compliance Report which demonstrates compliance with the current Building Regulation requirements of Part L2A 2021.

5. Planning

Initial consultation with the local planning department will be taking place during the design process and this is due in the next stage of design.

As this project is within the Royal Borough of Greenwich, the Greater London Authority Energy Hierarchy will apply to this scheme. The project will adhere to the carbon reduction requirements as stipulated by the GLA.

The scheme will also be designed to suit the requirements of the DfE S21 Output Specifications and in particular Annex 2H (Energy) and 2J (Sustainability).

6. Utilities

Existing mains records from Statutory Authorities have been provided.

Gas

Any existing gas services have been disconnected to the site.

Electricity

The site will be served by the local LV distribution network. A new GRP metering kiosk will be provided to the site boundary and from here two new LV power supplies will be provided to the scheme. One will serve the school and the other will serve the Air Quality Monitoring Station (AQMS). The AQMS will be operated and metered separately from the school.

An application has been made to the local Distribution Network Operator (UKPN) for a 150kVa, TPN electrical supply to the school and a 15 kVa single phase supply to the AQMS.

Also, refer to the Site Wide Services layout drawing.

Water

Any existing water supplies have been disconnected to the site.

For ease and simplicity a new metered water supply will be provided to the new school building.

This will be subject to Thames Water approval.

An initial utility application has been based on:

Water - 1.1 l/s

As the design develops any utility applications will be refreshed, where required.

Also, refer to the Site Wide Services layout drawing.

7. Plant & Distribution Strategy

The engineering services philosophy will be developed holistically through integration with the space planning, architecture, structure and construction, and will provide a balanced school building solution. This is based upon:

- Employing sustainable design
- Minimising energy requirements.
- Providing flexibility and adaptability.
- Providing deliverable systems.
- Affordability

Plant selections will be sized to match load profiles to maximise energy efficiency. The control and optimisation of plant will be achieved by the use of the BMS system. The BMS will also record plant usage and from the information generated maintenance schedules can be developed.

Plant sizing and configuration will, where practicable, be designed and arranged in order to respond to the changing needs of the school building.

The design will ensure that the installations can be maintained with minimum disruption to teaching and prevent unauthorised access to equipment for safety.

The majority of the primary plant such as buffer vessel, cold water storage tank and booster set will be located within the ground floor plantrooms. The roof will house primary plant items such as the kitchen air plant and PV panels. The ASHP's will be located externally in a dedicated external compound.

Where localised ventilation plant is provided, these shall be located within storerooms and/or above suspended ceiling voids in non-teaching spaces where possible, to minimise maintenance access and reduce any noise transmission potential.

Access to all plant for installation/withdrawal and maintenance procedures will be provided through secure plant access. The precise method of plant access/removal will be assessed during the detailed design development stage.

Co-ordination of services will be accomplished by effective planning during the detailed design and installation stages of the project.

Primary distribution routes will be configured to serve zoned systems. This provides flexibility for multi-functional use whilst maintaining the efficiency of the plant.

Pipework runs will be as unobtrusive as possible and located in accessible service and ceiling voids. Branch rises and drops will generally be in stores, corners of rooms and down columns. Where pipework is exposed in pupil accessible areas and in particular classrooms, these will be insulated and concealed within boxing. Pipework will be located to avoid major disruption to the schools

arising from minor repairs or routine maintenance and avoid routing through those rooms or areas where leaks would cause considerable disruption and financial loss.

All main pipework will be routed, where possible, horizontally through the accessible ceiling voids within the main circulation routes and vertically through dedicated service risers.

8. Water Distribution

All water services installations will be in accordance with the 'Water Supply (Water Fittings) Regulations 1999'. All water systems will be installed and commissioned in accordance with the provisions of the Health and Safety Commission Code of Practice for the Prevention and Control of Legionellosis and disinfected to comply with current standards. In addition, all water systems shall be designed and maintained to minimise risks of microbial contamination. The systems will be designed to suit the S21 specifications, CIBSE TM13 and HSE ACoP L8.

