

M&E BUILDING SERVICES STAGE 4 REPORT

Wolves Lane

Produced by XCO2 for OrganicLea

March 2023



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ABBREVIATIONS

Abbreviation	M&E equipment
LTHW	Low Temperature Hot Water
DHWS	Domestic Hot Water Services
CWS	Cold Water Services
PV	Photovoltaic Panel
MSDB	Multi-Service Distribution Boards
DB	Distribution Board
SVP	Soil Vent Pipe
AV	Audio-visual
IT	Information Technology
LV	Low Voltage
ASHP	Air Source Heat Pump
RCP	Reflected Ceiling Plan
UFH	Underfloor Heating

	Draft	Stage 4.1	Stage 4.2			
Remarks	P0	T0	T01			
Prepared by	RY / DP	RY / DP	RY / DP			
Checked by	AS / TD	AS / TD	TD			
Authorised by	RM	RM	RM			
Date	07/02/2022	18/02/2022	03/03/2023			
Project reference	9.585	9.585	9.585			

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

This report provides information for the second stage tendering process of the Wolves Lane community project (Phase 1). The Wolves Lane community project in Wood Green consists of teaching, learning, meeting, and events spaces with a focus on food education, circular economy and social inclusion.

The objectives of the report are outlined below:

- To confirm the client's requirement for Building Services
- To outline the requirements for compliance with Building Regulations
- To provide information regarding the proposed building services strategy (including the available utilities information for the site)
- To demonstrate how the services could integrate with the architectural and structural design
- To establish and consolidate design responsibilities for individual services elements
- To enable cost exercise to be undertaken in relation to MEP services

The contractor shall be responsible for carrying out the final RIBA Stage 4c final design, including calculations, confirming final equipment, developing final detailed working drawings and completing the operation and maintenance manual.

We note that the following documentation has not been received at the time of writing, and the findings will need to be considered and incorporated within the construction stage.

- Flood Risk Assessment
- Fire Strategy
- Acoustic Report

This report should be read in conjunction with the design drawings and schedules as prepared by XCO2 – see Appendix A.

1.1 SITE OVERVIEW

The Wolves Lane community project is to be located on the existing 2-acre former plant nursery in Wood Green, Haringey, London (refer to Figure 1). New classrooms, event spaces, offices, warehouse and distribution spaces are to replace several existing buildings and structures to the south of the existing glass houses in order to turn the Wolves Lane site into a hub for community food enterprise. Phase 1 of the development includes Building A, Building B and Building C (refer to

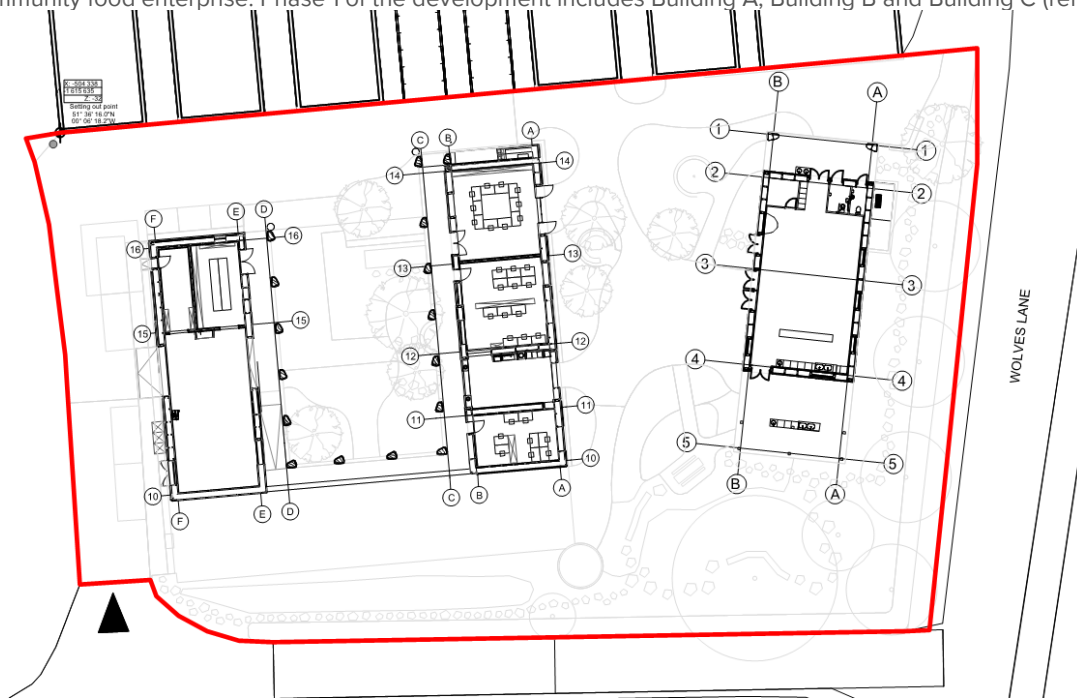


Figure 2) with the latter phases (not covered in this report) including Building D (refer to Figure 3).

Full details of the Wolves Lane community project can be found in the architect's Stage 4 information.

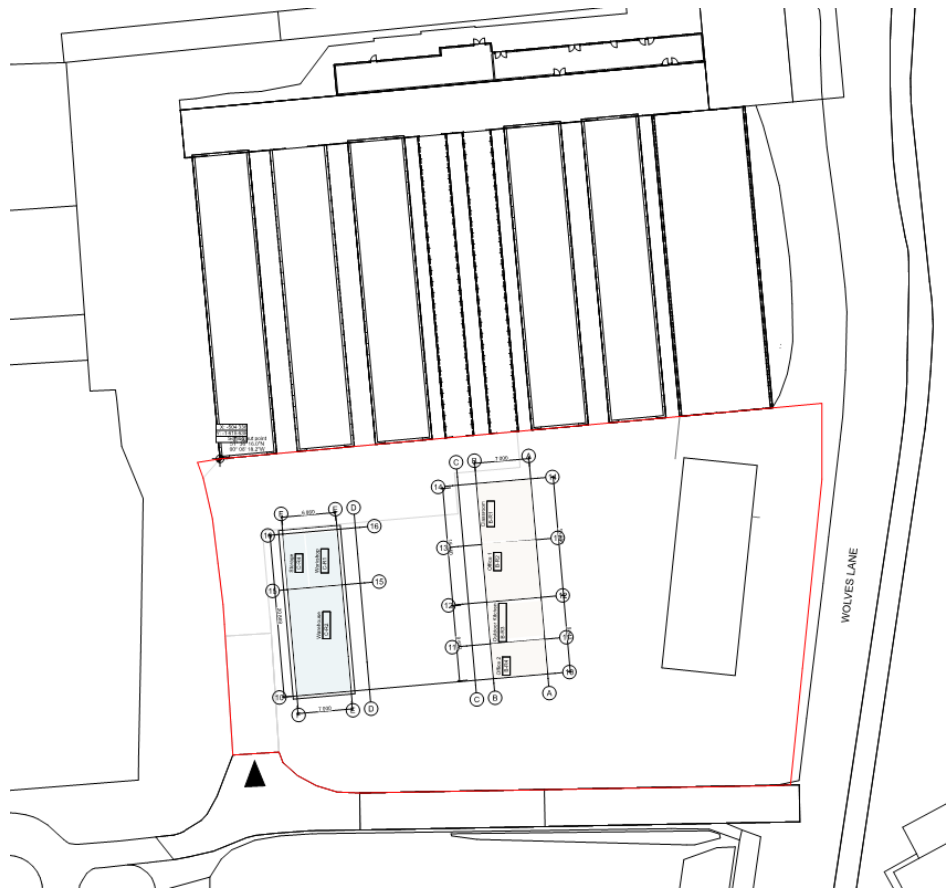


Figure 1. Wolves Lane site (site boundary shown in red)

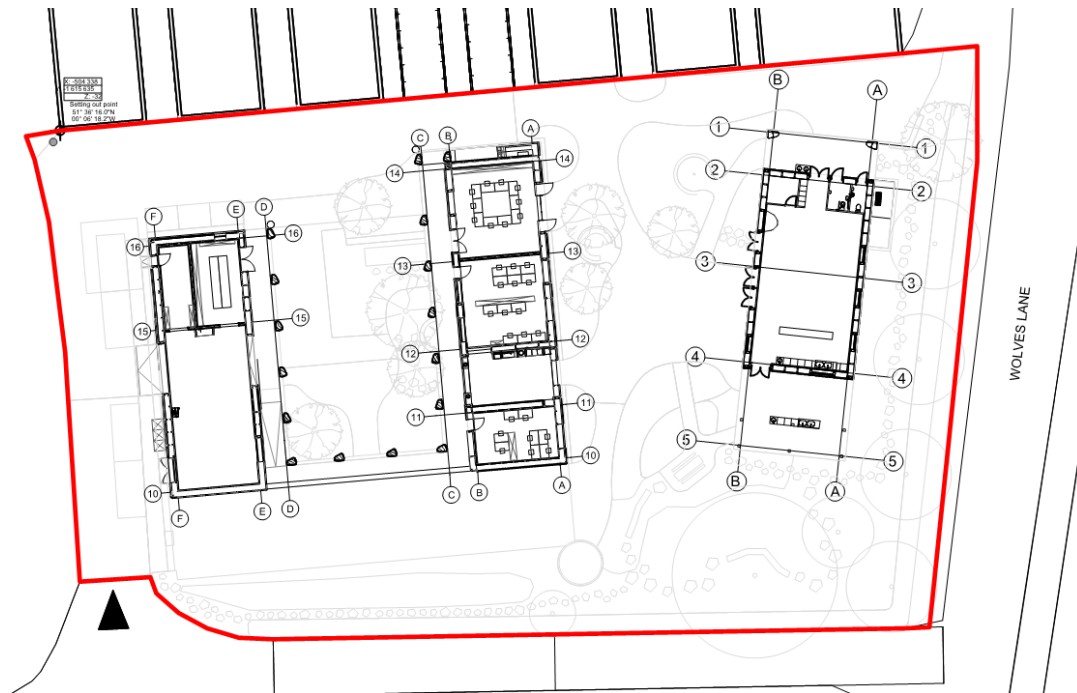


Figure 2: Wolves Lane proposed development showing Phase 1 only.

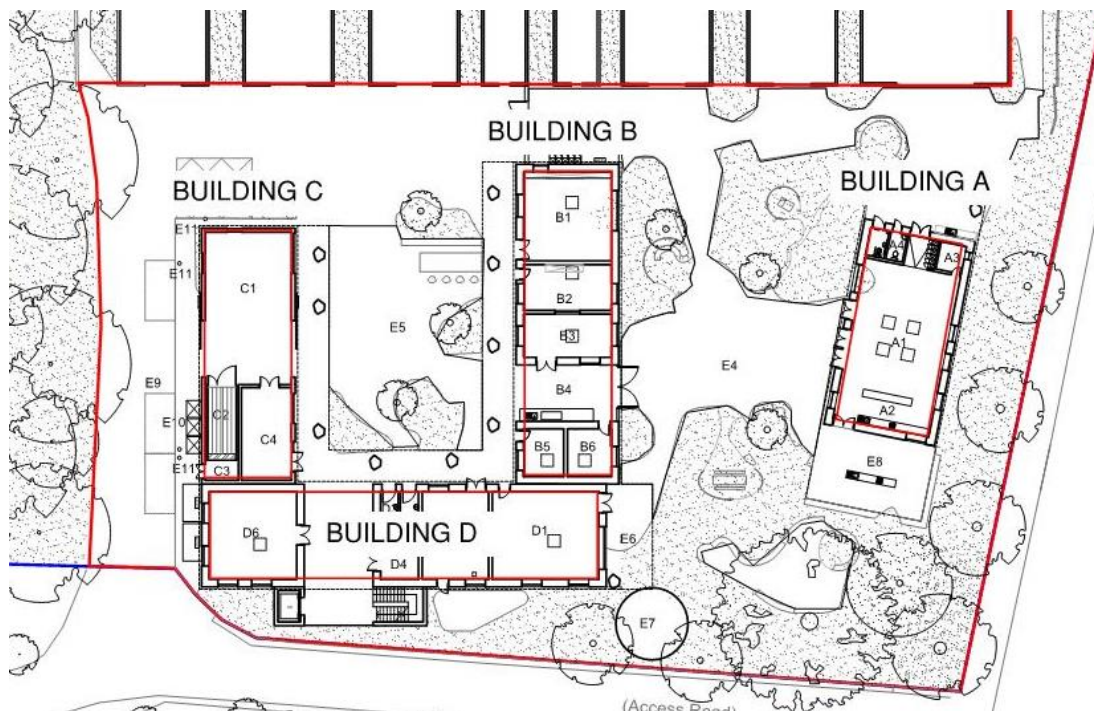


Figure 3. Wolves Lane proposed development of 4 buildings. **Note:** This report only covers Phase 1 (Building A, B and C).

1.2 SERVICES OVERVIEW

This section presents a summary of the proposed mechanical, public health and electrical services strategy.

1.2.1 UTILITIES CONNECTIONS

New utility connections to the site, including water, electricity, and communications. This will require close coordination with the sewer infrastructure (existing and proposed), structure and building foundations, landscaping, and any tree route protection zones.

