

Building Services Design Report Issued at RIBA Stage 3

J5129 56a Church Hill

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GENERAL NOTES

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REVISION HISTORY

Revisions indicated with line in margin.

Revision status: P = Preliminary, T = Tender, C = Construction, X = For Information

| Revision | Date | Author | Reviewer | Approver | Description |
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I INTRODUCTION

Webb Yates Engineers have been commissioned to complete the Engineering Building Services design for 56 Church Hill, London N21 1JA, a new-build residential dwelling in London.

This report identifies the mechanical and electrical services provisions made at RIBA stage 3 and is inclusive of envisaged mains services provisions and building regulations compliances.

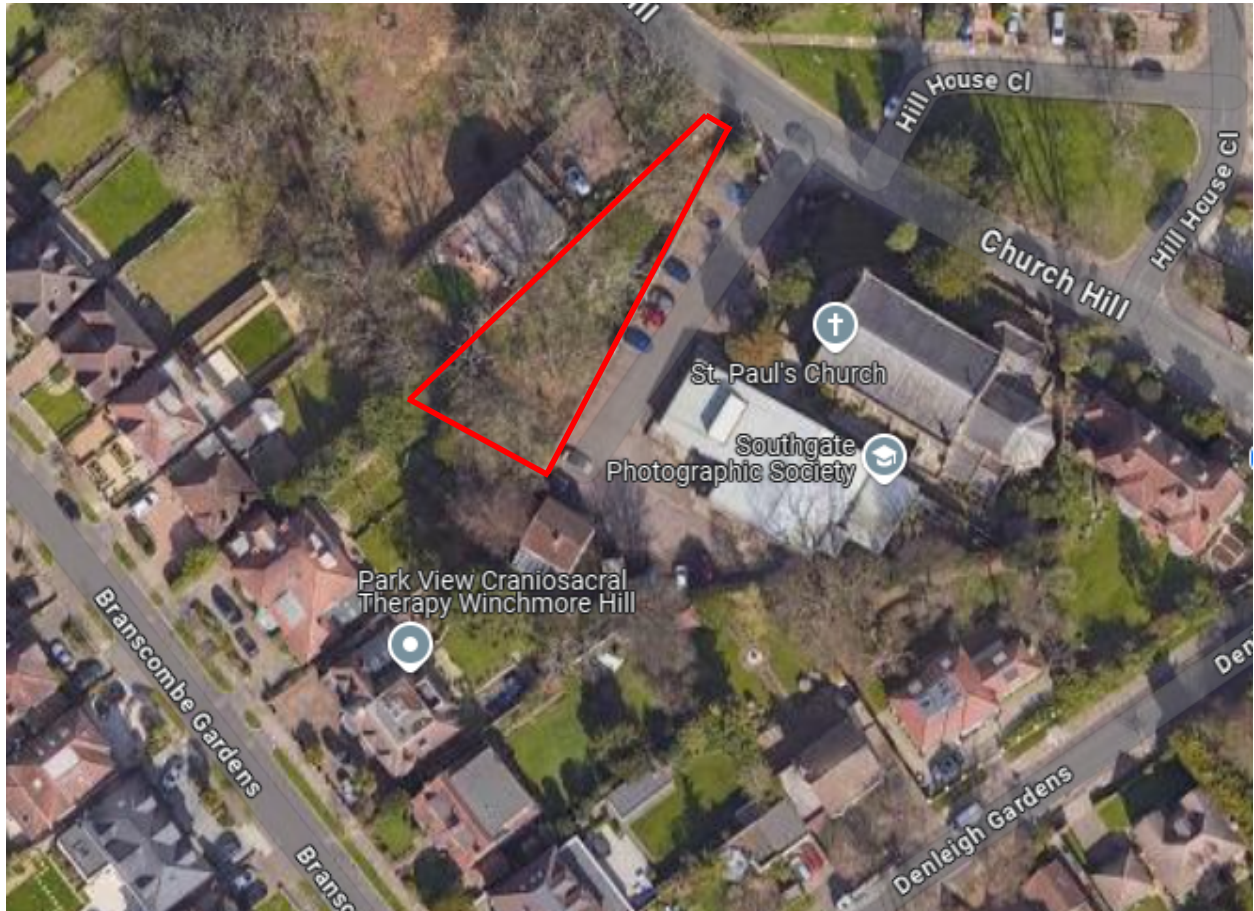


Figure 1. Site location extracted from Google maps

This report is based on the most recent architectural drawings.