The principle is to provide a wholesome supply of water for domestic purposes, including a supply of drinking water.

A sub-meter will be provided in ground floor plantroom where the new water supply rises enters the building. All water meters will be complete with outputs linking to the BMS for remote monitoring. This will enable monitoring of water usage and will provide mains leak detection.

It is anticipated that the existing fire hydrant adjacent Lemonwell Drive will provide appropriate coverage for the new school building as the existing fire hydrant is located within 90m of the main entrance.

The new incoming water main will distribute to connect to a one piece, GRP, cold water storage tank with integral duty/standby pumps located within the ground floor plantroom.

The packaged booster set and storage tank will be connected to the central BMS system.

A separate package category 5 break tank and pump will be provided to serve the external bib taps.

Proximity detection shut-off solenoid valves will be provided to all toilet areas, to reduce the risk of consumption due to minor leaks or damage through malicious actions in toilet facilities. Time control taps to sanitaryware and the changing room showers will also be provided.

The boosted cold water will be distributed throughout the school via the circulation area ceiling voids to serve all levels. This will include the classrooms, kitchen, hygiene room, staff rooms, toilet areas, changing areas and cleaner's rooms. Cold water will also be provided to local drinking water outlets.

All cold water distribution will be suitably insulated to prevent condensation and limit any temperature rise in accordance with Approved Document L2. In addition, where possible, all cold water distribution routes will be remote from heating pipework. Sufficient zoned isolation valves will be provided to allow for maintenance of discrete areas, in addition each final connection shall be provided with a local isolation valve.

Estimated Cold Water Plant Sizes:

Booster set flowrate – 1.1 kg/s

Booster set available pressure – 2.5 bar

Cold water storage tank volume – 1250 Litres usable

Also, refer to the Site Wide Services layout drawing.

9. Gas Distribution

No new gas supply is proposed for the new school building.

10. Domestic Hot Water Systems

Generally, hot water will be generated locally via point of use electric instantaneous water heaters. They are able to provide the necessary outlet temperature (adjustable 30°C to 43°C) without thermostatic mixing valves.

For cleaner's cupboards hot water will be generated via small storage local point of use electric water heaters, complete with suitable expansion, pressure reduction and safety devices.

Hot water generation to the kitchen outlets will be via two heat pump calorifers piped in parallel located within the ground floor heating plantroom. A domestic hot water flow and return system will distribute domestic hot water from the plantroom to the kitchen outlets.

Within the hygiene rooms and changing rooms, local electric showers shall be provided.

Where domestic water is supplied at higher temperatures in 'non-public' locations all outlets will be labelled appropriately.

All hot water pipework will be sufficiently insulated to minimise heat loss in accordance with Approved Document L2. Sufficient zoned isolation valves will be provided to allow for maintenance of discrete areas in addition each final connection shall be provided with a local isolation valve.

Estimated Hot Water Plant Sizes:

Kitchen heat pump calorifiers – 600 Litres (2x300 litres)

Cleaner's cupboards – 30 Litres

11. Above Ground Drainage

The public health engineering systems will be designed to ensure safe, hygienic, and effective disposal of all discharge from all sanitary appliances including Classrooms, kitchen facilities, toilets, changing areas, staff room, social areas, plant areas and other dedicated discharge points, quietly and with freedom from nuisance or risk of injury to health.

All sanitary discharge pipework will be provided from the sanitary appliances and other drainage outlets to ground floor level. The system will include ventilating pipes to atmosphere, connections to appliances and connections to the below ground system.

The foul drainage above ground will meet the performance requirements stated in BS EN 12056, the Building Regulations, Water Bylaws, Institute of Plumbing Design Guide and all other applicable British Standards and the equivalent European Standard. Each type of equipment/material selected will comply fully with either the latest issue of the BS or the European Standards.

The underground/below ground drainage systems will be designed by the civil engineers.