1.2.2 MECHANICAL SERVICES OVERVIEW

The mechanical services within the development shall comprise of:

- An ASHP system coupled with an underfloor heating system for Building A.
- An ASHP system coupled with an underfloor heating system for Building B.
- Future provision (spurs only) for electric radiant panels for Building C.
- No provision for cooling has been made.
- Ventive Windhive ventilation units (coupled with low level louvres and actuated skylights in Building A) will provide ventilation with heat recovery to Building A and Building B (as noted in Table 6).
- A natural ventilation strategy is proposed for spaces with less consistent occupancy patterns (such as workshops, distribution centres and stores as noted in Table 6).
- Ventilation for the composting WCs in Building A is by others and is to be designed to meet the manufacturers requirements. It is understood that the manufacturer proposes natural extract vent via a stack with make up air from a low voltage fan.
- Purge ventilation shall be via openable windows where possible.
- Kitchen hoods by others, kitchens assumed to be of domestic specification. In Building A, an externally vented hood is proposed.

1.2.3 PUBLIC HEALTH SERVICES OVERVIEW

The public health services within the development shall comprise:

- Clean water supply from utilities.
- Domestic hot water to be produced by local electric water heaters.
- Above-ground, gravity-driven sanitary drainage.

1.2.4 ELECTRICAL SERVICES OVERVIEW

The electrical services within the development will consist of:

- New LV Electrical supply from the local LV network.
- Main panel board for primary distribution in Building A.
- Low Voltage (LV) Distribution Board (DB) Building A, split metered.
- Low Voltage (LV) DB Building B, split metered.
- Low Voltage (LV) DB Building C, split metered.
- Energy-efficient lighting using high performance LED luminaires, to include emergency lighting and 'EXIT' signage.
- Electrical power outlets throughout the building to suit room occupancy requirements and client's brief.
- Electrical supplies to plant items and equipment, as required.
- Lightning protection systems (dedicated system per building), as confirmed by the appointed system specialist.
- Fire alarm systems to suit the building fire strategy (dedicated system per building), with capacity to connect Building D in the future (future construction phase).
- Provisions for telecommunications & data systems installations, security systems, and any other specialist systems distribution.
- Capacity to connect 40kWp PV system in the future.
- Capacity for adding one electric vehicle charging (EVC) point in the future.

1.3 SERVICES ITEMS NOT COVERED IN THIS REPORT

- Acoustic design
- Specialist lighting
- Below-ground drainage
- Fire services and strategy
- Fire Detection & Alarm System final design*
- Provision for sprinkler coverage
- Security systems final design*
- Telecoms systems final design*
- IT and AV systems final design*
- Rainwater (assumed to be external to the building)
- Lightning Protection system design
- PV system design
- EVC system design
- Composting WC design (including drainage and ventilation design)

*Indicative designs included for pricing – all containment and power supplies shall be provided for these systems by the electrical contractor

1.3.1 SPECIFIC PROJECT EXCLUSIONS

The design provided by XCO2 within the services drawings and this document relate to Phases 1 of the development programme. This specifically covers the construction of the new Buildings A, B and C. The overall development master plan includes for an additional building, Building D, which does not form part of this contract, but which will be constructed at a later date. In completing the design and construction of Buildings A, B and C, the future requirements of Building D are to be fully established and incorporated, such that this additional building can seamlessly added later. The development wide infrastructure, utilities connections, and services designs need to account for the requirements of Building D, and allowances have been made within the design undertaken to date to do so.

See the full list of inclusions and exclusions relating to Phases 1 within the architectural package and contract documents.

The following items are specific to the Building Services systems, for which suitable allowances have been made within the site infrastructure and services design up to this point, but for which the final installation of the systems are specifically excluded from this package of works/contract:

- Any works to existing buildings on the development site.
- External works, including all landscaping (inc. cycle storage) and associated services.
- The main entrance canopy and site access gates.
- Electric vehicle charging points – load allowances and have been made, and spare ways provided within the Phase 1 infrastructure to allow for the future installation of the required EVC points.
- PV system panels and inverters - allowances have been made and spare ways provided within the Phase 1 infrastructure to allow for the future installation of the required PV system(s). The architect and structural engineer will need to confirm how the required panels will be retro fitted to the roofs of the Phase 1 buildings, including for any penetrations (inc. waterproofing) through each buildings structure to/from the roof spaces. The contractor shall be responsible for confirming this element with the architects and structural engineers prior to construction and shall make all such allowances required within the Phase 1 works.
- Any final systems installations for Building D.

2.0 CONTRACTOR DESIGN PORTIONS

As part of the technical design scope, the contractor shall include for the following design responsibilities:

- Utilities connections final coordination and design (inc. phasing of the works)
- Noise Calculations and Testing
- Underfloor heating system final design
- Controls (including valve selection and authority)
- Telecommunication & Data Systems Design, to meet client requirements
- Fire Detection and Alarm Systems Final Design
- Access Control Systems Final Design
- CCTV Systems Final Design
- Intruder Alarm Systems Final Design
- Lightning Protection Systems Design
- Fire Services Systems and all associated electrical supplies (if applicable)
- Composting WC design (including drainage and ventilation design)

The M&E Sub-Contractor shall include for the above Contractor Design Portions (CDP). For these elements, they shall evaluate, audit, and adopt at contract, with suitable design costs identified for the M&E Sub-Contractor to develop and complete the design of these CDP elements to be submitted for approval by the client and architect (as XCO2 has no ongoing appointment through the construction stage) and installation. No variations shall be considered for these elements once the full contract is placed.

3.0 SUMMARY OF CONTRACTOR SCOPE

The contractor will be responsible for completing the works in line with the requirements of this report, the schedules and M&E drawings. As part of these works, the contractor shall be responsible for the following:

- The contractor must comply with current health and safety legislation, codes of practice, sector guidance and health & safety publications
- The contractor shall organise/attend meetings, supply and deliver equipment to site, erect and connect all plant, equipment and associated services, test on site, commission and performance test.
- The contractor shall provide a detailed method statement detailing the works procedure and programme for works.
- The contractor shall familiarise themselves with all documents and requirements relevant to the job, including other consultants' reports, planning requirements and client requirements, and implement all requirements into their final design and installation.
- The contractor shall undertake and submit a risk assessment, which highlights and mitigates where possible, risk associated with the works. Risks that cannot be mitigated must be managed under the Construction Design Management guidance.
- The contractor shall survey the site as necessary to complete the works.
- The contractor shall provide all necessary lifting equipment to undertake the works.
- The contractor shall provide items, accessories or apparatus which may not have been specifically mentioned but which are usual or necessary for the fabrication, handling during installation, or to achieve and maintain the performance requirements and safe operation.
- The contractor shall provide all necessary support framing for erecting equipment, plinths and the necessary vibration mounts/pads.
- The contractor shall provide Operation & Maintenance Manuals and record information.
- The contractor will be responsible for liaising and coordinating with utility authorities, to carry out and complete all required utility connections for the development (incl. completion of applications for revised quotes). This includes the confirmation of all utility routes and supply arrangements as currently proposed (see Section **Error! Reference source not found.** and information in Appendix A for further details).
- The contractor shall provide local power supplies and cabling to the ancillary mechanical equipment and lighting.
- The contractor shall coordinate and supply all site temporary power supplies required in order to complete the works.
- The contractor shall conduct detailed calculations to ensure noise from services equipment does not cause nuisance to adjacent rooms/ spaces and comply with the client/planning acoustic requirements.
- The contractor is expected to complete/develop not only the works listed in this document, the associated drawings and schedules, but also all additional building services works to create complete working and operational systems in line with the intent of this document. If additional design development is required by the contractor to complete the works, the contractor shall undertake the necessary design development and submit it to the client and architect for approval (as XCO2 has no ongoing appointment through the construction stage).

As standard industry practice, the contractor shall produce a final Stage 4c design (for construction) in line with the BSRIA design framework documentation. The contractor will be responsible for producing fully co-ordinated working drawings and associated builder's work drawings representing actual intended or procured plant and equipment in final locations and coordinated with final architecture, structure, and landscaping. The contractor will submit these drawings to the above-mentioned design team members for review and approval prior to installation.

3.1 PROGRAMME

The contractor shall prepare, maintain, and monitor a detailed programme for all aspects of the Building Services Works, including:

- Detailed programmes for design, drawing production, procurement, installation, pre-commissioning, inspection, testing, commissioning, demonstration, handover information, defects correction etc.
- Revise the programme if any circumstances arise that impact on the programme.
- Monitor and report regularly on the ongoing progress of the procurement, manufacture, installation, and commissioning of all plant items.
- Following the appointment immediately provide for the Contract Administrator (CA) a detailed programme listing all installation drawings, calculations, and schedules plus the required approval dates.
- Provide commencement and completion dates of the equipment to be installed.
- Identify items, which are on the critical path and give the dates by which they need to be ordered.
- Ensure that the programme is co-ordinated with all programmes for items of work which form part of the project, but which are not part of the Works.
- Prepare and provide installation drawings, calculations, and schedules in accordance with the programme.
- Attend monitoring meetings at the request of the CA.
- Make available all information required for the CA to accurately assess progress.
- Progress negotiations with Statutory Authorities to ensure that all underground Works are completed in accordance with the overall programme.

3.2 DESIGN, DETAILING & SELECTION OF EQUIPMENT & MATERIALS

The works described in this document are to be undertaken by specialist MEP sub-contractors. If the head contractor chooses to progress construction without these sub-contractors completing BSRIA RIBA Stages 4b and 4c, then the head contractor shall be fully responsible for the total design and installation of the works.

The drawings produced by XCO2 are in PDF format. Final shop, working and as-installed drawings will be produced by the contractor in DWG format. The contractor will produce those drawings themselves. XCO2 dwg. files will not be supplied to the contractor.

As part of the works – the contractor will be responsible for the development/production (to RIBA stage 5 and 6) and supply and installation of the following:

- Equipment Data Sheets/ Schedules
- CDM Hazard Identification & Risk Assessments
- Fully evaluate and submit a detailed report on any alternative equipment proposed.
- Fully re-evaluate and submit a detailed report on all parts of the Works Installations and building design affected by any alternative equipment proposed.
- Safety Method Statements
- Utility and incoming services works and utility authority applications
- Method Statements
- Installation/shop Drawings
- Builders Work Drawings
- Installation Wiring Drawings
- Specialist Drawings
- Manufacturer's Drawings
- Manufacturer's Certified Drawings
- Final Calculations: Pump Duties
- Final Calculations: Pipe sizes

- Final Calculations: Fan Duties
- Final Calculations: Duct sizes
- Final Calculations: HVAC System Noise Attenuation
- Design of Supports
- Design of Access Ways
- Design of Guide & Expansion Systems
- Design/Selection of Fire Stopping
- Final Selection of Valves
- Final Selection of Dampers and Actuators
- Selection of Anti-Vibration Systems to meet the projects acoustic/support requirements
- Final Selection of Grilles & Diffusers (to be approved by the architect)
- Selection of Louvres (to be approved by the architect)
- Builders work Penetrations and Making Good
- Containment and Ducts for Incoming Utilities Services
- Final Containment Routes and Sizes
- Final Sizing of all Cables and Circuit Protective Devices (to suit final installation methods)
- Support and anti-vibration measures for equipment ductwork, pipework, and electrical containment
- Liaising and coordinating with manufacturers and specialists to ensure final equipment selection and design is in line with their requirements and warranties
- Implementation of environmental certification actions

The above gives an overview of contractor responsibilities and is not conclusive.

XCO2 currently have no ongoing scopes through construction and so all construction level information produced by the contractor shall be submitted to the client and architect for review and sign off. The contractor will retain design responsibility for any variations made to the original design and specification.

3.3 COMMISSIONING & TESTING RECORDS

The contractor must provide commissioning records and submit sample commissioning and testing record sheets to the client. The following must be addressed with regards to commissioning & testing records.

- Ensure records are completed in legible, neat writing
- Ensure up to date design data has been added on test sheets before commissioning work is started
- Ensure that relevant information is recorded during the inspection, checking, pre-commissioning, commissioning and testing procedures

For further details refer to Section 9.0.

3.4 MANUFACTURER'S GUARANTEES & WARRANTIES

The contractor must provide manufacturers' guarantees and warranties for materials and products.

The contractor must also ensure that manufacturers' guarantees and warranties are valid up to the end of the Defects Liability Period following practical completion of the works or as identified below.

Table 1: Manufacturer's Guarantees & Warranties*

Type	Commencing from	Duration
Manufacturers' Guarantees & Warranties	Practical Completion	12 months
Extended Guarantees for Repair under Defects Liability Period	Date of Repair	12 months
Guarantee of availability of spares Practical Completion	Practical Completion	10 years
Longer term Manufacturers' Guarantees & Warranties	Practical Completion	As agreed with client

*Durations shown are for guidance only and must be confirmed with the client (if not already done so during the tender process). No variations shall be accepted where longer/additional warranty periods are required.

The contractor must address the following with regards to manufacturer guarantees and warranties.

- Ensure materials and products normally guaranteed by the manufacturers for a period longer than that defined above remains under guarantee for the maximum period
- Provide an extended guarantee period from the date of the repair for any system part repaired during the Defects Liability Period as identified in the table above, except for normal wear and tear
- Ensure any maintenance required by the supplier is provided before Practical Completion and that records are kept and included in the O&M Manuals

4.0 RESPONSIBILITY MATRIX

The following responsibility sets out the contractor's duties and responsibilities in developing the design to construction level and in completing the works.