The areas identified on these drawings and included within the Stage 3 report include:

Ground Floor: Master bathroom, master bedroom, 2 no. bedrooms, 2 no. en-suites, library, kitchen, utility, living and dining room

This report outlines the mechanical and electrical building services design strategies. The Scope of the building services for the project includes:

- New Air Source Heat Pump system (ASHP)
- New mechanical services including ventilation (MVHR) and heating.
- New public health including hot and cold-water services
- No active environmental cooling system has currently been proposed in the design. Natural ventilation via windows will provide cooling to the building in summer.
- New low temperature hot water heating system serving radiators/underfloor heating.
- Mechanical controls including heating systems
- New electrical 100A TPN Supply
- General small power is provided via isolated supplies, the provision of all distribution equipment containment, final circuits and terminations included in this project.
- Lighting and control systems -CDP
- Emergency lighting – CDP
- Life Safety systems -CDP
- Access Control and Security system – CDP
- Electrical Containment systems throughout the route length of all electrical circuits and:
- Extra Low Voltage: Telecoms / Data / AV / Intercom / Security / Access Control / CCTV in separately contained systems – To be defined, detailed by specialist, containment only

2 BRITISH STANDARDS, REGULATIONS AND INDUSTRY GUIDANCE

The service installations will be designed to current regulations, recommendations and standards which include the following:

2.1. STANDARDS AND DESIGN GUIDES

- British Standard Codes of Practice for Building Services Systems
- British Standards or European equivalents
- BISRIA Commissioning Guides
- Pre-Commission Cleaning of Pipework Systems (BG 29/2012)
- CIBSE Commissioning Codes and Technical Memoranda
- CIBSE Guides Volume A to E inclusive
- CIBSE Lighting Guide and Codes
- The Institute of Plumbing, Plumbing Services
- Loss Prevention Council (LPC) Rules
- Requirements of Client Insurers
- British Standards requirements for Electrical Installations IET Wiring Regulations BS7671

2.1. CODES AND REGULATIONS

- IET Wiring Regulations for Electrical Installations
- All Building Regulations, Local Authority Regulations and By-Laws Applicable to the Building Concerned
- Relevant British Standards
- Openreach (BT) Regulations
- CDM Regulations 2007
- CE Mark with particular regard to the :
 - The EMC Directive 89/336/EEC
 - The Low Voltage Directive LVD/72/23/EEC
 - The Machine Safety Directive 89/392/EEC
- CIBSE Technical Memoranda TM13. Minimising the Risk of Legionnaire's Disease
- Control of Substances Hazardous to Health Regulations 1992 (COSHH)
- Health and Safety at Work Act
- Approval Code of Practice (L8)
- The Construction Act
- The Electricity at Work Regulations 1989
- The Electricity Supply Regulations 1937
- British Standard BS 7671

- Fire Safety Guidance, in particular Kitchen Extract Systems GN86
- The Environmental Health and Safety Officer
- The Environmental Protection Act
- The Gas Safety Regulations 1990
- The Petroleum Officers Requirements
- The Pressure System Regulations 1989
- The Workplace (Health, Safety and Welfare) Regulations 1992
- Water Regulations
- Local authority guidance for noise and pollution control

3. DESIGN CRITERIA

3.1. EXTERNAL TEMPERATURES

| | | |
|--------|---------|---------|
| Summer | 30°C db | 20°C wb |
| Winter | -4°C db | -4°C wb |