The principles for the internal drainage design will incorporate strategically located vertical soil vent pipes, passing through the building to connect to the below ground drainage system. The vertical soil vent pipes will also pass through the roof and will ventilate to atmosphere.

The design philosophy is to arrange the disposal systems into independent zones allowing maintenance and inspection to be undertaken within each zone without affecting the continued operation of neighbouring zones.

All vertical soil vent pipe within a zone will serve single or groups of sanitary appliances and/or equipment in the building. The appliances and equipment will be connected to the vertical stacks wherever practical at low level, where this is not practical ventilated stub stacks will be provided, the discharge pipework from the stub stacks will connect to the main vertical soil vent pipes.

The stub stacks will connect directly into the below ground drainage system.

All discharge and ventilation pipework will be air tested at various stages and on completion of the installation to ensure compliance with the requirements of the Building Regulations and BS EN 12056.

Chemical resistant polypropylene pipework will be provided to laboratory sinks.

12. Heating & Cooling Systems

Heating Systems

The heating systems will be designed and installed to comply with the requirements of the Building Regulations and the S21 Output Specifications.

Heating will be provided by three Air Source Heat Pumps (ASHPs) each sized to 40% of total heating load. The ASHPs will be located externally at level 1 on the roof of kitchen. The ASHP's shall be arranged to provide resilience in accordance with Annex 2F of the S21 output specification.

The ASHPs will have integral pumps and piped in a reverse return arrangement before connecting to a buffer vessel. The associated pressurisation unit, expansion vessels, buffer vessel and primary and secondary circulating run / standby pump sets, will be located within the ground floor plantroom.

The secondary heating system will be provided with invertor driven run / standby pumps to ensure design flowrates are achieved and provide control and energy efficiency.

Where required, the school buildings will be divided into heating zones to allow maximum flexibility as well as energy saving. Zone controls will be easily understood and operate by non-specialist personnel and teaching staff. Final configuration/zoning will be agreed with the Client and End User.

The distribution systems will consist of constant temperature heating circuits serving each of the heating zones, as the maximum mean temperature of the heating circuits will only be 43 deg C, in accordance with Annex 2F of the S21 Output Specification. This omits the requirement for a

variable temperature circuit as the heating flow temperature is not deemed to be sufficient to provide adequate benefit of control.

All Low Temperature Hot Water (LTHW) heating pipework will be sufficiently insulated in accordance with Approved Document L2A.

Within circulation and pupil accessible areas other than classrooms, heating will be provided via ceiling mounted radiant panels.

Within the staff only areas of the school i.e. Staff WC's/changing, staff rooms, offices, meeting/training rooms etc heating will be by standard radiators. Each radiator will be provided with thermostatic radiator valves (TRV's) and will be fully co-ordinated with the building structure and any internal furniture.

Heating in classrooms will be provided by warm air heating, via the hybrid ventilation units within the space.

Heating to the kitchens will be provided by the mechanical supply air ventilation system, required as part of the make-up air required for the general extract and kitchen canopy extract systems.

Where areas of the building are ventilated by mechanical ventilation means the air will be tempered by Low Temperature Hot Water heating coils located within the ventilation units and also by duct mounted heater batteries where required. Each ventilation unit will also be provided with heat recovery facilities.

Estimated Heating Loads:

75 kW – 3no. ASHPs at 40% (30 kW)

Cooling Systems

Cooling will be provided to the dedicated server room, where high heat gains mean the temperature cannot be controlled effectively using any other means. An internal wall mounted split DX unit will be installed. The associated external condenser units will be located on the roof of kitchen.

13. Ventilation Systems

All ventilation systems will be designed and installed in accordance with the S21 Output Specification, Building Regulations and the CIBSE Codes. The ventilation rates will be in accordance with Annex 2F and influenced by the results of the overheating report.

Hybrid ventilation will be the primary solution for providing ventilation through the school, with mechanical ventilation provided to internal rooms. A number of staff areas away from the main road are suitable for natural ventilation.