Based on BSRIA BG 6 5th edition PROFORMA 4: TECHNICAL DESIGN RESPONSIBILITIES (RIBA STAGE 4) Some activities in RIBA Stage 4 may continue after the start of the project's construction stage. L - lead, R - review, S - support					XCO2	
Project: 9585 - Wolves Lane Engineer: RY/DP Date: 17/02/2022						
NOTE: Main Contractor to take responsibility for M&E Sub Contractor responsibilities prior to the appointment of M&E Sub Contractor						
Ref	Design activity in connection with building services	Responsible party				Comments
		XCO2	Main Contractor	M&E Sub Contractor	Other	
General obligations, external liaison (statutory bodies, utilities)						
4.1.1	Carry out ongoing checks for compliance with regulations	L/S		S/L	R	R - approved inspector L & S switch once sub-contractor design begins
4.1.2	Advise on impact of any changes from scheme used to calculate the Building Emissions Rate for Building Regulations energy compliance and (if relevant) EPC	L		S		Dependent on if XCO2 appointed for Part L or not
4.1.3	Provide information for pre-site building control approval	L			R	R - approved inspector
4.1.4a	Obtain initial quotations for incoming services based on initial agreed building loads	L	R	R		
4.1.4b	Obtain final quotations for incoming services based on final agreed building loads	R	R	L		
4.1.5a	Seek initial utility company comments on the spatial requirements and builders' work associated with the provision of incoming services	L	R	R		
4.1.5b	Seek final utility company comments on the spatial requirements and builders' work associated with the provision of incoming services	R	R	L		
Client liaison (briefing, handover, surveys)						
4.2.1	Prepare the building services Employers Information Requirements in accordance with PAS 1192-2	L			R	R- client
4.2.4	Define the scope and content of operating and maintenance manuals appropriate for the project	L				
4.2.5	Review the design against operational design targets, involving the future building manager(s) and update/reissue design reports, specifications and/or Soft Landings reports	L				
4.2.6	Define the requirement for handover information	L				
4.2.7	Specify form of delivery and method of production of handover information	S			L	L- client
4.2.8	Prior to commencement of works, prepare method statement for the maintenance of existing services (if required)	L	R	R		
Team liaison (builders' work, spatial coordination, energy targeting)						
4.3.1	Undertake checks in relation to Building Regulations energy performance compliance and (if relevant) EPC criteria.	L		S	R	R- approved inspector
4.3.2	Review proposals from others in relation to Building Regulations energy performance compliance and (if relevant) EPC criteria.	L		S	R	R- approved inspector
4.3.3	Review dimensional and other numerical tolerances to be applied to building services design and deliverables at different project stages.	L		S		
4.3.4	Make submissions to obtain Building Regulations approval in relation to energy performance	L			R/S	R/S - approved inspector
4.3.5	Design weatherproofing details for all services passing through external elements of the building	S			L	L - architect
4.3.6	Provide typical details for all acoustic stopping for services penetrating builders' work elements			L	S	S - acoustic consultant (if appointed)
4.3.8	Develop and update building services Task Information Delivery Plan.			L		As per PAS 1192-2.
4.3.9	Develop and update Master Information Delivery Plan during project.		L	S		As per PAS 1192-2.
4.3.11	Carry out project-wide design review of feasible-generic design for building services.	L	R	R	S	By Lead Designer/Coordination Manager S - design team
4.3.12	Agree the principles relating to reflected ceiling plans.	S			L	L - architect
4.3.13	Carry out Stage 4 coordination between building services, structure and architecture prior to selection or procurement of actual equipment. (Feasible for building services contractor/ trade-contractor pricing and installation without major re-routing).	L			S	Major spaces: plant rooms, risers, ceiling and floor voids. Removal of critical clashes. S - architect
4.3.15	Consider requirements for cable pulling (routes and anchor points).					
4.3.16	Review design risk assessments incorporating specialist design input.	S		L		
4.3.17	Check the provision for and adequacy of builders' work information provided for specialist elements (including CDP).	S	L	S		
4.3.18	Select and detail sleeves, inserts, frames, and fixing anchors, and any other items required to be cast or built into the structures by others, including coordination of positions to such extent and accuracy to allow structural construction to proceed.	S	L	S		
4.3.19	Detail and coordinate all access platforms, stairs, rails and protection elements required for future maintenance and operation of plant/equipment.	S		S	L	L - architect
4.3.20	Carry out final detailed location and dimensioning of 2nd fix equipment based on architectural information.	R		L		
4.3.21	Determine location of access panels.	R		L	R	For example, rodding eyes and pipework valves. R - review and final confirmation by architect

Ref	Design activity in connection with building services	Responsible party				Comments
		XCO2	Main Contractor	M&E Sub Contractor	Other	
4.3.22	Carry out project-wide design review of coordinated-generic design.	R		L		See section 3.8 of BG 6
4.3.23	Confirm builders' work information for specified equipment or materials, or where alternatives to those provisionally or pre-selected are agreed.	S		L		Bases, supports and structurally significant holes
4.3.24	Provide final details for all acoustic stopping for services penetrating builders' work elements			L	S	S - acoustic consultant (if appointed)
4.3.25	Carry out Stage 4 coordination between all building services trade contractors after the selection or procurement of actual equipment.	R		L		Removal of critical clashes R - review of technical submittals and installation drawings
4.3.26	Carry out Stage 4 coordination between the building services, structure and architecture after the selection or procurement of actual equipment.	R		L		Removal of critical clashes R - review of technical submittals and installation drawings
4.3.27	Prepare detailed construction programme for installation and remaining design activities.		R	L		
4.3.28	Carry out project-wide design review of coordinated-specific design.	R		L		
Selection of plant and specialist designers						
4.4.1	Develop initial technical design for systems to be procured as Contractor Design Portions (where building services contractor not already appointed).	L				
4.4.2	Advise of significant allowances or constraints incorporated in the main design that may affect the specialist design.	L				
4.4.3	Obtain indicative quotations for plant not requiring specialist design.	S			L	L - Cost consultant
4.4.4	Review that all plant and equipment incorporated into the works can be safely maintained and accessed in compliance with current legislation.	L		R		
4.4.5	Check plant and system sizing once Stage 4 coordination of the works has been undertaken with selected or procured equipment (4.3.25).	R		L		Removal of critical clashes
4.4.6	Select plant, equipment, components and material to meet the specified performance. Where items or manufacturers differ from provisional selections ensure they are fully compatible with all the other system parameters, components and design requirements.	R		L		
4.4.7	Advise whether the proposed alternative items or manufacturers comply with the selection criteria.	R		L		
4.4.8	Advise whether the proposed alternative items or manufacturers are acceptable.	R		L		
4.4.9	Re-evaluate all parts of the services design which may be affected by acceptance of alternative items or manufacturers.	R		L		
4.4.10	Re-evaluate all parts of the architectural or structural design which may be affected by acceptance of alternative items or manufacturers.	R		L	R	R - architect and structural
4.4.11	Amend the building services design to incorporate agreed alternative items or manufacturers	R		L		
4.4.12	Prior to confirming agreed final fixed costs with the client, agree final equipment selections and manufacturers.	R		L	R	R - cost consultant and client
4.4.13	Monitor the specialist design input for compliance with the design intent.	R		L		
4.4.14	Evaluate the impact of the specialist design on those parts of the overall design that are provisional.	R		L		
4.4.15	Monitor the ongoing progress of the procurement, manufacture, installation and commissioning of all plant items.			L	R	R - project manager
4.4.16	Review all plant and equipment incorporated into the works with respect to safe maintenance and access in compliance with current legislation.	R		L		
Mechanical design						
4.5.1	Determine parameters of flues to incorporate the requirements of the plant manufacturer, building control, environmental health officer and current legislation such as the Clean Air Act.	L		R		
4.5.2	Finalise detailed design calculations for all mechanical services being included in the technical design in accordance with recognised national standards.	L		R		
4.5.3	Determine detailed flue, duct and pipe sizes and routes.	L		R		
4.5.4	Following equipment procurement, modify distribution systems and equipment capacities as may be required as a result of coordination (4.3.25).	R		L		
4.5.5	Design all necessary facilities for flushing, and commissioning.	R		L		
4.5.6	Size, select and determine final locations of commissioning sets based on coordination of procured equipment (4.3.25).	R		L		
4.5.7	Carry out final sizing of sections of ductwork between terminal units and diffusers to ensure the specified acoustic criteria and duct velocities.	R		L	R	R - acoustic consultant
4.5.8	Carry out final detailing and confirm the location and sizes of duct connections to external louvres.	R		L	R	R - architect
4.5.9	Carry out detailed design of anchors, guides and other provision for movement of services and systems due to thermal expansion and contraction and building movement.	R		L		

Ref	Design activity in connection with building services	Responsible party				Comments
		XCO2	Main Contractor	M&E Sub Contractor	Other	
4.5.10	Check fan and pump system resistances based on coordination of procured equipment (4.3.25).	R		L		
4.5.11	Check system water capacities and quantities of chemical additives based on the final equipment selection.	R		L		
4.5.12	Carry out final detailing of drain and vent points.	R		L		
4.5.13	Carry out final selection of all terminal devices.	R		L	R	R - architect
4.5.14	Carry out final selection of pressurisation units and expansion vessels.	R		L		
4.5.15	Detailed design and sizing of refrigerant pipework between items of equipment provided under the contract works based on the final equipment selection and coordinated working drawings.	R		L		
4.5.16	Select and confirm location of fire dampers and any other fire-stopping for mechanical systems.	R		L	R	R - architect and fire engineer
4.5.17	Select and confirm location of control dampers and control valves to achieve the specified function and to suit the characteristics of items served and final system configurations based on the final equipment selection and coordinated working drawings.	R		L		
4.5.18	Carry out final selection of control valves to suit pipework and authority of controls based on final installation drawings.	R		L		
4.5.19	Carry out final selection of all anti-vibration mountings.	R		L	R	Additional review by Acoustics Consultant and Architect
4.5.20	Design review.	L		S		
Electrical design						
4.6.1	Finalise detailed design calculations for all electrical services being included in the technical design in accordance with recognised national standards.	L		R		
4.6.2	Determine detailed cable and containment sizes, switchgear sizes and locations, control panel locations, user equipment sizes and locations, and sensor locations for small power, lighting, high voltage systems, and metering.	L		R		
4.6.3	Determine approximate sensor locations, control panel locations for fire safety and security systems.	L		R	R	Final location by appointed specialist
4.6.4	Design automatic controls systems as required to meet the operational, functional and spatial requirements of the specification.	R		L		
4.6.5	Determine control strategy for lighting.	L		R	R	R - client and architect
4.6.6	Design fixing, connection, earthing and bonding details as required for final installation of lightning protection systems.	R		L	S	S - CDP item, support from appointed specialist
4.6.7	Modify distribution systems and equipment capacities as may be required as a result of Stage 4 coordination with intended or procured equipment.	R		L		
4.6.8	Verify spatial requirements for cable pulling and installation.	R		L		
4.6.9	Verify cable sizes for primary electrical supply based on coordination of procured equipment (4.3.25) and cable lengths.	R		L		
4.6.10	Verify cable sizes for specialist systems based on coordination of procured equipment (4.3.25) and cable lengths.	R		L	S	Such as fire alarm, datacomms, CCTV, and access control S - CDP item, support from appointed specialist
4.6.11	Select and confirm location of fire-stopping for electrical systems.	R		L	R	R - architect and fire engineer
4.6.12	Check control panel cable entry and exits are possible in the final location and that safe operating and maintenance clearances are provided.	R		L		
4.6.13	Check compatibility of building services plant and equipment with the controls systems.	R		L		
4.6.14	Carry out design and incorporation of all interfaces (including relays or other devices or modifications to hardware or software).			L		
4.6.15	Incorporate final information for electrical systems into the design via schedules or BIM objects, including control addresses for lighting and fire alarm systems, BMS points.	R		L	S	
4.6.16	Design review.	L		S		See section 3.8 of BG 6
Public health design						
4.7.1	Finalise detailed design calculations for all public health services being included in the technical design in accordance with recognised national standards.	L		R		See Appendix B for specific services
4.7.2	Determine detailed pipe sizes and routes for gravity and pumped drainage systems.	L		R		Above ground drainage only. Below ground by structural/civil engineer
4.7.3	Determine final positions of cast-in drainage gullies ensuring coordination with structural design and final mechanical plant locations.	R		L	R	R- architects and structural/civil engineer
4.7.4	Finalise vent termination locations to coordinate around final AHU and air vent intake positions.	R		L		
4.7.5	Determine final power, BMS and Controls interface requirements from equipment.	R		L		

