

Highgate School Science Block Refurbishment

MEP Strategy
LH0498-RPT-001

June 2022

High-performing partnership
Higher performing buildings

Highgate School Science Block Refurbishment

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This report has been authorised by:

.....

Danny Pattle
Associate

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1.0 Introduction

This RIBA Stage 2 report has been commissioned by Highgate School to define the Mechanical, Electrical and Public Health (MEP) engineering services brief and strategies for the Science Block Refurbishment works.

The existing Science Block was built within the 1920's and originally consisted of 3 floors (Ground-Second). In 2006 a third floor was added to contain further classrooms and office areas.

The existing Science Block contains the following activities;

Ground Floor

- + Headmaster, Bursar & Administration
- + Staff Room

Mezzanine

- + Administration

1st Floor

- + Physics & Biology Department

2nd Floor

- + Chemistry & Biology Department

3rd Floor

- + Modern Languages
- + SBR Department

Link

- + 6th Form Common Areas
- + Storage

1.1 The Brief

Scope of Works for Outline & Strategic Brief

The Science Building is an L-shaped 3-storey building built in the 1920's with a roof extension added in 2006. Refurbishment work has taken place to the exterior and interior of the adjoining Garner building in recent years. Some parts of the Science Building have been altered and improved over the last 20 years, but further refurbishment and upgrading is to provide the building with the same level of educational & office facilities as the remainder of the buildings on the Senior School Island Site.

Condition & validation surveys and a feasibility study have since been carried which were produced in October 2017. Based on this, Highgate School have instructed the design team to proceed to RIBA Stage 2 prior to submitting a planning application.

The primary refurbishment works will apply to the whole Science Building which will include the following;

- + Four storey plus basement extension to east wing to provide new entrance and improved circulation, lift and ancillary accommodation, and internal re-planning/ alterations;
- + Two storey extension above ground level colonnade to central building, to provide internal re-planning and additional teaching accommodation.
- + Creation of additional plant space at roof level of the East Link Block.
- + Complete replacement of building systems/ plant.
- + Rooftop observatory extension
- + Replacement windows and restoration of existing facades aassociated landscaping.

The MEP Scope of Works are as follows;

- + Enabling Works Package including full decant and construction of temporary accommodation building.
- + Full strip out of existing services installation.
- + Provision of a lift to ensure DDA compliance.
- + Provision of roof plant enclosure for a standalone heating system.
- + Solar gain measures to the newly extended third floor area.
- + Replacement of IT infrastructure cabling.
- + Replacement of domestic hot & cold water services installation.
- + Replacement of above ground drainage installation.
- + Replacement heating plant & distribution
- + Replacement of electrical sub main distribution boards, mechanical power supplies etc. including all associated cabling
- + New lighting and emergency lighting
- + External Lighting
- + New general small power
- + Modification/upgrade of the existing fire alarm installation.
- + New security installation.
- + New CCTV installation
- + Modify/Upgrade incoming natural gas and distribution throughout
- + Replacement of mechanical ventilation
- + Replacement of local comfort cooling installation.

1.2 Quality Assurance

This report has gone through a Quality Assurance protocol in accordance with the requirements of BS EN ISO 9001:2008, our approved Quality Management System.

1.3 Our Team

Stephen Wood	-	Project Partner (Project Lead)
Danny Pattle	-	Mechanical Lead (Project Co-ordinator)
John Marwat	-	Electrical Project Engineer
Jon Moraza	-	Environmental & Energy (Project Lead)

2.0 Design Criteria

This section provides outline design guidance for the engineering systems design associated with the refurbishment works. Irrespective of the items outlined in this brief the design shall be compliant with all current Building Regulations, Standards, Codes and Legislation and relevant planning conditions.

The use of passive and energy efficient measures are to be considered in all aspects of the design to reduce the need for heating and cooling and reduce energy consumption.