Within classrooms, a hybrid solution has been proposed, using hybrid natural ventilation units complete with heat recovery and LTHW heating coils. The classroom windows will be manually openable but due to acoustic constraints cannot be relied upon for overheating or general comfort. The hybrid natural ventilation units will be connected to the high-level louvres and will provide a hybrid air distribution supply to the classrooms, which will allow for 'mixing' of the supply and return air during winter months, using the occupants of the room and heat gains from other sources.

Combined temperature and CO2 sensors will be provided to each teaching space to monitor CO2 concentration and the temperature. Where required, the controller will include an integral LED indicator light, to identify to the staff when the windows need opening. The sensors/controller will be located adjacent to the Teachers station/desk.

Mechanical supply and extract ventilation will serve landlocked office areas and high-density areas that cannot be served via hybrid roof terminal units. This will primarily be via local Mechanical Ventilation Heat recovery (MVHR) units, located within ceiling voids or externally on the roof. The internal MVHR Units will be connected to external louvres above the windows, where possible, or other localised external louvres. From the MVHR units, distribution ductwork will connect to the grilles and diffusers, complete with dampers and associated attenuation to suit the noise criteria of the rooms they are serving. Local control shall be provided to these units.

Staff areas located on the perimeter of the buildings shall be ventilated by means of natural ventilation via openable windows.

Plant rooms shall be ventilated by means of natural ventilation via louvred doors on the façade.

Sanitary Accommodation Ventilation

Sanitary accommodation will be maintained under a negative pressure by mechanical extract ventilation with a nominal transfer of air from surrounding spaces via undercut doors.
The toilet extract ventilation will be provided via a central inline fans, extracting vitiated air from sanitary accommodation. The extract fans will be located within the ceiling voids with extract ductwork terminating to atmosphere by localised external louvres.
Where there are remote toilet areas, extract will be provided by local inline fan unit with extract ductwork terminating to atmosphere by localised external louvres.

Kitchen Ventilation

Kitchen extract ventilation will be provided via a dedicated bifurcated extract fan, located at roof level and this will be linked to the supply air handling unit and safety systems.
The kitchen will be maintained under negative pressure by mechanical extract ventilation to pull air from the ancillary spaces.
A supply AHU will be provide tempered, fresh air to the kitchen, kitchen office and dry store.

14. Summertime Overheating

The S21 Output Specifications identify the requirements for preventing and reducing summertime overheating within teaching spaces and the design solution based upon these documents, will demonstrate compliance through the most efficient and economical means.
A classroom Thermal Comfort and Indoor Air Quality Report has been produced, which show various option appraisals have taken place and a preferred, compliant solution identified to inform the principle of design.
In summary, the strategy for preventing summertime overheating is to use a mix of natural and hybrid solution, taking into account external acoustic influences and that they do not impact on the teaching facilities.
Openable windows and hybrid natural ventilation units will be utilised to provide a ventilation solution to offset the overheating criteria set out in the S21 Output Specifications. The operation of these systems are detailed within the Thermal Comfort Report.

All sanitary accommodation and washrooms will be provided with mechanical extract ventilation, in accordance with the S21 Output Specification.

15. BMS

Automatic building management and control systems will be provided to enable centralised control, testing and monitoring facilities for all mechanical equipment. The Building Management System should significantly help to improve both the performance of the building and its controllability.
The BMS proposed will provide a workable control system suitable for the successful operation of the school. This satisfies all legislation including Part L of the Building Regulations and will be in accordance with the S21 Output Specification. The control system will allow monitoring information to be available to the local Authority in real time.
The BMS will consist of control panels strategically located adjacent to plant, with an outstation located in the control panels connected to sensors and control devices.
One of the basic principles and function of the BMS is to wherever possible; provide simple warning of any systems failure, by means of alarms (e.g. pump failure and automatic pump changeover). This will help to avoid the potential non-availability to a school and thus avoiding all associated disruptions.
The BMS will be linked into other systems within the school, such as the fire alarm system, to ensure the school is suitably monitored and protected.