Ref	Design activity in connection with building services	Responsible party				Comments
		XCO2	Main Contractor	M&E Sub Contractor	Other	
4.7.6	Coordinate all surface water domestic and waste water pipework rodding eye locations with other services, structural and architectural elements to ensure suitable maintenance access can be provided.	S		L	R	R - architect S - locations defined by XCO2
4.7.7	Verify storm water discharge flow rate satisfies planning and statutory authority requirements including SuDS.	S		R	L	L - SuDS typically by civil/structural engineer
4.7.8	Determine detailed routing of pipework and drainage to/from risers.	L		R		
4.7.9	Carry out detailed design of pipework gradients for builders' work and coordination.	R		L		Includes domestic and waste drainage (gravity/pumped), surface drainage and condensate runs
4.7.10	Modify distribution systems and equipment capacities as may be required based on coordination of procured equipment (4.3.25).	R		L		
4.7.11	Make allowance for anchors, guides and provision for movement of services and systems due to thermal expansion and contraction and building movement.	R		L		
4.7.12	Select and confirm location of fire collars and any other fire-stopping for public health systems.			L	R	R - architect and fire consultant
4.7.13a	Check all initial surface water, domestic and waste drainage discharge flow rates with external civils interface package.	L		R		
4.7.13b	Check all final surface water, domestic and waste drainage discharge flow rates with external civils interface package.	R		L		
4.7.14	Check all initial utility interface details (locations, pipe sizes and invert levels) with civils package to ensure internal and external services coordinate.	L		R		
4.7.14	Check all final utility interface details (locations, pipe sizes and invert levels) with civils package to ensure internal and external services coordinate.	R		L		
4.7.15	Design review.	L		S		See section 3.8 of BG 6
Commissioning						
4.8.1	Review all designs to ensure that systems are commissionable.	R		L		
4.8.2	Determine witnessing and commissioning requirements for items installed on site.	R		L		Other than those covered by 3.8.2
4.8.3	Identify and incorporate into system designs the essential components and features necessary to enable the proper commissioning of building services (including preparation).			L		For example, including test points
4.8.4	Review the commissioning plan.	L				
4.8.5	Update the commissioning plan.			L		
4.8.6	Review proposals and method statements from prospective commissioning specialist(s).	R		L		
4.8.7	Finalise location of test points.			L		
4.8.8	Appoint an independent specialist commissioning contractor responsible for testing and commissioning.			L		See also 3.8.4
Deliverables - including drawings, specifications, reports						
4.9.1	Provide a technical design report up to the level of feasible-generic components and equipment, as an update to the Developed Design Stage 3 report	L				
4.9.2	Provide health and safety risk assessments for the design.	L			S	S - CDM principle designer
4.9.3	Provide an approximate cost plan using feasible-generic components and equipment for mechanical, electrical and public health services based on floor area, building type and typical system type or other agreed approximate methodology.	S		S	L	L by Cost Consultant
4.9.4	Provide any information that is required in connection with any application for planning permission including reviews and/or appeals where applicable and related to building services.	S		S	L	L - planning consultant
4.9.5	Provide updated estimate of regulated [RP] in-use energy consumption.	L				If required
4.9.6	Provide updated assessment of comfort conditions and overheating risk	(L)				(L) dependent on appointment
4.9.7	Provide updated report on adequacy of existing mechanical, electrical and public health services to incorporate extended or refurbished works.	L		R		
4.9.8	Provide technical design or performance information and specifications to modify, refurbish or replace existing mechanical, electrical and public health engineering services and plant to incorporate new and extended engineering services.	L		R		
4.9.9	Provide tender documentation for inclusion in a tender package if the procurement method requires it.	L			R	R - client
4.9.11	Provide information for detailed whole-life cost studies.	S			L	L - cost consultant
4.9.12	Provide information to the Environmental Assessment Method Assessor to allow credits to be checked and awarded.	L			S	S - Architect and environmental assessor
4.9.13	Provide specifications for final commissioning and handover.	R		L		

Ref	Design activity in connection with building services	Responsible party				Comments
		XCO2	Main Contractor	M&E Sub Contractor	Other	
4.9.14	Provide detailed commissioning plan.	R		L		
4.9.15	Provide information for Construction Phase Plan as per CDM Regulations.			L		
4.9.17	Provide schedules to cross-reference cables to containment systems.	R		L		
4.9.19	Provide Technical Design drawings.	L		R		
4.9.20	Provide Technical Design schematics.	L		R		
4.9.21	Provide updated schedule/drawings of builders' work information based on technical design information.	S			L	L - architect and structural engineer to adopt information onto their builders work drawings. S - provide information
4.9.22	Produce materials and workmanship specifications.	L				
4.9.23	Produce performance specifications for specialist designed elements of the works.	L		R		
4.9.24	Produce equipment schedules.	L				
4.9.25	Provide initial design stage information towards log book and/or building user guide(s).	L		R		Design stage only, construction information from Contractors
4.9.26a	Provide initial mechanical, electrical and public health information necessary to obtain statutory approvals.	L		R		
4.9.26b	Provide final mechanical, electrical and public health information necessary to obtain statutory approvals.	R		L		
4.9.27	Provide detailed specifications for mechanical, electrical, public health services, if relevant.	L				
4.9.28	Sign off detailed specifications.				L	L - Client
4.9.29	Contribute to draft construction programme for the project.		R	L		
4.9.30	Produce Construction Phase Plan before work starts on site, as per CDM Regulations.			L		
4.9.32	Provide building services coordinated working drawings.	R		L		
4.9.33	Provide coordinated reflected ceiling plans based on agreed architectural information for all components.	R		L	R	R - architect
4.9.34	Provide coordinated room elevations based on agreed architectural information for all components.	R		S	L	L - architect
4.9.35	Provide detailed cost plan.	R		L	R	R - cost consultant and client
4.9.36	Provide final construction programme.	R	R	L		
4.9.37	Provide detailed commissioning programme.	R	R	L		
4.9.38	Provide updated Technical Design model with revised or new design details.	R		L		Using specific objects and coordinated to demonstrate resolution of clashes between architecture, structure and services in line with level of clash resolution and agreed tolerances.
4.9.39	Provide report on the specialist designers' proposals within the main contract.	R		L		
4.9.40	Provide a report in consideration of any alternative plant, equipment, and component selections.	R		L		
4.9.41	Provide calculations and/or software files in support of specialist design proposals.	R		L		

5.0 REGULATIONS AND CODES OF PRACTICE

Unless otherwise stated, the installations shall conform to the current requirements of the following:

- a) Latest relevant BS Standards and Codes of Practice
- b) The Health and Safety at Work Act
- c) The Management of Health and Safety at Work Regulations
- d) The Electricity at Work Regulations
- e) The Provision and Use of Work Equipment Regulations
- f) The Construction (Health Safety & Welfare) Regulations
- g) The Confined Spaces Regulations
- h) The Construction (Design & Management) Regulations
- i) The Work Place Health Safety and Welfare Regulations
- j) Current Building Regulations
- k) Local Authority Regulations and By-laws
- l) Electricity Supply Regulations
- m) CIBSE Code of Interior Lighting
- n) HVCA Ductwork Specification DW 142, DW144 and DW 172
- o) Statutory Authorities/ Undertakers By-laws, Regulations and Recommendations
- p) CIBSE Guides and Commissioning Codes including Lighting Levels
- q) IEE Regulations Latest Edition including all the latest amendments (BS7671)
- r) Local Water Authorities By-laws
- s) The Gas Safety (Installation and Use) Regulations
- t) Environmental & Public Health Approvals
- u) All current Technical Memoranda
- v) CIBSE Energy Codes
- w) CDM regulations
- x) COSHH regulation
- y) IGEM Documents

The M&E sub-contractors are to obtain an understanding of the above and ensure that the installations comply in all respects.

Inform the CA where compliance with the design or specification may lead to non-compliance with any Regulations or Codes of Practice when systems are installed or in operation.

5.1 APPROVED DOCUMENTS

Under United Kingdom (UK) law, the residential development shall be in accordance with the following documents approved under the Building Regulations,

- Approved Document F Means of ventilation.
- Approved Document G Sanitary, hot water safety and water efficiency.
- Approved Document H Drainage and waste disposal.
- Approved document L Conservation of Fuel and Power
- Approved Document M Access and use of buildings.
- Approved Document J Combustion appliances and fuel storage systems.
- Approved Document B Fire Safety.
- Approved Document P Electrical Safety.
- Approved Document S Infrastructure for The Charging of Electric Vehicles.

5.2 M&E STANDARDS

The building services design is to be based on the Chartered Institute of Building Services (CIBSE) design guidelines. A list of the guidelines is given below for reference.

- CIBSE Guide A: Environmental design
- CIBSE Guide B: Heating, air conditioning and refrigeration
- CIBSE Guide C: Reference data
- CIBSE Guide D: Transportation systems in buildings
- CIBSE Guide E: Fire safety engineering
- CIBSE Guide F: Energy efficiency in buildings
- CIBSE Guide G: Public health engineering
- CIBSE Guide H: Building control systems
- CIBSE Guide J: Weather, solar and illuminance data
- CIBSE Guide K: Electricity in Buildings
- CIBSE Guide L: Sustainability
- CIBSE Guide M: Maintenance engineering and reporting method
- CIBSE SLL Lighting Guides
- CIBSE Technical Manual 39: Building Energy Metering

5.3 ELECTRICAL STANDARDS

The following electrical standards have been adopted for this development.

- BS 7671 Requirements for electrical installations. IET Wiring Regulations (including all amendments).
- BS 6724 Electric cables — Thermosetting insulated, armoured cables for voltages of 600/ 1000 V and low emission of smoke and corrosive gases when affected by fire
- BS 7430 Code of practice for protective earthing of electrical installations
- BS 5839 Fire detection and fire alarm systems for buildings — All relevant parts
- BS 9999 Code of practice for fire safety in the design, management and use of buildings
- BE EN 1838 – Lighting Applications, Emergency Lighting
- BS 5266-1 Emergency Lighting – Code of practice for the emergency lighting of premises
- BS EN 50172; BS 5266-8 Emergency escape lighting systems
- BS EN 62305 Protection against lightning
- BS 8519 Selection and Installation of Fire-resistant Power and Control Cable Systems for Life Safety and Fire-fighting Applications.
- BS 1363 Plugs & Sockets.
- BS EN IEC 61851-1 Electric Vehicle Conductive Charging System

5.4 PUBLIC HEALTH STANDARDS

The public health installation is designed in accordance with the following standards:

5.4.1 DRAINAGE

- BS EN 12056 Gravity Drainage Systems Inside Buildings

5.4.2 WATER SERVICES

- WRAS Regulations (inc fittings)
- BS EN 806-1:2000 Specifications for installations inside buildings conveying water for human consumption — Part 1: General
- BS EN 806-2:2005 Specifications for installations inside buildings conveying water for human consumption — Part 2: Design
- BS EN 806-3:2006 Specifications for installations inside buildings conveying water for human consumption — Part 3: Pipe sizing — Simplified method
- BS EN 806-4:2010 Specifications for installations inside buildings conveying water for human consumption — Part 4: Installation
- BS EN 806-5:2012 Specifications for installations inside buildings conveying water for human consumption — Part 5: Operation and maintenance

5.5 MECHANICAL STANDARDS

The mechanical installation is designed in accordance (but not limited to) with the following standards:

5.5.1 MECHANICAL DESIGN

- BS EN 1264-2 - Water based surface embedded heating and cooling systems - Floor heating: proven methods for the determination of the thermal output using calculation and test methods
- BS EN 1264-5 - Water based surface embedded heating and cooling systems - Heating and cooling surfaces embedded in floors, ceilings and walls - Determination of the thermal output

1.1.1 VENTILATION

- Approved Document F Means of ventilation
- BS 5925 CoP for Ventilation principles and designing for natural ventilation
- BS EN 13779 Ventilation for non-domestic buildings

6.0 DESIGN CRITERIA

6.1 PURPOSE

This MEP report outlines the requirements for the development and provides the contractors with the performance criteria on which this report (and associated design documentation) is based. The Contractor should allow for all necessary materials and work required to ensure that, the outline strategies described in this document and shown on XCO2's design drawings can be designed in detail and installed to fully working and functional systems.

The building services design has been proposed to reduce the consumption of resources such as energy and water, to reduce running costs and to be as sustainable as possible within the project constraints whilst ensuring that the systems are user friendly, easy to maintain and provide optimum levels of comfort and well-being to the building occupants.

6.2 WEATHER CONDITIONS

Table 2. External Design Conditions (extracted from CIBSE Guide A)

Season	Dry bulb	Wet bulb
Summer	28.1°C db,	19.2°C wb
Winter	-4°C db	Saturated

6.3 BUILDING FABRIC ASSUMPTIONS

The recommended U-Values for the floor, walls, windows, roof and the proposed air permeability shall be in accordance with the Energy Strategy and Sustainability Report prepared by XCO2.

Table 3: Thermal Design Conditions

(U-values in W/m ² .K)	
Domestic	
External Walls	Refer to Energy and Sustainability Report
Floor	Refer to Energy and Sustainability Report
Roof	Refer to Energy and Sustainability Report
Windows and glazed doors	Refer to Energy and Sustainability Report
Roof lights	Refer to Energy and Sustainability Report

Proposed Air Permeability refer to Energy and Sustainability Report.

6.4 INTERNAL DESIGN CONDITIONS

Indoor Design Conditions

Table 4: Indoor Design Conditions

Area	Winter	Summer
Building A		
Multi-function space	21°C ± 2°C	N/A
Kitchen	21°C ± 2°C	N/A
Storage	Unheated	N/A
WC's	Unheated	N/A
Building B		
Classroom	21°C ± 2°C	N/A
Office	21°C ± 2°C	N/A
Outdoor Kitchen	Local heating provided by electric radiant panel – for occasional use only	N/A
Office	21°C ± 2°C	N/A
Building C		
Distribution Warehouse	Unheated – future provision for heating provided by electric radiant panels to be provided	N/A
Storage	Unheated	N/A
Workshop	Unheated – future provision for heating provided by electric radiant panels to be provided	N/A

Occupancy Levels

Table 5: Occupancy

Area	Maximum Occupants (as confirmed by the Client)
Building A	
Multi-function space & Kitchen	30*
Storage	1
WC's	4
Building B	
Classroom	20
Office	16
Outdoor Kitchen	5
Office	16
Building C	
Distribution Warehouse	20
Storage	1
Workshop	10

* This is the agreed design occupancy with the client. The client intends to hold occasional events in the space with an occupancy of significantly higher. The heating and ventilation systems are designed to the occupancy figures above, with the associated risks of exceeding these figures agreed by the client.