General Standards to be used include:

- + The Building Regulations, current editions, and any additional targets included as part of the Planning Consent
- + Building Bulletin 90 – Lighting Design for Schools (1999)
- + Building Bulletin 93 – Acoustic design of schools: performance standards (2015)
- + Building Bulletin 100 – Design for fire safety in schools (2007)
- + Building Bulletin 101 – Guidelines on ventilation, thermal comfort and indoor air quality in schools (2018)
- + Requirements of Building Control and/or the District Surveyor and Fire Officer
- + Reasonable provisions for the Disability and Equality Act and the Disability Discrimination Act
- + Applicable British Standards and BS EN Standards
- + CIBSE Guide A (Environmental Design)
- + CIBSE Guide B (Heating, ventilating, air conditioning, and refrigeration)
- + CIBSE Guide G (Public Health and plumbing engineering)
- + CIBSE Lighting Guide 5 – Lighting in education
- + CIBSE TM52 – The Limits of Thermal Comfort: Avoiding Overheating in European Buildings

2.1 External Design Temperatures

- + Summer: Temp 30°C db, 21°C wb.
- + Winter: Temp -4°C, RH 100%.
- + Heat Rejection Design: Temp 35°C db.

When considering overheating in rooms without cooling, calculations shall be based on current weather data files.

2.2 Internal Design Temperatures

Notes:

- + Rooms will be designed to limit overheating in accordance with Building Bulletin 101 recommendations, utilising dynamic thermal modelling to demonstrate compliance.
- + When considering internal temperatures, the design shall also take into consideration the effect of draughts from ventilation equipment and radiant effect of heat emitters and glazing within the space and be in accordance with the BB101 recommended values for comfort conditions.

BB101 Requirements

Room/Area	Room Air Temperature			
	Summer		Winter (Normal – Maximum operative)	
	Temperature	RH	Temperature	RH
Stores	Uncontrolled	N/A	5°C	N/A
Toilets, circulation spaces and store rooms that are normally occupied.	Uncontrolled	N/A	17-24°C	N/A

Spaces with normal level of activity, including teaching, study, exams, admin and staff areas, prep rooms, practical spaces and computer suites.	In accordance with CIBSE TM52	N/A	20-25°C	N/A
Spaces with less than normal level of activity or clothing, including sick, isolation rooms and changing rooms.	Uncontrolled	N/A	21°C-26°C	N/A

2.3 Ventilation

All ventilation systems shall comply with Part F of the Building Regulations.

Classrooms

Generally classrooms shall be naturally ventilated if this cannot be achieved then a mixed mode system shall be adopted that makes use of a mixture of mechanical and natural ventilation.

BB101 Requirements

Room/Area	Ventilation Flow Rate	
	Supply (l/s)	Extract (l/s)
Sanitary accommodation and washrooms	90% of extract	6l/s per shower head/bath 6l/s per WC/urinal
Cleaners Stores	Undercut door	10 A/C/H
Food and beverage preparation areas eg kitchenettes	Uncontrolled	15l/s
Laboratories and preparation room 37-70m²	4l/s/m²	4l/s/m²
Laboratories and preparation room >70m²	(0.106xArea) l/s/m²	(0.106xArea) l/s/m²
Chemistry store room	2 A/C/H 24 hours	2 A/C/H 24 hours
Rooms containing printers and photocopiers	Natural make up	20l/s per machine during use. Cooling will be required in larger reprographic rooms with internal heat gains of exceeding 2kW.
Fume Cupboards	In Accordance with CLEAPASS Guide G9 & British Standards	

2.4 Heat Gains / Losses

Heat gains for assessment of summertime overheating will be assumed as follows:

		Internal Heat Gain (W)
Occupancy (People)	Per person	70W (sensible) 55W (latent)
Lighting Loads	Office	12 W/m²
	Classrooms	7.2 W/m²
	Circulation	5 W/m²
Small Power Loads	Office/Classroom	25 W/m²
	Circulation	10 W/m²

2.5 Above Ground Drainage and Rainwater
Basis of Calculation to be utilised in developing the design

2.5.1 Foul Water
British Standard BEEN I 2056:2000 Part 2 States:

Usage of appliances Frequent use e.g. hospital, school, restaurant, hotel (K factor 0.7)

Table 2 Discharge units System III used – single discharge stack system with full bore branch discharge pipe [Typical Practice in UK – IoP guide (page 106)]

Discharge Units	
o	Water closet (6 litres capacity) 1.7l/s
o	Wash basin 0.3l/s
o	Shower without plug 0.4l/s
o	Sink 1.3l/s
o	Dishwasher 0.2l/s
o	Washing machine (6kg load) 0.6l/s

Calculation of flow as equation $Q_{ww}=k\sqrt{\sum DU}$

Where: Q_{ww} = Waste water flow rate
 K = Frequency Factor
 $\sum DU$ = Sum of discharge units

Ventilation provision

- + Single stack system for four storey block and below.