3.2. INTERNAL TEMPERATURE AND HUMIDITY

| | |
|--------|-----------------------------|
| Summer | Not controlled (no cooling) |
| Winter | 20°C ± 2°C |

3.3. VENTILATION RATES

Continuous mechanical ventilation via an MVHR unit has been proposed. The table below gives the mechanical ventilation continuous rates for each space that requires it:

| Space | Design Basis | Comments |
|------------------------------|-------------------------------|------------------------|
| Bathrooms | 8 l/s Extract | 85% Negative Pressure* |
| Open Plan Kitchen | 13 l/s Extract | Negative Pressure* |
| Sitting Room, Study, Library | 0.3 l/s/m ² Supply | |
| Bedroom | 0.3 l/s/m ² Supply | |

*Areas such as bathrooms, toilets and kitchens will be kept at a negative pressure, in order to contain any humidity, smoke or odour.

3.4. DUCTWORK NOISE LEVELS

| Type of Space | Noise levels |
|---------------|--------------|
| Residential | NR30 |

Duct velocities (m/s) should not exceed the following:

| | Main Ducts | Branch Ducts | Final Run outs |
|------|------------|--------------|----------------|
| NR30 | 5.5 | 5.0 | 2.5 |

Note maximum pressure drop should not exceed 0.8pa/m and statics need to match specific fan power requirements

Final attenuation and acoustic performance to be checked by acoustic consultant. Internal noise levels as defined by ISO R 1996, will apply at a distance of 1.5m from any grille/diffuser (at an angle of 45°C) or any wall surface.

3.5. OCCUPANCY PERIOD

The occupancy period and internal condition have been set according to the assumption below.

The internal conditions of the Thermal model are based on the National Calculation Method, as in the NCM Activities database v5.2.7 for dwellings.

3.6. BUILDING REGULATIONS

All designs for the building will be undertaken to comply with Building Regulations, in particular Part L1A (New dwellings).

All designs for the buildings will be undertaken to comply with current legislation set out in Part F (Means of Ventilation), Part H (Drainage and Waste Disposal).

4. MECHANICAL SERVICES

4.1. MECHANICAL VENTILATION SYSTEM

Ventilation to the building is proposed to be provided by a Mechanical Ventilation with Heat Recovery (MVHR) unit, located in the utility room (location to be finalised). The MVHR unit has a heat exchanger in order to reclaim heat from the extract air, tempering the supply air in colder months with approximately 90% efficiency. This helps to significantly reduce heating costs as the fresh air being supplied has been preheated by the extract air and so the supply air in winter months is much closer to room temperature. In warmer months, where heat reclaim could contribute to overheating, the heat exchanger in the MVHR has a bypass to allow the MVHR to only reclaim heat when it is beneficial. The MVHR unit also contains filters on the incoming fresh air supply with the aim of improving internal air quality.

The MVHR will be all be fitted with attenuators where necessary, in order to control noise transmission, in line with the guidance from the acoustic consultant.

4.2. HEATING AND HOT WATER

The intention is to provide heating and hot water to the house via an air source heat pump (ASHP) system, subject to technical resolution. The ASHP system (location to be finalised) will provide Low Temperature Hot Water (LTHW) at 55°C. The heated water will be transferred to buffer vessels and to the fitment.

The LTHW and HWS systems will operate on the basis of a static compensated primary and variable flow secondary system. The secondary system will include all necessary differential pressure control valves and bypasses to control over pressure and min flow conditions. The return loop on the hot water loop will be used to minimise lag time between opening a hot water outlet and hot water being delivered.

Heating to the new dwelling is distributed via the LTHW network to the underfloor heating manifold. It is proposed that the house will be equipped with wet underfloor heating systems in the main occupied area. The location and dimension of each underfloor heating manifold will be confirmed by specialists. Alternatively, radiators may be considered if preferred.

The whole system will comply with BS: 6700, HSC ACOPS L8, CIBSE TM13, and Water Regulations 1999 second edition. All fittings, appliances, valves and materials to be Water Research Council listed.