Ventilation

Table 6: Ventilation Provision

Area	Ventilation Rate	Method
Building A		
Multi-function space	10 l/s/person or to maintain acceptable CO2 levels*	Ventive Heat Recovery unit, actuated skylights and purge ventilators
Kitchen	Design by others	Ventive Heat Recovery units, purge ventilators and local kitchen extract (externally ducted hood)
Storage	5 ACH	Secure louvres
WC's	To meet Part F, Part H and Part L.	Ventilation for the composting WCs in Building A is to be designed by others and is to be designed to meet the manufacturers requirements. It is understood that the manufacturer proposes natural extract vent via a stack with make up air from a low voltage fan.
Building B		
Classroom	As per Building Bulletin 101 Guidance	Ventive Heat Recovery units
Office	10 l/s/person	Ventive Heat Recovery units
Outdoor Kitchen	N/A	N/A
Office	10 l/s/person	Ventive Heat Recovery units
Building C		
Distribution Warehouse	10 l/s/person	Secure louvres unless otherwise agreed by Building Control.
Storage	5 ACH	Secure louvres unless otherwise agreed by Building Control.
Workshop	10 l/s/person	Secure louvres unless otherwise agreed by Building Control.

* The current design is to provide sufficient ventilation rates for the design occupancy of 30 people. In higher occupancy events, an acceptable level of CO2 must be maintained through the use of first actuated skylights in combination with the low level louvres, then through manual opening of windows/doors. A CO2 monitor with a visual indication to the occupants of exceeding acceptable CO2 rates shall be provided to maintain acceptable indoor air quality. Provision has been made for the future retrofit of 3 no. of Ventive Windhives (to replace the skylights).

Noise Conditions

External and internal noise level criteria shall be in line with BS 8233, relevant CIBSE Guides, Building Bulletin 101 (classrooms) and World Health Organisation's guidelines and are to be reviewed in line with any planning conditions related to noise. If required, the contractor shall appoint an acoustic specialist to review the M&E proposals for compliance.

Table 7: Noise conditions

Area	Noise level
Building A	
Multi-function space	NR 40 - 45
Kitchen	NR 40 - 45
Storage	NR 35 - 45
WC's	NR 35 - 45
Building B	
Classroom	NR 35
Office	NR 30 - 35
Outdoor Kitchen	N/A
Office	NR 30 - 35
Building C	
Distribution Warehouse	NR 45 - 55
Storage	NR 45 - 55
Workshop	NR 45 - 55

Electrical Service Requirements

The electricity connection from the power grid should meet the following criteria at the incoming service cut out.

Table 8: Electrical Service Connection from Grid Network

Parameter	Description
Low Voltage	400V (+10/-6%)
Phase	3-phase
Frequency	50Hz
Earthing Provision	Protective Multiple Earthing (TN-C-S), tbc by UKPN
Allowance for export onto grid (not applicable until PV is installed)	G98/G99 approval for export of excess energy from solar panels

Lighting

The lighting systems are designed to take into account the minimum lux levels and control methods given below. Any further final lighting design undertaken by the contractor in completing the works shall follow these criteria unless otherwise agreed with the client and design team.

Table 10: Typical Lighting lux levels

Area	Lux Level	Controls
Building A		
Multi-function space	300	Manual Dimming Switch
Internal Kitchen	300-500	Manual Dimming Switch
External Kitchen	300-500	Manual Switch & daylight sensor
Store/Plantroom	200	Manual Switch
WC's	200	PIR
Building B		
Classroom	500	Manual Dimming Switch
Office 1	500	Manual Dimming Switch
Outdoor Kitchen	300-500	Manual Dimming Switch
Office 2	500	Manual Dimming Switch
Building C		
Warehouse	200	Manual Switch
Storage	200	Manual Switch
Workshop	300	Manual Switch

All Lighting levels will be designed in line with CIBSE and British Standard recommended lighting levels. Above values are for general lighting – additional task lighting will be included where required.

Table 11: Emergency Lighting Lux Levels by Area Type

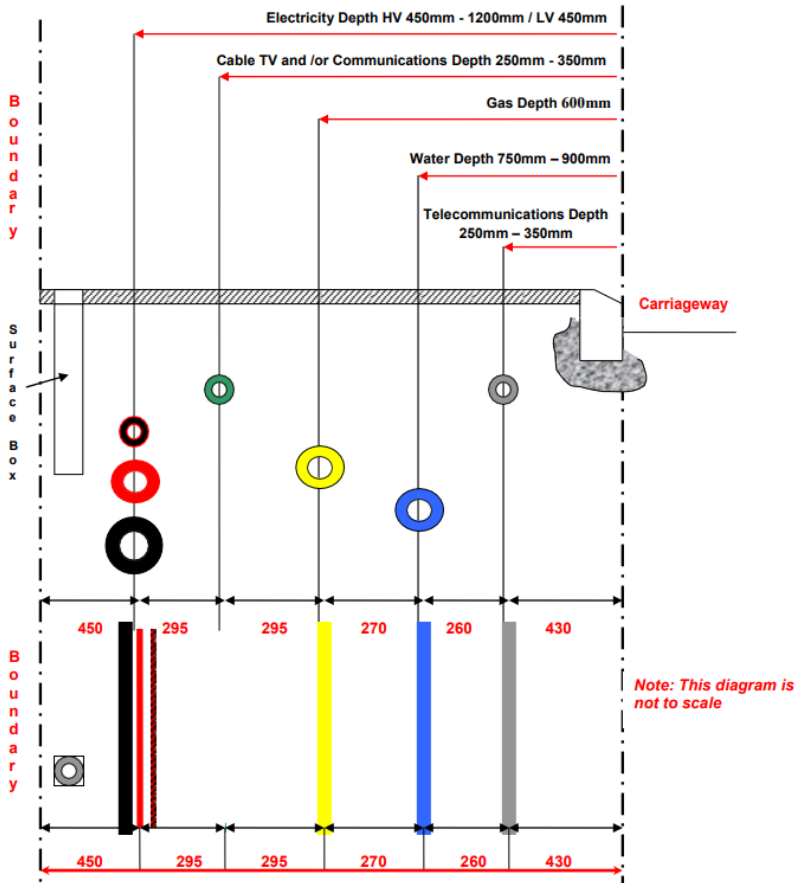
Form	BS 5266 (EN 1838)	Max/Min ration and uniformity
Escape Route (e.g. corridors, stairways etc.)	1 lx min on centre line	Up to 40:1 Max : Min
Open Area (e.g. areas greater than 60m ² , large offices or common areas requires anti panic etc.)	0.5 lx minimum	Up to 40:1 Max : Min
High Risk (e.g. control room, plant room etc.)	10% of normal or 15 lx min	Up to 10:1 Average to min uniformity

General and Emergency Lighting levels will be in line with the latest editions of the British Standards and CIBSE recommended lighting levels. Above values are for general lighting – additional task lighting will be included where required.

7.0 BUILDING SERVICES STRATEGY

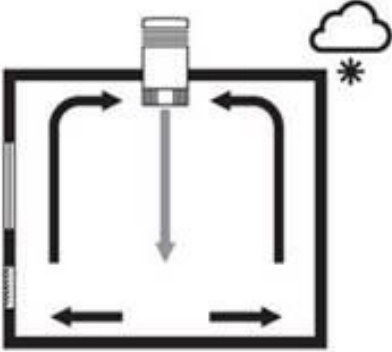
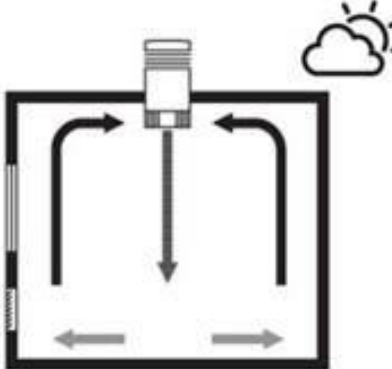
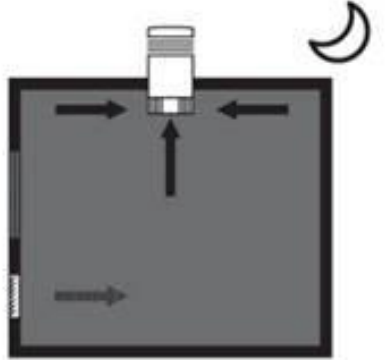
Below is a brief summary of the building services strategy.

Table 9: Descriptions of services

Services	Strategy
Incoming Utility Services/Metering	As part of the works, all new utility services will have to be distributed from existing utility services to the development. Indicative services depths are given below.  The development will be served by: • An incoming water bulk supply (Thames Water), which will be installed up to a single bulk water meter recessed in the ground – no submetering of the buildings has been allowed for as agreed with the Client. Valve arrangement and access requirements to be in line with Thames Water requirements. A future capped connection will be provided to serve Building D. • A new incoming low voltage (UKPN) electricity supply from the local network will be provided, terminating in Building A. ▪ All cabling ducting for the installation of incoming LV services inside the site boundary shall be provided by the Contractor as required and as detailed within the Electrical Services Layouts. Any additional cabling ducting, duct joint boxes / access chambers etc. shall be identified and provided by the Contractor as required. ▪ The final cabling routes and requirements from the new LV supply shall be coordinated by the Contractor with UKPN. ▪ The Contractor shall design and provide all incoming service ducting & internal containment necessary to facilitate the installation of the new LV supplies to serve the development. ▪ The Contractor shall include for all necessary negotiations with the UKPN to provide the required supply capacity to the site and for the final connections within the Building A Electrical Cupboard to be made. ▪ The Contractor shall also arrange for all MPAN numbers to be raised as required for the final billable Settlements.

	- UKPN quotation received in March 2021: reference number is 8500170850 / QID 3500104219, UKPN contact person Steve Mills (steve.mills@ukpowernetworks.co.uk). Application to be renewed by contractor as required. - Incoming communications services will be installed to all buildings. It is envisaged that each building will be provided with incoming fibre services, in addition to any analogue lines for specialist systems. - All cabling ducting for the installation of incoming communications services inside the site boundary shall be provided by the Contractor as required and as detailed within the Electrical Services Layouts. Any additional cabling ducting, duct joint boxes / access chambers etc. shall be identified and provided by the Contractor as required. - The final cabling routes and requirements from the new fibre supplies shall be coordinated by the Contractor with Client's preferred provider. - The Contractor shall be responsible for placing the final orders and progressing the design of all incoming service ducting & internal containment necessary to facilitate the installation of the new communications supplies to serve the development. - The Contractor shall include for all necessary negotiations with the Client's preferred supplier to provide the required supply capacity to the site and for the final connections within the Electrical Cupboards to be made. For further information on the site wide utilities infrastructure refer to Section Error! Reference source not found..
New Power Connections	- The electrical demand of the development (for all buildings in Phase 1, and the future phases) is anticipated to be in the region of 150kVA. - Should any design changes be made through construction, the contractor shall confirm the electrical load required through their own assessment and modify the application as required. - UKPN quotation received in March 2021: reference number is 8500170850 / QID 3500104219, UKPN contact person Steve Mills (steve.mills@ukpowernetworks.co.uk). Application to be renewed by contractor as required to procure the supply to the development. - A new incoming low voltage (UKPN) electricity supply from the local network will be provided, terminating in Building A, from where all electrical services distribution for all buildings will commence. - All future provisions to be included for providing LV connection to serve Building D (Phase 3) as detailed within the Electrical Services Layouts.
Electrical Distribution & Metering	- A main panel board in Building A will distribute electricity to local distribution boards in each of the buildings. - The panel board shall be of sufficient capacity/rating and include sufficient spare ways for the future development of Building D under the Phase 3 works. - A single 3-phase utility meter and CT chamber shall be provided within Building A to record all usage throughout the new development. - All devices installed with an panel or distribution board must be from the same manufacturer as the panel itself.
Secondary Power	- Secondary power supplies to be provided to all essential life safety equipment, to operate should the original power source be interrupted. All life safety equipment to be provided with dual power supplies in accordance with BS 9999 – final requirements to be confirmed by the Fire Specialist. - It is envisaged at this stage that all alternative, secondary power supplies to equipment will be provided via integral battery packs within the equipment/equipment main control panels. - Final requirements of any life safety equipment to be confirmed by the Fire Specialist.
Cold Water Service	- The site shall be served via a dedicated water supply using mains pressure complete with an inline water conditioner, without a storage tank and booster set. - The incoming water bulk supply will be installed up to a single bulk water meter recessed in the ground – no submetering of the buildings has been allowed for in line with the Client requirements. - A capped connection shall be provided to Building D to allow for the phased construction of Building D. - External bib taps are assumed to be a fluid category 3 (i.e. a hand held hose is to be used with self closing nozzle – for above ground watering). This is subject to a risk assessment from the local water authority. A CAT 5 break tank shall be provided for Building C washdown.
Above Ground Drainage and Rainwater Drainage	- The development will utilise a gravity driven foul water drainage system. - The above ground drainage system will consist of stub stacks, with all water appliances, sanitary ware and safety discharge from plant situated close to the stacks and located on the ground floor. - External gravity driven rainwater drainage system from roof with guttering. - Below ground drainage will be by the civil engineer: - Below ground strategy is understood to be onsite water treatment via a reedbed. Contractor to confirm full requirements with the civil engineer and system specialist and provide all services as required. - Below ground drainage connection for the composting WCs to be in line with the manufacturer's requirements. - It is understood that an existing rainwater storage tank and associated pump(s) shall be retained and utilised to serve the new development, the full requirements of which are unconfirmed. The contractor is to assess the requirements of the pump(s) once confirmed and provide all power supplies and associated services as required to complete the full functional installation.
General Distribution Strategy	- MEP services shall be distributed horizontally through each building at both low level and at high level wherever possible. The routes and installation shall be coordinated with the architect based on the below principles and M&E Services Layouts: - All services runs (ductwork, pipework, cabling & containment) to be run fully concealed either within the building fabric (where possible) or concealed within joinery. No cabling and containment runs to internally or externally mounted final devices shall be run exposed. The exception to this will only be for initial containment runs within back of house areas where connection into the concealed main containment spines is carried out.