16. Electrical Distribution

Incoming Electrical Supply

The initial estimated maximum demand for the development is identified in the earlier utilities section of this report.

An application for an electrical power supply has been made with the local Distribution Network Operator, UKPN.

Main Low Voltage Switchgear

A Main Low Voltage switchboard will be installed within the ground floor LV switchroom, complete with all the necessary components and outgoing circuits to feed the centres various electrical distribution requirements.

The panel will be sized to accommodate 10% additional load to facilitate future expansion and be provided with 10% additional spare ways. Provision will also be made for lateral extension of the panel, with sufficient space allowed to one side for the future addition of an extra cubicle if required.

The main LV panel will be located within the school's electrical plantroom at ground floor level.

This main panel, constructed to Form 4, Type 2 spec, will feed the final distribution to all sub-DB's withing the building.

The system will be provided with MCCB-protected spare ways to allow for the future connection of power factor correction and harmonic filtering, should the site load conditions require it once fully occupied.

Overvoltage transient protection will be provided on the main LV switchboard.

Energy Metering Strategy

The buildings main incoming LV supply will be equipped with a digital metering unit with pulsed BMS outputs for centralised reading for the measuring and recording of the kVA (MD), kVAr, A, V, pf, kW, kWhrs, harmonics and frequency.

Further meters will be provided to designated outgoing ways on the main low voltage switchgear as well each section of the split load (lighting and power) distribution boards located around the building. Separate metered distribution boards will also be provided for the following areas to monitor the energy usage:

- Mechanical supplies
- Server Room
- Kitchen Areas

Energy metering arrangements for the building will follow the recommendations of Building Regulations approved document Part L2A and CIBSE TM39.

All meters will be monitored by the BMS.

Final LV Distribution

MCB distribution boards for small power, lighting, mechanical power and ancillary equipment and for any specialist installations will be strategically located throughout the school building. This will provide efficient use of primary distribution routes and clearly defined distribution zones, whilst enabling ease of maintenance.

Split load distribution boards will be provided serving lighting and small power with each section being individually metered.

Metered split load distribution boards will also be provided to serve mechanical power only. This allows for the energy monitoring of the ventilation systems and water heaters to be separated.

Additional separate final distribution boards will be provided where appropriate, such as:

- IT server rooms
- Plant rooms
- Kitchen (catering equipment)
- External Lighting
- Car Park EV chargers

The routing of the sub-main cabling will principally be within the ceiling voids on cable tray/ladder.

All general sub-main distribution cabling will be multi-core XLPE/SWA/LSF cables.

Submain cabling serving fire protection/life safety systems shall be suitably fire rated.

RCD protection of final circuits serving socket outlets will be provided, a variation to this may be applied to the ICT server cabinets where an appropriate risk assessment will be required.
MCB distribution boards will be provided with lockable doors to limit access to the circuit breakers to authorised maintenance personnel only.

Spare Capacity

Spare capacity will be provided to the electrical installation to allow for the future expansion and addition of future electrical loads. The spare capacity will be allowed as follows:

- Sub-main Circuits - these will be designed so that the capacity can be increased by up to 10% of the initial design current without exceeding the limitations of the circuit.
- Distribution Boards - Spare capacity will be provided within each distribution board to take into account future demands. This will be 10% in terms of spare outgoing ways and load capacity.
- Containment - 10% Spare capacity will be provided in general containment systems to support the requirement for spare capacity provisions associated with the electrical distribution system.

Earthing and Equipotential Bonding

A complete earthing and equipotential bonding system will be provided to serve the electrical services systems associated with the development.

Existing Below Ground Distribution

Across the site there are electrical ducts which serve the existing building. Any redundant below ground electrical distribution will require stripping out.