Drain valves will be provided at all system low points and isolation valves on all appliances connections.

All piped water services within plant rooms, service risers, ceiling voids etc., will be clearly identified to BS (EN) 1710 together with the direction of flow.

The whole system will comply with BS EN 806, BS: 6700, HSE ACOPS L8 and the Water Regulations 1999 second edition. All fittings, appliances, valves and materials are to be water research council approved.

A Ground Source Heat Pump (GSHP) system was also considered as an alternative to the ASHP. However, this proposal was discarded because of the limited available ground space among the trees.

4.3. CONTROL SYSTEM

A controls system will be provided to provide control of the heating systems.

The intention is to control the underfloor heating system via a thermostat in each underfloor heating zone. There will also be a main control to switch the heating system on and off, which will be in the plant room (location to be finalised).

4.4. WATER TREATMENT

New pipework systems will be flushed, chemically cleaned and treated in accordance with BSRIA Pre-Commission Cleaning Guide BG 29/2011.

4.5. MECHANICAL COMMISSIONING

All air, heating/hot water, cold water, plant and control systems will be commissioned in accordance with BSRIA guidelines.

The Contractor will undertake comprehensive testing and commissioning of the entire mechanical services installations within the building as described in the Materials and Workmanship section of the specification.

The works will include off-site testing of equipment and systems, the employment of system specialists to commission dedicated systems, to prove the functionality of each system.

In addition, all service installation will be demonstrated to the approval of the Contract Administrator, Building Control organization and the Client's Representative will be instructed in its correct use and maintenance procedures of each system.

5. PUBLIC HEALTH AND FIRE AND SAFETY SERVICES

5.1. DESIGN CRITERIA

The public health services will be designed in accordance with the latest editions of all British Standards. The following British Standards further dictate the basis of design construction and commissioning.

- BS EN 12056 Gravity Drainage Systems include Buildings (System 3)
- BS EN 806 Specifications for installations inside buildings conveying water for human consumption
- BS EN 9990 Code of Practice for non-automatic fire fighting systems
- BS 8515 Rainwater harvesting systems
- Water Supply Regulations

5.2. SOIL AND WASTE INSTALLATION

Throughout the proposed development, the foul drainage points will be served by a gravity fed (where possible) fully vented Type 3 soil stack system which will drain to the below ground drainage system.

The foul drainage above ground system will be installed to meet the performance requirements stated in BS EN 2056 (Part 2), the Building Regulations and all other technical manuals and guides applicable. The system will be installed using the minimum pipework, fittings and accessories necessary to carry away all discharges from the sanitary appliances etc. quickly, quietly and with freedom from nuisance or risk to health. It is essential that air from the foul drainage system is prevented from entering the building. All pipelines will be identifiable in accordance with BS 1710.

All drainage pipework will be installed to convey discharges without cross flow, back fall, leakage or blockage and it is essential that the system is adequately tested, cleaned and maintained throughout the construction process. Soil vent pipes will terminate to atmosphere at roof level, sanitary fittings including any showers and taps will be selected by the Architect.

5.3. RAINWATER PIPES

All roof areas and external terraces and other areas are to be drained via a series of gullies, roof outlets, channel drains and rainwater downpipes into the site wide surface water network system via gravity where possible. All roof outlets and rainwater downpipes are to be designed as per BS EN 12056 Part 3.

5.4. POTABLE COLD WATER SERVICE

A water survey will be carried out to understand the capacity of the existing water supply (if applicable). If a new mains water connection is required, a booster set and a storage tank may be required. Water system serving irrigation purposes should be supplied by a CAT 5 storage tank and a pump set to avoid reversed flow.

Drain valves will be provided at all system low points and isolation valves on all appliances connections.

The whole of the new cold water systems after the local authority mains will be chlorinated by the Sub-Contractor who will allow for all necessary injection points as may be required to facilitate such works.