	○ For areas with ceiling voids, service distribution shall be within the ceiling void. This shall include cabling to ceiling mounted devices such as lighting outlets, power connections to the Windhive units, and fire alarm system devices. ○ General cable distribution around each building and within front of house areas shall be via floor recessed metallic trunking systems (c/w architectural inlay/finish, as confirmed by the architect), as detailed within the Electrical Services drawings. Full detailing of the integration of the floor trucking systems into the floor build-ups/finish shall be confirmed and detailed by the architects, and the trunking shall be coordinated with the underfloor heating pipeworks. Cabling shall then be run from this main containment spine into the wall/skirting build ups (cabling to be fully concealed) to rise to any wall mounted devices/high level as required. Vertical runs contained within fully concealed steel conduits. Where vertical conduits need to run through the structural ring-beam, penetrations shall be separated by no less than 1m. ○ For areas with exposed ceilings services will be run concealed within the building fabric/pre-agreed services channels/ within joinery to specific locations, where they will then run exposed to any ceiling mounted/suspended/fixed final equipment/accessories/devices. All exposed cabling runs shall be carried out in galvanised metallic conduit, installed such that no manufacturer markings are visible, and with all routes and runs agreed with the architect prior to installation. ○ In screed trunking and floor boxes to be provided in Building A & Building B as detailed in Electrical Services Layouts. ○ Where pipework is to distribute below ground (refer to the M&E services layouts) these shall be ducted in smooth bore externally corrugated PVC (polypipe rigiduct or equivalent). Access panels and final distribution routes by the Contractor, to be coordinated with the structural/civil engineer and the landscape design. ○ Services which penetrate through the straw bale construction, must be designed to eliminate the risk of condensation or damp ingress. Refer to architects' information for details. • All submains cabling to be carried out in steel wire armoured cabling to BS6724 and BS 61034-2, and shall be contained within flexi duct systems where they run below ground. • All cabling to final circuits shall be carried out using single-core cabling to BS 6491B, 600/1000 Volt grade, copper conductor, with low smoke (emission) zero halogen (LSF) insulation, installed in galvanised steel conduits throughout their full runs from the main containment spines, in a ring or radial circuit configuration depending on the equipment served.
Space Heating	• Dedicated building ASHPs are proposed to serve Building A and Building B to provide space heating via underfloor heating. The unit/s will connect to a heat exchanger and buffer vessel located indoors (and as per manufacturer requirements) which will connect to the underfloor heating manifolds within those buildings – expected design temperatures of 45 degrees. • Where an underfloor heating system is proposed, the design is to be by the underfloor heating specialist. Final underfloor heating temperatures to be confirmed by the underfloor heating specialist and coordinated with the ASHP manufacturer. • Acoustic attenuation requirements for outdoor units to be advised by an acoustic engineer. ASHPs are to be located in line with manufacturer recommendations for clearances (both access and air flow). • Electric radiant panels (including future provision for radiant panels) provide space heating to areas with less consistent occupancy patterns. Final height of panels to be in line with manufacturer recommendations for area coverage and intensity of heat required. Panels serving the outdoor kitchen are to be complete with a manual switch with run on timer to minimise the risk of the unit being left on for any sustained amount of time. The design intention is that the panel heater will be used only very occasionally. • The heating for Building A has been designed for the design occupancy. At the time of writing this report, the client has understood and agreed to the risk that, in the event of a higher occupancy, the internal temperature set point will not be able to be achieved. The use of thermally actuated louvres to temper the incoming air at low level could be considered at the construction stage to help reduce the perceived thermal discomfort of occupants in high occupancy events in external winter conditions.
Domestic Hot Water	• Electric local water heaters are to be used to meet the domestic hot water requirements across the site. Hot water will therefore only be produced locally and when required thereby minimising the heat losses from storage and distribution in addition to providing lower installation and maintenance requirements. • Water temperatures are per manufacturers specification. Installation to be as per manufacturers requirements.
Ventilation	• Given the environmental aspirations of this project, Ventive Windhive ventilation units (and low level louvres for Building A only) are to be provided to each occupied space (as described in Table 6). The Windhive units recover the heat from the exhaust air with very low power consumption (to move the dampers to control the portion of air being brought into and out of the space, as shown in 4). The low level louvres (in Building A only) allow for further ventilation (automatic purge ventilation) of the space to help keep the CO2 within acceptable levels for the design occupancy level. • The current design is to provide sufficient ventilation rates for the design occupancy of 30 people in Building A. In higher occupancy events, an acceptable level of CO2 must be maintained through the use of first actuated skylights in combination with the low level louvres (all controlled via the Windhive control system), then through the manual opening of windows. A CO2 monitor with a visual indication to the occupants of exceeding acceptable CO2 rates shall be provided to maintain acceptable indoor air quality. Provision has been made for the future retrofit of 3 no. of Ventive Windhives (to replace the skylights) to increase the capacity of the ventilation system to run with heat recovery. • The actuated skylights are to be carefully integrated with the Ventive system to minimise future control issues post installation. • The louvres are to be built to ensure the minimum free area required by the manufacturer (refer to XCO2 drawings for details) – the louvres are to be carefully coordinated with both the architectural and structural design.

	 Full heat recovery Windhive passes 100% fresh air through pure natural ventilation. The PVHR method ensures there are no cold draughts, reducing heat loss by up to 72%. In winter the dampers close to produce an airlock and ensure heat is retained overnight.  Bypass mode Windhive dynamically adjusts to sensor data from the classroom to provide an optimal balance of heat recovery with air quality. This can change multiple times during the day as occupancy levels vary.  Passive cooling During warm conditions Windhive engages in secure night-time purging. Supplying fresh air through a wall louvre, the windhive actuators open all three roof dampers to create negative pressure and draw warm air out of the room. Capable of 4 air changes per hour, this method can reduce temperatures overnight by up to 10°C. Figure 4: Ventive unit operation • A natural ventilation strategy is proposed for spaces with less consistent occupancy patterns (as noted in Table 6). Building Control to confirm if permanent ventilation openings are required or whether natural ventilation via door/ infiltration and windows is acceptable for this space. Unless otherwise agreed by Building Control, trickle ventilators or secure louvres will be used to meet the minimum background ventilation rates of the rooms as noted in Table 6. • Purge ventilation shall be via openable windows where possible. • Ventilation for the composting WCs in Building A is to be designed to meet Part F, Part H, Part L and the manufacturers. Care to be taken to avoid any venting of compost chambers being recirculated into the occupied space. • Kitchen hoods by others, kitchen assumed to be of domestic specification. Ventilation allowance for a commercial kitchen specification will be considerably higher and has not been allowed for.
Kitchen Extract Ventilation	• The indoor kitchen in Building A will have its own externally vented hood. This assumes that this is not to be used as a commercial kitchen.
Fire Suppression	• Details and requirements regarding fire suppression systems to be provided by fire specialist. ◦ At this stage it is not envisaged that any specialist fire suppression systems are required.
Small Power & Power Supplies to Equipment	• Mechanical plant and Kitchen items to be served from local distribution boards as required, with final cabling to fixed plant and equipment wired using XLPE/SWA/LSF copper cables. • Fused connection units & rotary type isolators shall be provided as required for supplies to fixed electrical equipment and plant items, based on final selected equipment. • Floor boxes and USB charging points to be provided in Building A and Building B as detailed in the Electrical Services Layouts. • Electrical devices and accessories (manufacturer/range/finish) are to be as specified within the architectural package, and shall be confirmed prior to any orders being placed. Contractor to confirm what to allow for within their bid if unsure. • All setting out shall be by the architect.

Lighting	- Luminaire selection will be energy efficient lighting using high performance LED luminaires to be utilised throughout. For luminaire selection refer to luminaire schedules. - Pendants and wall mounted luminaires are used: See XCO2 lighting layout drawings for lighting design. - Luminaires located within bathrooms and at external locations will be suitably IP rated. - External lighting design to account for any conditioned planning requirements, and to meet the requirements of Secured by Design. - Lighting controls: See XCO2 lighting layout drawings for initial controls strategies, comprising of photocell or timed controls and presence detectors/manual switching. - Emergency lighting & illuminated Exit Signage to all areas, plantroom spaces and amenity areas as required. - All luminaire and controls device setting out shall be by the architect.
Telecommunications & IT	- The Contractor shall be responsible for the final design, supply, installation, connection, testing, commissioning, and setting to work of the complete and fully operational telecommunications & data installations to each building of the development, as confirmed by the client. - A single fibre service of the client's choice shall be run into each building within appropriately sized duct to provider specification, with fibre splitter nodes and distribution points installed within the Electrical Cupboard of each building. - Contractor to install cabling and containment to client/service provider standards from the electrical cupboard/distribution points/server cabinet(s) to the final outlet locations. Internal cabling to be CAT 6 throughout, emanating for the pre-agreed server cabinet location(s) within Building B – provided by the contractor - to all final devices. Cabling to be left coiled at server cabinet location(s) for final termination by the client directly. All IT cabling to be suitably labelled and tested by the contractor prior to completion, with any defects remedied. - ELV duct to link from Building B to Building A and C for the routing of data cabling from the Building B server cabinet to final outlet locations as required. - Server cabinet to be provided by the contractor, with all active IT system equipment (patch panel, switches and routers) to be provided as required by the client directly. - Final outlets to be provided as 2 CAT 6 sockets per desk position, plus 2 CAT 6 sockets per printer station (see architects furniture layouts), and as further indicated on Electrical Services Layouts. - Final Wi-Fi routers within each building to be provided by the client directly. - Direct analogue 'Redcare' type services will be provided to each building for the Fire Alarm Panels as required, with a future spare line brought in to Building C for the future connection to the Building D lift emergency communication system.
Intruder Detection	- The Contractor shall be responsible for the final design, supply, installation, connection, testing, commissioning, and setting to work of the complete and fully operational intruder alarms systems to each building of the development, as indicatively indicated on the services design drawings and as confirmed by the client. - The intruder alarm systems shall be designed and installed by a specialist contractor who shall be accredited and certified as required. - Independent intruder alarm systems shall be installed to separately cover each building. - The systems shall include door/window contacts and dual technology microwave and passive infrared sensors as required to cover all entrances and windows, with main alarm control panels provided within each unit's electrical cupboard as required, and system keypads at main entrances as indicated in the design layout drawing (final location tbc by the client and system specialist prior to installation). - In the event of an intruder activating the system, respective external audible two-tone electronic alarm and a high-intensity flashing visual alarm shall also operate. - The Contractor shall confirm the required provision of sounder devices with the system specialist prior to installation. - The requirement for any external monitoring / automatic dial out functionality shall be confirmed by Client and provided by the Contractor as required. - All security and CCTV cabling to be installed fully concealed – no system cabling should be surface mounted/exposed.
CCTV	- The Contractor shall be responsible for the final design, supply, installation, connection, testing, commissioning, and setting to work of the complete and fully operational closed-circuit television (CCTV) system, installed across the site to monitor the external spaces of the development as confirmed by the Secured By Design Officer, and the Client themselves. - The CCTV system shall be designed and installed by a specialist contractor who shall be accredited and certified as required. - Cameras shall be mounted externally to cover the external perimeter and entrance points into the building as indicated on Electrical Services Layouts. - Camera types to be confirmed by client, but shall be external grade and vandal resistant, and shall include for infrared night vision functionality. - Single DVR will be provided in Building B electrical cupboard to cover all buildings and services shall be ducted below ground to the final camera positions as required. A high-definition colour screen to be provided at DVR position for viewing and downloading images on site. Refer to equipment schedule and electrical drawings for more details. DVR and screen to be installed in a lockable cupboard. - All security and CCTV cabling to be installed fully concealed – no system cabling should be surface mounted/exposed.