17. Electric Vehicle Charging points

An allowance for 1no. twin 7kw charger has been included, with duct routes provided to the remaining 8 car parking spaces for future EV charging.

18. Photovoltaic Panels

Photovoltaic (PV) panels will be installed on the roof. A 39.4kWp system is proposed to meet the PVs targets of the TM54 Operation energy modelling undertaken.

Green Leaf are currently undertaking a detailed design and specification of the array to ensure the building's proposed roof has sufficient free area to accommodate the 174.3m^2 of PV panels.
It is envision that the amount of electricity generated by the PV system will, at times, be more than can consumed by the building and therefore the excess will be export to the Grid. UKPN have currently been engaged on the topic of PV export and we are currently awaiting confirmation on the PV export capacity limit.

19. Electrical Containment Systems

Cable containment systems will be provided for all system cabling from central equipment locations to points of use.
All electrical service cables will be segregated for final distribution cables, sub-mains cabling, fire alarm, ELV systems (i.e. security, BMS) and data systems.
Fire alarm cabling and/or containment will be fastened independently of other services top maintain integrity during a fire condition.
The primary containment routes will be generally confined to the ceiling void spaces provided within circulation spaces and within the services cupboards located within the building. This will be co-ordinated with all building services and other building elements.
Dado trunking on the teacher's wall pupil areas will be provided for the containment of mains, ICT and AV cabling.
Dado trunking will be installed where deemed appropriate in staff areas.
All dado trunking will be suitable for CAT6A cabling.

20. Lighting

Throughout the school the lighting will be designed to deliver a high-quality energy efficient installation, whilst providing "measurable" lighting levels to comply with the relevant illumination levels identified by SLL Lighting Guide 5 - *Lighting for education*, BS EN 12464-1 and any other relevant standards and guidances.
The selected luminaire will use LED lighting sources.
Luminaires will be selected to suit the particular environment and ceiling type.
Switching and control outlets to have visual contrasting finishes to walls as per Part M.

Classrooms

The design will maximise the use of natural lighting during daylight hours.

The artificial lighting will be designed to complement and supplement the use of natural daylight when required, via a daylight linking system, which will dim the luminaires when sufficient daylight is available.

The luminaires will be selected to achieve lighting to minimise contrast and achieve a good average level of luminance. Particular attention will be paid to ensuring that walls and ceilings are illuminated to enhance the classroom and learning experience.

Other Areas

Where considered as being appropriate the design will maximise the use of natural daylight via dimmable luminaires combined with a daylight linking system.

21. Lighting Controls

DALI protocol will be used to control luminaires where necessary for daylight linking.

DALI protocol will be used to within circulation spaces to provide flexibility in the control of the lighting at commissioning stage e.g. all circulation space luminaires controlled by any single presence detection, luminaires dim down to set output as opposed to off, etc.

The use of automatic switching (absence & presence) and regulating daylight linking technologies will be used where indicated. The definitions are:

Absence detection works by the manual operation of the local switch to turn on the lights, with automatic sensors to switch off the lights when the room is empty for a pre-determined length of time.

Presence detection works by using an automatic sensor to turn on the lights when presence (movement) is detected and to switch off the lights when the room is empty for a pre-determined length of time.

Plant areas will be provided with manual controls.

Group rooms or similar are proposed to have manual control and dimming. This will be achieved by a wall mounted retractive switch, push on/off and hold to dim.

All lighting switches / accessories will typically be white plastic, with metal finish within plant room areas etc. IP 65 rated switches will be provided in wet areas.

Classrooms

The lighting control proposal to the classrooms is based upon day-light linked photocell and absence detection combined with manual switching. The daylight control will automatically dim or shut down lighting in zones with adequate day lighting.

The intent is to provide a user-friendly, simple control system that maximises the use of natural daylight and minimises the use of artificial light by using an intelligent facility providing dimming and level matching.

The row of lighting parallel to the teaching wall will be controlled by an override on/off switch adjacent the Teacher's position.