2.5.2 Rainwater
With the building only being extended in parts, the buildings rainwater drainage shall be retained as existing principles, although new rainwater will be provided. Where new roofs are provided to extensions the rainwater discharge will be calculated utilising BSEN 12056-3:2000 – Gravity Drainage systems inside buildings Part3: Roof Drainage, layouts and calculations.

2.6 Building Envelope Air Tightness
For specific recommended air tightness values for different areas of the development please refer to the Planning Energy Statement.

2.7 Illumination Levels
Lighting levels as CIBSE Guides and Building Bulletin 90

Room/Area	Maintained illuminance (lux)
Admin Office and Office areas	500 @ 0.75 AFFL
Laboratory Areas	500 @ 0.75 AFFL
General Classroom	300 @ 0.75 AFFL
Circulation/Stairs/Landings	100 @ FFL
Store	100 @ FFL
Foyer Area	200 @ FFL

Staff Room	300 0.75 AFFL
WC Area	100 @ AFFL
Disabled WC	200 @ AFFL

The emergency lighting installation will be designed in compliance with BS 5266, BSEN 1838.

2.8 Electrical Power
All electrical design shall be in accordance with the latest edition of BS 7671 and all associated Guidance Notes.

Area	Power W/m2	Lighting W/m2
Admin Office	25	12
General Class Room	10	10
Laboratory Areas	10	12
Circulation/Stairs/WC/Store	5	5

2.9 Fire Safety Systems
The School is currently served by an analogue addressable fire alarm system, with the main panel located within the Site Delivery reception. The panel serves the whole site via a number of Zones. It is proposed to retain and modify the existing panel in order to provide a new detection system throughout the Science Block to a Category L2 system (To be confirmed by Building Control/Fire Officer).

3.0 Services Infrastructure

3.1 Water (Domestic)

The mains cold water supply enters the building within the South East corner and rises to serve various appliances throughout the building including the 3rd floor plant room. The water supply currently relies on towns mains to maintain adequate pressure, however in recent years it has been reported that whilst fully occupied, adequate water pressures were not being achieved.

As the refurbishment works do not include a significant increase in water demand it is therefore considered that the current MCWS to the Science block is sufficient however a boosted water supply will be required to maintain adequate pressures.

3.2 Natural Gas Supply

Due to the omission of gas fired boilers for space heating it is envisaged that the existing gas supply located within the Locker Room Meter Cupboard is retained since there is no increase in capacity.

3.3 LV Supply

The Science Block is currently being served by 3No incoming utility supplies

- 100A TP&N supply serving West Side of Science Block
- 200A (400A casing) TP&N supply serving Ground floor IT, Third Floor Plant room & other ancillary areas.
- 80A TP&N serving East Side of Science block

We have contacted UKPN regarding the existing KVA usage and received an indication that the agreed existing KVA usage from the 400A service head located with the locker room cupboard is in the region of 200A. The school has since carried out a load test analysis which has identified a maximum peak load of 79A.

The Schools IT Department have requested a load of approximately 100A TP&N for any future IT expansions and this would need to be considered during the stage 3 design.

There is also a requirement for an additional 73kW of electrical load to serve the new proposed low grade heat ASHP plant. To accommodate this the existing electrical supply or supplies will require upgrading. The proposed strategy for this will need to be reviewed and developed during Stage 3.

3.4 Telecommunications

Based on the current refurbishment scope of works it is considered that no upgrade will be required to the existing incoming BT supply, however its current location will need to be re-sited to accommodate the main extension works.

4.0 Enabling Works

As part of the enabling works the Science Block will require a full decant and relocation to temporary accommodation. The temporary accommodation will consist of a 3 storey modular building, final location to be confirmed by the school.