Fire detection & alarm	- The electrical contractor shall employ a specialist sub-contractor to design, supply, install, test and commission the fire detection and alarm system throughout the building in full compliance with BS 5839. - A new analogue addressable fire detection and alarm system shall be installed in each building in accordance with the requirements of BS 5839 and Building Control / the Local Authority, consisting of a main system control panel; smoke and heat detectors devices, manual call points; Sounder and beacon devices; Interfaces to other systems/equipment as required. - Spare capacity/systems loops to be allowed with the Building B and Building C systems to allow for the future integration/connection of the Building D fire detection and alarm system in the future. - Each fire alarm panel shall have battery backup so as to remain fully operational in the event of a mains power failure, with capacity of 72 (+3) hours. - Each fire alarm panel shall be installed with a dedicated GSM integrated emergency auto-dialler device to enable automatic dial facility to be undertaken when the fire alarm system is activated. The device shall be 5G compatible as a minimum and shall use a roaming, non-steered subscriber identity module (SIM) so as not to be tied to a single provider. Final requirements of the automatic dial out line shall be confirmed by the Client. - Fire alarm panels to be provided in fully weatherproof enclosures where positioned in external locations/exposed to external conditions. - Category/Level of fire detection and alarm systems unconfirmed at this stage – see XCO2 layout drawings for indicative device allowances, which are to be confirmed through the contractor's final design. - Fire alarm system interfacing to other systems, to include (but not limited to) mechanical plant. - Any voids great than 800mm in depth to be provided with smoke detection c/w remote indicator device. - All setting out shall be by the architect.
Assistance Alarm Systems	- Assistance alarm systems to be provided to accessible WC's and facilities as required as part of the final fit out requirements. - Within the disabled toilet, a pull cord unit shall be provided with reassurance LED outside and above the toilet's door, with an overdoor light above the toilets. These lights will illuminate when the pull cord is activated. - The complete system shall include the Reset Unit, Overdoor Indicator Lamp Unit, Distress Alarm Pull Cord, Indicator Panel, Power Unit. The associated works shall include connecting the complete system, tests and commissioning by the supplier. Wiring diagrams shall be supplied, in duplicate, by the approved supplier. - The reset button, which shall have an integral sounder to indicate to the WC occupant that the alarm has been activated, shall be located within reach of the WC, at 1200mm from the floor. - Final device finishes shall be approved by the architect prior to any orders being placed. All setting out shall be by the architect.
Lifts	- Load allowance has been made in the overall incoming supply for the provision of one passenger lift for Building D (Phase 3 works). No lift will be provided under this contract. - Dedicated external analogue telephone line to enable the connection of an autodialling assistance system from within the lift car to enable two-way communication to be provided at Phase 1 under this contract, terminated into Building B or C (client to confirm).
Earthing & Bonding	- The Contractor shall design and fully coordinate the complete and fully operational earthing and bonding installation to all areas of the new buildings, which shall provide a path for electric current to discharge to earth and cause circuit protection equipment to operate in the event of any live circuit sustaining a short circuit to earth. - Site's main earthing arrangement to UKPN requirements. - Earth bar to be provided in each building, connected back to the main earth terminal adjacent to the incoming supply termination, with local connections as required within each building.
Lightning Protection	- The Contractor shall appoint a specialist contractor to undertake a risk assessment to determine the requirements for the lightning electromagnetic pulse protection management system for the full development, and to design, supply, install, test, and commission the final systems to cover all buildings as required. - All system devices/down conductor tapes to be installed fully concealed behind final cladding where possible, with final setting out of earth termination pits to be confirmed by the architects. - Provisions for covering the future roof top mounted PV systems and for adding Building D to the site lightning system to be allowed for within the Phase 1 works under this contract.
Electric Vehicles	- Electrical vehicle charging (EVC) points to be installed at a later date. - Load allowance has been made at this stage in the overall incoming supply so that two EVC can be added in the future.
Renewables	- Allowances have been made and spare ways provided within the Phase 1 and 2 infrastructure to allow for the future installation of the required PV system(s), to be installed under a separate contract at a later date. - The architect and structural engineer will need to confirm how the required panels shall be retro fitted to the roofs of the Phase 1 and 2 buildings, and whether any allowances need to be made as part of these works. - The contractor shall be responsible for confirming this element with the architects and structural engineers prior to construction, and shall make all such allowance required within the Phase 1 and 2 works – it is currently assumed that no fixings for future PV panel installations shall be required under the Phase 1 and 2 works.

8.0 UTILITIES

The below section of this report presents details of the assessment of the utility services running within and around the proposed development site and highlights any disconnections and/or diversions that may be required. The comments have been based on an existing Utility Search Report from Groundsure Premier Utilities produced in October 2020. The proposed building footprints and site boundary have been based on the information received by Practice Architecture LLP and Studio Gil LTD on 22nd October 2020. Should the proposed building locations change, a re-assessment of the impact on the utilities will need to be undertaken. In all cases, further on-site investigation will be required to identify the exact location of the utility services.

The assessment below is a desk top study, limited to the search information obtained and is reliant on information received from third parties. The accuracy of information received cannot be guaranteed and XCO2 Energy Ltd accepts no liability for errors or omissions in the supplied data or information.

XCO2 recommends that the contractor obtain a site wide Ground Penetrating Radar survey (GPR) survey to confirm the presence, or lack thereof, of any existing utilities services within the site boundary.

The exact location and depth of services described in this report will need to be confirmed by survey and/or investigation prior to the commencement of any works on site. The Contractor will need to familiarise themselves with all existing services infrastructure within and adjacent to the site boundaries, and take all necessary precautions prior to the commencement of works. In many instances, further investigation will be required by the Contractor to identify the exact locations and the extent of all services present, as the utility search report may not provide all the necessary information. The general guidance below is intended as high-level advice only regarding the clearances required when excavating near existing utilities:

- Clean water: No development or structure should be built within five metres of trunk mains or within three metres of distribution mains. If the above mentioned clearances are not kept, then a diversion application needs to be made.
- Sewer: Where the development or structure is proposed to be built within 3m of a pipe serving more than one property (public sewer), an application to Thames Water is required – refer to Civil Engineers Tender documentation.
- Gas: As long as no mechanical excavations are taking place above or within 0.5m of the low/medium pressure system or above or within 3.0m of an intermediate pressure system, no further diversions are anticipated to be required.

8.1.1 WATER

Thames Water (clean water)

- There is a Thames Water distribution main running in Wolves Lane Road both to the north of the site and south of the site (see Figure 5). A connection to the site is not shown.
- The distance from the development boundary to Wolves Lane Road is approximately three meters, with the proposed structures being significantly further than this – no disconnection or diversions are therefore expected. For any work on the landscape close to the road, the Contractor must ensure adequate protection zones of the services are provided and agreed with Thames Water so as to avoid any possible disconnections and diversions. The Contractor must ensure any excavation for below ground ducts within root protection area must be hand dug. Contractor to approve method with Arboriculturist.
- Thames Water has confirmed capacity is available to serve the site – see Appendix B.
- The proposed point of connection is shown in see Figure 5 – with an estimate pipework length of 60 metres up to the site boundary for the new connection.

- The contractor will be responsible for liaising and coordinating with Thames Water, to complete all required utility connections for the development (incl. completion of applications for budget estimates and final connection applications).

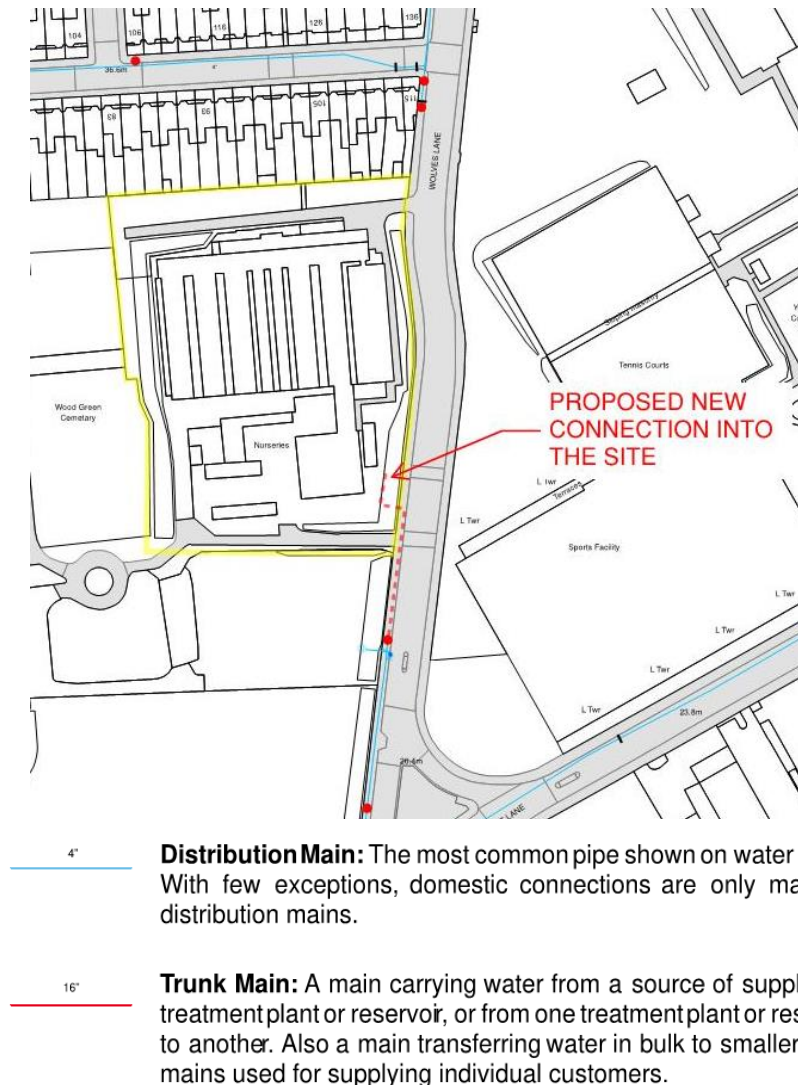


Figure 5: Thames Water Clean Water Map (taken from the Utility Search Report)

Thames Water (sewer)

A summary of the findings from the desktop study are outlined below for information only - all below ground drainage design shall be as per the Civil Engineers design – refer to the Civil Engineering Tender documentation.

- There is a Thames Water foul sewer running across Wolves Lane Road and connecting to the north of the site (see Figure 6).
- There is Thames Water surface water pipework running within Wolves Lane Road and connecting to the centre of the site (see Figure 6).
- The distance from the development boundary to Wolves Lane Road is approximately three meters, with the proposed structures being significantly further than this – no disconnection or diversions are therefore

expected. Any work on the landscape close to the road must ensure adequate protection zones of the services are provided (if relevant) so as to avoid any possible disconnections and diversions.

- The existing site connections (foul and surface water) will need to be altered so that they serve the new development where required and so that they do not pose any obstruction in the erection of the proposed development. Requirements are to be confirmed by the civil engineers.

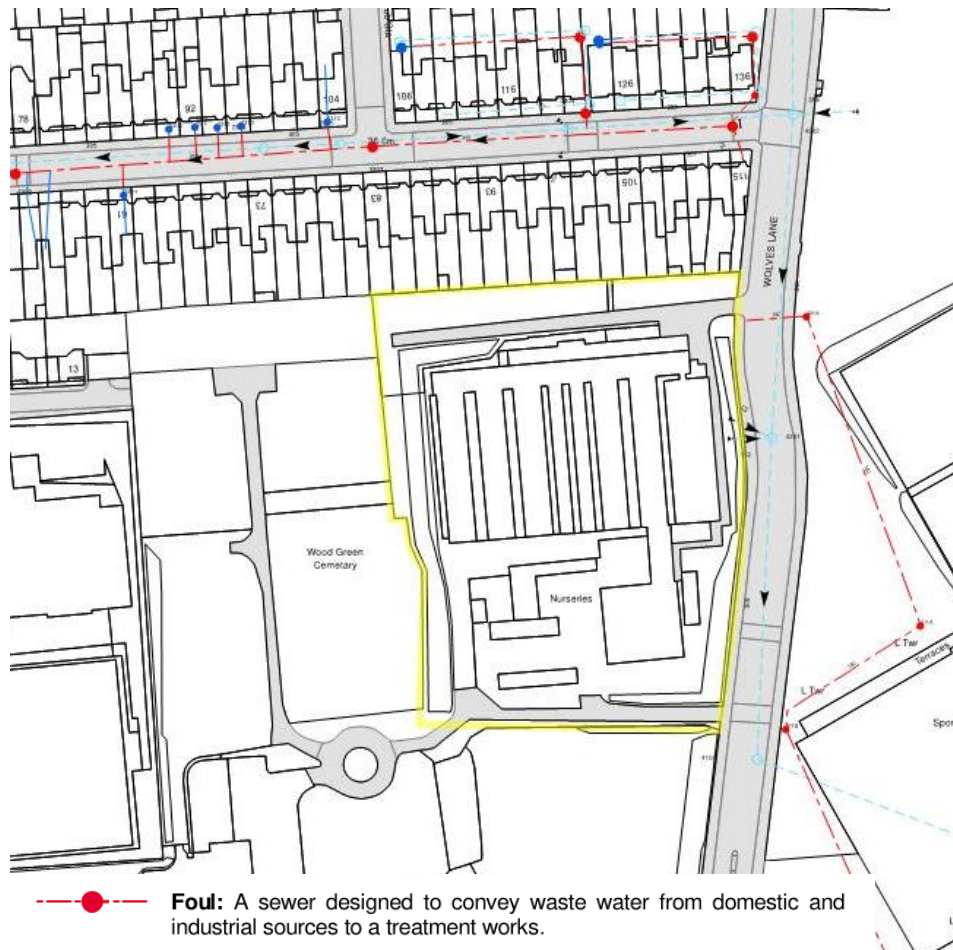


Figure 6: Thames Water Sewer Map (taken from the Utility Search Report)

8.1.2 GAS

Cadent

- There is a $\varnothing 180\text{mm}$ Low Pressure gas mains running in Wolves Lane Road and $\varnothing 90\text{mm}$ Low Pressure gas connecting to the north of the site (as shown in Figure 7).
- There is no evidence of any High Pressure gas mains within and around the development.
- The Low Pressure gas mains running in Wolves Lane Road is outside the 0.5m clearance zone required for low pressure gas pipework. Diversions to this main are therefore not expected.
- The $\varnothing 90\text{mm}$ Low Pressure gas connecting to the north of the site is within the development site boundary. An adequate protection zone of the pipework must be provided or else a diversion application must be submitted to Cadent.
- The development site is to be gas free so no new connection (or upgrade to the existing connection) is required.
- The contractor will be responsible for liaising and coordinating with Cadent about working in the vicinity of their assets and complete any diversion applications that are required in the event adequate protection zones cannot be provided.