22. Emergency Lighting

The building will be provided with an emergency lighting system to meet all requirements of BS 5266, Building Bulletins and Building Regulations.

Emergency lighting will be provided to all defined and undefined escape routes throughout the building and will be subject to the approval of Building Control and local Fire Officer.

Emergency lighting will be installed to provide a safe means of escape from the building in the event of failure of the normal local lighting systems and will be a category M3 or NM3 as appropriate throughout the building.

Maintained emergency fittings will be provided in areas used for performances such as the main hall. All other installations shall utilise self-contained emergency LED downlights

The emergency light fittings will operate on both total power failure to the building and local lighting circuit failure.

Enhanced levels of emergency lighting will be provided to specific locations /High Risk Task areas in accordance with BS 5266-1 Table E-1.

Exit signs will be photo-luminescent type externally illuminated by local emergency lighting; with the exception of the main hall and designated exit routes from the main hall whereby internally illuminated exit signs will be provided.

Each emergency luminaire will have a self-test function.

Emergency lighting luminaires will be provided above all final exits leading from the building to external.

23. External Lighting

External Lighting is proposed to the following areas:

- Pedestrian Walkways – It is proposed that Pedestrian Walkways will be illuminated around the perimeter of the school and from walkways from each car park.
- Play Areas and External Dining Areas
- External Roof Plant – It is assumed that access to all roof mounted plant for maintenance purposes will be limited to the hours of daylight and no artificial and emergency lighting will be installed.
- Car Park – It is proposed that the cars park will be illuminated.

The external lighting will be design in accordance with Environmental Zone E3 'Medium district brightness' as defined in BS EN 12464-2:2014 Section 4.5 Table 2.

The external lighting will be supplied from a distribution board internally to the building and time controlled from the BMS; photocell override will be provided to switch off the external lighting when sufficient daylight is available.

External Lighting shall be controlled by automatically via the BMS using photocell/Time clock with manual override.

External cabling will be installed as follows:

- Within buried cable ducts/draw pits under areas of hardstanding.
- Direct buried in soft landscaped areas.

24. Specialist Lighting Systems

None proposed.

25. Small Power

A small power installation will be provided throughout.

The proposed quantities of small power outlets have been determined from the available FFE layouts.

Socket outlets to have visual contrasting finishes to walls as per Part M.

The small power installation will incorporate power for touchscreen display panels, AV systems, general power outlets and power outlets for equipment and plant.

The installation will generally comprise of twin switched socket outlets, fused connection units and suitably rated isolators.

All socket outlets are to be protected via 30mA RCDs.

Final sub circuits, where used to power computers or other equipment containing mains filters, shall be designed to limit the number of socket outlets fed, such that the RCDs are operated within the manufacturers maximum permissible standing earth leakage current and issues with surge currents are mitigated.

Within all areas (other than plant areas and the technology space) all electrical accessories will have a white plastic finish. Within plant areas, due to robustness, all electrical accessories will have a metal clad finish. The end user has advised that vandal resistant accessories are not required in pupil areas.

Emergency power off pushbuttons will be installed in areas such as the main kitchen and life skills room. These will form part of the emergency cut-off controls and will isolate all supplies to all equipment in the room with the exception of heating, ventilation, lighting, teacher's PC or projector, fridges/freezers and cleaners' sockets.

Small power requirements will be detailed for:

- Hand dryers within changing rooms, and toilet areas and hygiene areas
- Water heaters in WCs
- Water Heater in Learning Base
- Water Heater in the Kitchen
- Water Heater in the Vocational Base

- Water Heater in the staff rooms
- Water Heater in cleaners' stores
- Water Heater in medical treatment rooms
- Electric Hoist within the Hygiene room
- Electric Hoist within the Learning Base
- Electric Showers within each Hygiene room
- Electric showers within the pupil changing spaces
- Each access-controlled doors and central controller
- BMS
- Kitchen equipment
- Design tech equipment

26. ICT/Data/Comms

Galliford Try have appointed Novatia as their IT specialist for this project. Please refer to their information for details.