It is assumed that the temporary building will be designed and fully fitted out by the Modular Building Contractor including temporary lead up services. The final location of which will need to be agreed once the building location has been confirmed.

5.0 Mechanical Service Strategy

5.1 Domestic Water Services

5.1.1 General

The existing hot & cold water distribution system is to be stripped out and replaced in its entirety, including the Ground & Mezzanine Administration Office & 3rd floor.

A new boosted cold water distribution system shall be provided to serve the whole building and shall connect to sanitary ware and equipment as indicated on the Proposed Architects drawings.

Hot Water shall be generated by local point of use heaters to match the existing hot water generation strategy.

New pipework risers shall be formed to facilitate pipework distribution. For riser locations and primary pipework routes please refer to Sketches located within Appendix 2

5.1.2 Boosted Cold Water

To ensure adequate water pressures are being achieved to each area of the building it is proposed that a new boosted cold water supply is provided. This would consist of a booster set and break storage tank arrangement in accordance with the latest Water Regulations.

To house the above a new plant room would be required. The proposed booster set and cold water storage tank shall be located within a newly formed plantroom at ground floor level. For further details please refer to Appendix 2.

The cold water storage tank would be sized accordingly to serve the cold water demand for the entire science block at approximately 4m³.

5.1.3 Domestic Hot Water

It is proposed that all hot water will be provided by local point of use heaters to match the existing HWS strategy.

5.2 LTHW Heating

5.2.1 General

The existing heating provision serving the Science block currently consists of two systems Grd-2nd & 3rd Floor. It is intended to replace the heating distribution serving the Grd-3rd via a new independent Boiler plant located within the roof of the link building.

5.2.2 Grd -2nd Floor

The Grd-2nd floors are fed from the central boiler room located within the main block. This consists of a single pipe distribution system serving traditional cast iron radiators via a single heating zone. Controls are very basic and are either on or off. Over recent years the school have received reports that the heating has either been very hot or very cold. The existing system is very inefficient, has exceeded its life expectancy and is due for replacement.

The Staff Room Mess which has been refurbished within the past 5 years is heated via electric panel heaters as there were concerns over performance if the existing heating system were to be utilised. As part of the refurbishment works it is intended to revert the Staff Room back to a wet heating system.

5.2.3 3rd Floor

The 3rd Floor was added to the Science Block in 2006 and is heated independently. The Boiler plant is located within its own plant room. Heating distribution is provided by modern steel panel radiators. Both boiler plant and pipework distribution will be replaced as part of the refurbishment works.

5.2.4 LTHW Proposal

It is proposed to provide a new standalone low grade heat Air Source Heat Pump (ASHP) plant located on the East end of central core roof within the roof and will be of a modular arrangement to provide a level resilience for the science block.

To suit the orientation of the building and minimise energy usage it is intended to provide separate zoned weather compensated circuits complete with variable speed pumps. Heat emitters will consist of steel panel radiators complete with local TRV control.

New pipework risers shall be formed to facilitate pipework distribution. For riser locations and primary pipework routes please refer to Sketches within Appendix 2.

5.3 Ventilation

5.3.1 General

The Science block is generally naturally ventilated and the intention is to retain this strategy where applicable, however where this cannot be achieved forced mechanical ventilation with heat recovery will be required in accordance with BB101. For further details please refer to the Overheating Assessment.

5.3.2 Toilet & Shower areas

All existing and proposed toilet & shower areas will be provided with mechanical ventilation systems in accordance with the latest Building Regulations Part F/BB101 requirements. Heat recovery will be implemented where feasible.

5.4 Cooling

Cooling provision to the science block consists of a number of DX Split systems serving the ground & mezzanine administration areas, IT Rooms and 3rd Floor offices. At present it is intended for the cooling serving the ground areas to be removed (excluding IT Rooms) and where compliant replaced with natural ventilation or mix mode application.

In some instances this may not suffice and cooling would need to be provided via a new VRF system. For further details of affected rooms please refer to the Over Heating Assessment

5.5 Controls

All existing controls serving the Science Block shall be decommissioned and removed. A new Trend protocol BMS system shall be installed to provide plant enabling/monitoring, time scheduling and energy metering.

Once complete the control system shall be connected to the site wide controls infrastructure to enable functionality & monitoring from the schools head end BMS PC.