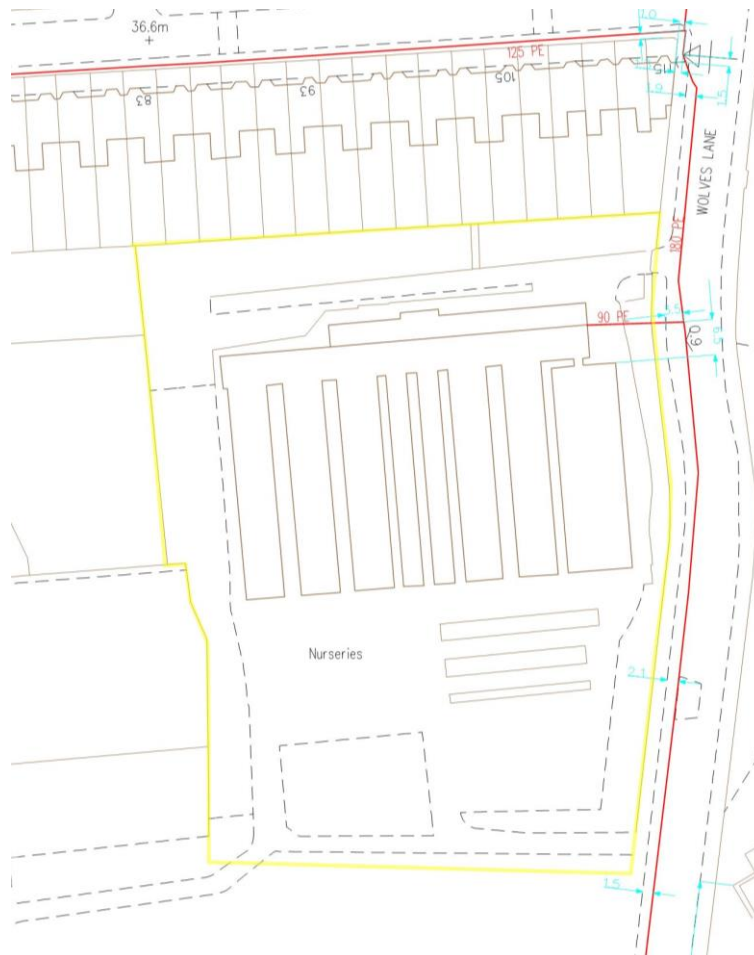


Figure 7: Gas Map (taken from the Utility Search Report)

8.1.3 *ELECTRICITY*

UKPN

- An existing connection supply goes to the greenhouses from the northeast corner of the site. It is possible some existing circuits will need to be stripped back away from the areas of the new building.
- An application for a new connection into Building A was submitted at Stage 3.
- A new incoming low voltage (UKPN) electricity supply from the local network will be provided, terminating in Building A.
- All cabling ducting for the installation of incoming LV services inside the site boundary shall be provided by the Contractor as required and as detailed within the Electrical Services Layouts. Any additional cabling ducting, duct joint boxes / access chambers etc. shall be identified and provided by the Contractor as required.
- The final cabling routes and requirements from the new LV supply shall be coordinated by the Contractor with UKPN.
- The Contractor shall design and provide all incoming service ducting & internal containment necessary to facilitate the installation of the new LV supplies to serve the development.
- The Contractor shall include for all necessary negotiations with the UKPN to provide the required supply capacity to the site and for the final connections within the Building A.
- The Contractor shall also arrange for all MPAN numbers to be raised as required for the final billable Settlements.
- UKPN quotation received in March 2021: reference number is 8500170850 / QID 3500104219, UKPN contact person Steve Mills (steve.mills@ukpowernetworks.co.uk). Application to be renewed by contractor at next stage.
- No diversions have been identified through the utility search.



Figure 8: Electricity Map (taken from the Utility Search Report)

8.1.4 TELECOMMUNICATIONS

BT Openreach

- An existing connection services the greenhouses from the northeast corner of the site.
- Incoming communications services will be installed to all buildings. It is envisaged at this stage that each building will be provided with incoming fibre services, in addition to any analogue lines for specialist systems.
- All cabling ducting for the installation of incoming communications services inside the site boundary shall be provided by the Contractor as required and as detailed within the Electrical Services Layouts. Any additional cabling ducting, duct joint boxes / access chambers etc. shall be identified and provided by the Contractor as required.
- The final cabling routes and requirements from the new fibre supplies shall be coordinated by the Contractor with Client's preferred provider.
- The Contractor shall be responsible for placing the final orders and progressing the design of all incoming service ducting & internal containment necessary to facilitate the installation of the new communications supplies to serve the development.
- The Contractor shall include for all necessary negotiations with the Client's preferred supplier to provide the required supply capacity to the site and for the final connections within the Electrical Cupboards to be made.
- No diversions have been identified through the utility search.

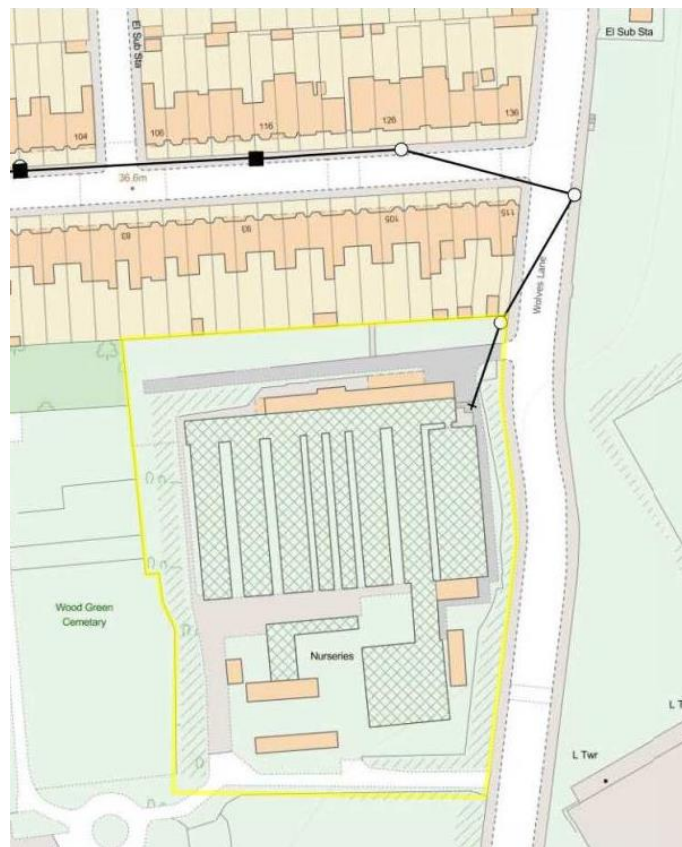


Figure 9: Telecoms Map (taken from the Utility Search Report)

8.1.5 OTHER

London Underground

- London Underground/DLR has no assets within 50 metres of the site.

9.0 COMMISSIONING

The purpose of this section is to provide a framework for the Testing and Commissioning Procedures to be employed for the entire works included in the Electrical & Mechanical Contract and as described below, taking due account of the overall work content and programme of the entire works.

The work described in this Section is to be carried out by the Electrical & Mechanical Contractors who shall employ specialists experienced in complex and extensive work of this kind, where required.

The Electrical & Mechanical Contractors shall monitor the progress of the works, including changes to any items of specified Equipment, throughout the Electrical & Mechanical Contract period and shall be responsible for ensuring that sufficient documentation is incorporated to allow satisfactory Testing and Commissioning.

To a large extent the role of the Electrical & Mechanical Contractors shall be to provide a management input to ensure a smooth coordination of the efforts of his own resources and those of others.

A commissioning schedule shall be produced, which will include a timescale for commissioning and testing all building services and control systems, in accordance to the Building Regulations, BSRIA and CIBSE guidelines.

The following items provide an outline of the work to be undertaken by the Electrical & Mechanical Contractors.

1. Testing and preparation for setting to work and commissioning
2. Preparation, monitoring, reporting, revision and updating of a Commissioning Programme
3. Execution of commissioning for own works
4. Directing, programming, witnessing and documenting of work carried out by the Specialist Commissioning Agents, Electrical & Mechanical Contractors, etc.
5. Preparation and submission for approval by the Main Contractor of the complete documentation of Commissioning Results for own works and those of Specialist Commissioning Agents, Electrical & Mechanical Contractors, etc.
6. Preparation and submission for approval by the Main Contractor the comprehensive 'Operating and Maintenance Manuals' incorporating Commissioning Results and 'As Built' record information
7. Preparation and submission for approval of the Main Contractor the comprehensive 'As Fitted Drawings' and 'Schematic Diagrams'
8. Devise and install a scheme of labelling power control and monitoring cabling equipment, etc. for the approval of the Main Contractor
9. Provision of 'Instruction and Training of Client Personnel' for all systems
10. Provide all measuring equipment or special apparatus required for carrying out inspections and tests unless otherwise agreed by the Contract Administrator

10.0 SUMMARY OF MATTERS FOR FURTHER CONSIDERATION & DEVELOPMENT

This section provides a summary of any design items which require further development and/or consideration and which will need to be addressed during construction:

- Final detailed coordination of services within architectural layouts, structural design and landscape design.
 - Heights and setting out of all outlets to be coordinated with furniture layouts.
 - Detailed coordination of all building services throughout the buildings and across the development (final setting out of all visible devices by architects).
 - Final installation methodologies and detailing within the structural and architectural elements of the buildings – structural penetrations and integration of services into architectural and structural elements/features.
- Detailed coordination of services distribution across the site avoiding clashes with tree protection zones, below ground drainage features (such as the reedbed/ raingardens), and landscaping elements.
- Confirmation and incorporation of specialist system requirements including access control, telecommunications, lightning protection and underfloor heating.
- Confirmation of final fire detection and alarm device provisions based on the confirmed system categories required with the appointed fire specialist and Building Control.
- Contractors working drawings for mechanical and electrical services including contractor's calculations.
- Detailed calculations to be conducted to ensure break-out noise from mechanical equipment does not cause nuisance to adjacent rooms/ spaces and comply with any acoustic requirements and planning conditions.
- Discharge of all planning conditions associated with the works.

APPENDIX A – BUILDING SERVICES DRAWINGS AND SCHEDULES

The following documents are to be read in conjunction with this document:

Electrical Services:

- WL-XCO-ZZ-XX-DR-E-0003-D2-T01_Electrical_Services_Legend_Sheet
- WL-XCO-ZZ-XX-DR-E-7501-D2-T01_Electrical_Schematic_LV_Earthing_Schematic
- WL-XCO-ZZ-00-DR-E-7601-D2-T01_Lighting_Fire_Alarm_Security_Layout_Ground_Floor
- WL-XCO-ZZ-00-DR-E-7502-D2-T01_Small_Power_Layout_Ground_Floor
- WL-XCO-ZZ-00-DR-E-7503-D2-T01_Containment_Layout_Ground_Floor

Mechanical and Public Health Services:

- WL-XCO-ZZ-00-DR-M-7001-D2-T01_Above_Ground_Drainage_Layout_Ground_Floor
- WL-XCO-ZZ-00-DR-M-7101-D2-T01_Domestic_Water_Layout_Ground_Floor
- WL-XCO-ZZ-00-DR-M-7301-D2-T01_Heating_Layout_Ground_Floor
- WL-XCO-ZZ-00-DR-M-7401-D2-T01_Ventilation_Layout_Ground_Floor

Combined:

- WL-XCO-ZZ-XX-DR-ME-0001-D2-T01_MEP_CDM_Drawing

Schedules:

- WL-XCO-ZZ-XX-SH-M-0002-D2-T01_Mechanical_Equipment_Schedule
- WL-XCO-ZZ-XX-SH-E-6301-D2-T01_Electrical_Equipment_Schedule
- WL-XCO-ZZ-XX-SH-E-6302-D2-T01_Building_A_Distribution_Board_Schedule
- WL-XCO-ZZ-XX-SH-E-6303-D2-T01_Building_B_Distribution_Board_Schedule
- WL-XCO-ZZ-XX-SH-E-6304-D2-T01_Building_C_Distribution_Board_Schedule
- WL-XCO-ZZ-XX-SH-E-6305-D2-T01_Building_A_Luminaire_Schedule
- WL-XCO-ZZ-XX-SH-E-6306-D2-T01_Buildings_B-C_Luminaire_Schedule

APPENDIX B – CORRESPONDENCE WITH UTILITY PROVIDERS AND UTILITY SEARCH DOCUMENTATION

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