Insulation will be provided for frost protection and to guard against the build-up of temperature to all cold water pipes and storage cisterns. Where exposed to external ambient temperatures pipe work and vessels will be trace heated.

The whole system will comply with BS EN 806, BS: 6700, HSE ACOPS L8 and the Water Regulations 1999 second edition. All fittings, appliances, valves and materials are to be water research council approved.

All piped water services within plant rooms, service risers, ceiling voids etc., will be clearly identified to BS (EN) 1710 together with the direction of flow.

6. ELECTRICAL SYSTEMS

This report represents the development made at RIBA stage 3 and is subject to design development.

Electrical systems will comprise incoming electrical services, electrical services cables and cable management system, low voltage electrical services, BT services, IRS services, security systems and Automations.

All electrical systems will be installed to comply to the latest British standard regulations and all other relevant regulations and statutory requirements.

6.1. INCOMING ELECTRICAL SERVICES.

Includes new incoming electricity supply and BT fibre service.

New electricity supply

The development will be served by a new Three phase TP+N 100A electricity supply.

The incoming electricity supply will terminate into a recessed fibre glass reinforced plastic.

The new smart electricity meter will be installed with the fibre glass reinforced plastic.

New BT Fibre supply

The new fibre services will terminate into the Customer splice point.

The Optical Network termination point and the Router will be installed in the property services cupboard.

6.2. CABLE MANAGEMENT SYSTEM

All electrical services cable will be new, BASEC certified and Low smoke zero Halogen type.

All cables will be securely contained.

Cable installation to comply to the latest requirements of BS 7671 IEE Wiring regulations.

Cable management system will be installed in all areas of the cable routes.

Cable management will be neatly installed and cross bonded.

LV cables and ELV cables will not be installed on the same cable tray, trunking or cable duct.

6.3. LOW VOLTAGE ELECTRICAL SERVICES

Low voltage electrical services include, electricity power distribution boards, small power, power to mechanical services and ELV control panels, lighting.

The new 18th edition electrical power distribution board will be installed on the Basement floor.

All the development power supplies will be derived from the electricity power distribution board.

DB will new and complete with integral disconnecter switch, Surge protection device and Arc Fault Detection Device.

6.4. SMALL POWER

All small power circuits shall be RCD protected.

13A switched sockets will be installed in all areas of the building.

Kitchen appliances will be controlled via the Kitchen grid switch.

Hob will be independently wired from the Power distribution board.

All external electricity power points will be IP rated to a minimum of IP54.

The kitchen equipment details should be provided to the design team as soon as available.

Power to mechanical equipment and ELV control panels

All mechanical equipment and ELV control panels will have local isolated electrical power supplies.

Power supplies will be to the manufacture's written instruction.

6.5. LIGHTING

Lighting will comply to the latest requirements of CIBSE guide.

All lighting will be new and LED low energy lighting type.

Lighting will be controlled by a local switch and automation lighting control system.

Bathrooms and wet rooms will have IP54 rated light fittings.

External lighting will be controlled by a dusk to dawn sensor, motion sensor and internal lighting control switch.

6.6. FIRE ALARM SYSTEM

The development will have an automatic fire detection and fire alarm system that complies with the latest editions of BS 5839 and the Building control requirements Part B.

6.7. DOOR ENTRY SYSTEM

Access control requirements to be defined by the Architect

6.8. CCTV SYSTEM

A CCTV system as well as signage will be added to the development.

6.9. LIGHTNING PROTECTION

A lightning protection risk assessment will be carried out by the Lightning Protection specialist to determine the level of protection and the required lightning protection arrangement during the stage 3 works.

6.10. HOME AUTOMATION SYSTEM

The extent of the AV system will be defined in stage 4 works.

6.11. INFORMATION REQUIRED

- Lighting design brief
- Small power Layouts
- AV/Comms brief
- Security Brief
- Kitchen equipment details
- Electric vehicle charge point requirements
- External power & Lighting scope