27. Classroom Communication

No classroom communication has been proposed.

28. Security Systems

A number of security systems will be provided:

- Intruder detection system
- Access control system
- CCTV system
- Intercom system

Intruder Detection System

A grade 2 intruder detection system will be provided

A panic alarm shall be provided at the reception desk.

The system alarm will have remote keypads and be zoned to permit community use out of school hours if required.

Access Control System

Access control will be provided to restrict access within the buildings.

The system will be networkable with all access-controlled doors reporting back to a central location.

The systems will permit controlled access during normal school hours. Outside the school hours all external doors will be manually locked.

Internal & external doors equipped with access control systems and forming means of escape in the event of emergency or fire shall be interfaced with the fire alarm system.

Override (Green) break glass units will be provided on certain access-controlled doors leading onto escape routes.

Intercom System

An audio only Intercom systems will be provided at the following locations and will be linked back to the main reception/office area:

- Pedestrian / visitor gate access
- Staff gate access

CCTV System

The CCTV system will be designed so that the following areas are covered:

- All entrances and exits.
- Recreation areas
- Car Parks
- Delivery areas

The client is to confirm whether any additional cameras are required. All associated cabling, containment, accessories and equipment will be sized to accommodate additional future requirements.

29. Fire Alarm & Detection/Disabled Refuge

An analogue addressable fire alarm system will be provided, linked to a central monitoring station and the BMS.

The fire alarm and detection will be designed in accordance with Category L1 of BS5839.

Full consultation with local Building Control and the Fire Officer will be made in view of providing a fire engineered solution for the building.

The fire alarm system will be provided with battery backup sized to maintain the system for a period of 48 hours.

The main fire alarm panel will be located within the main reception.

Visual alarm devices (VAD's) will conform to BS EN 54-23 and shall only be used in conjunction with audible alarms. VAD's will only be installed in toilets, changing rooms, roof plant areas and, areas with high ambient noise levels and in locations whereby people with impaired hearing may work in isolation.

Deaf alarm beacons shall be fitted in each cubicle rather than a single beacon in the WC suite/changing room.

Final requirements to be agreed in conjunction with Building Control.

All manual break glass units in pupil areas will be key operates to mitigate against false activation of the fire alarm system. Call points in Staff only areas will be standard break glass type.

The fire alarm system will allow notifications to be transmitted to a central monitoring centre of the client's choice.

Void detection will be provided in accordance with BS5839 and by appropriate fire risk assessment.

Interface modules will be provided for systems such as:

- Access control system and local door controllers
- BMS field controllers
- Mechanical plant
- Door hold open devices

Plant interface modules should be capable of isolation by key switch during regular system testing.

Key switch is to be installed adjacent to the main control panel.

30. Public Address

No Public Address (PA) system is proposed.

31. Induction Loops

A mobile induction loop will be provided for use in classrooms

A fixed induction loop will be provided in the main hall and reception desk in the main entrance.

32. Accessible WC Alarms

Disabled toilet alarm systems are to be installed to each of the following areas:

- Accessible Staff Changing rooms/WCs
- Accessible WCs
- Hygiene Room

These will signal back to the reception office when activated.

33. TV Systems

No TV systems are proposed.

34. Period Change

No period bell systems are proposed.

35. Clock Systems

No clock systems are proposed.

36. Lightning Protection

A lighting protection system to the building in accordance with BS EN 62305. The system will, where possible, utilise the available building components (e.g. metallic structure) to form effective component parts of the lightning protection system.

A coordinated surge protection installation will be provided to encompass incoming/outgoing cables (power, signal, telephone and data etc.), main LV switchboard, sub-main distribution boards where feeding external supplies/plant and security system panels.

37. Fire Protection

Fire stopping requirements and/or fire treatment will be required to all electrical outlets, containment etc., which penetrate fire compartmentations.

38. Fire Suppression

None proposed.