5.6 Natural Gas

5.6.1 General

Natural gas enters the site via 2No locations;

- Gas Meter Room adjacent Central Boiler Room (Gas Meter Size : 46m³/h)
- Gas Meter Room Adjacent to Ground floor Locker Room (Gas Meter Size: 40m³/h)

Gas to Science rooms and 3rd floor is fed via the Ground Floor Locker Room meter.

5.6.2 Natural Gas Proposal

Due to the omission of the gas fired boiler plant it is envisaged that no gas main upgrades will be required. However the existing gas main serving the laboratories will be removed back to source and replaced to suit the new space planning requirements.

5.7 Above Ground Drainage and Rainwater Systems

5.7.1 Existing Services

It is intended that all above ground drainage is to be replaced including all main stacks and drainage connections.

5.7.2 Proposed Above Ground Drainage

The above ground drainage and rainwater systems shall be in accordance with BSEN 12056:2000 Parts 2 and 3 respectively.

Where the buildings are 4 storeys or less, the above ground soil and waste system shall be a primary ventilated system with a single soil and vent pipe.

All vertical and horizontal foul water pipes/stacks shall be run in fusion welded HDPE and be acoustically insulated throughout their length. Where chemicals are used chemical resistant pipework shall be provided (laboratories)

Access shall be provided at each level and on all changes of direction.
Drainage connection to existing infrastructure is being carried out by the Structural Engineer (to be co-ordinated with TB+A)

5.7.3 Rainwater

Rainwater outlets would generally be replaced on a like for like basis since the existing roof is being retained. Where extensions are provided new downpipes will be required (internal or external)

5.8 Dry Riser

In accordance with the building regulations the provision of a dry riser is required for buildings over 18m in height. The Science Block is approximately 16m in height and it is therefore assumed a dry riser will not be required.

6.0 Electrical Service Strategy

6.1 LV Distribution

It is envisaged that the site temporary power supply will be served from either of the existing 3 No. incoming LV electrical supplies.

All existing distribution equipment including all power supplies, cabling, containment etc. shall be stripped back to the incoming head locations.

It is proposed that from each of the incoming supply locations a complete new LV distribution system shall be provided consisting of sub main distribution boards, sub main cabling, containment, final distribution boards, power supplies for mechanical services equipment and the new DDA lift. Each classroom/lab area shall be provided with its own final circuit metered distribution board in accordance with the latest Building Regulations. Detailed layout and quantities of distribution equipment shall be developed during stage 4 design.

6.2 General Small Power

All existing socket outlets, power supplies and associated cabling, containment, lighting controls, etc. shall be stripped out.

A complete new general small power installation shall be provided throughout consisting of socket outlets, isolators fused connection units, emergency power-off (EPO) buttons, and containment and associated cabling.

General small power serving socket outlets and fixed equipment within each classroom/lab area shall be served from local split distribution boards (i.e. Lighting and power) and circuits are generally protected by RCBO/MCB circuit breakers. All classrooms shall also be provided with emergency power-off (EPO) buttons, which provides a single point of equipment shutdown.

Offices area shall be served sockets outlets mounted on to a dado trunking system.

General socket and cleaners socket outlets shall be provided throughout each area, which shall generally be served via local metered distribution boards.

General Power shall also be provided to serve local point of use heaters for sinks, basins etc.

6.3 Lighting

All existing light fittings and associated cabling, containment, lighting controls, etc. shall be stripped out.

A complete new general lighting installation shall be provided consisting of new energy efficient LED light fittings, lighting controls, cabling and associated containment. Lighting circuits within each classroom/lab area shall be served from local split distribution boards. Lighting within the staffroom, offices, admin areas and circulation shall be served via local metered distribution boards.

All lighting circuits shall be wired using low smoke and fume (LSF) sheath cables.

Emergency lighting shall be provided throughout and shall generally consist of light fittings being fitted with integral 3-hour battery packs.

External Lighting shall be provided around the perimeter of the building and to the landscape architects requirements. Light fittings shall consist of LED energy efficient lamps and shall be photocell and time clock controlled.

6.4 Fire Alarm Detection

All existing fire alarm devices and associated cabling, containment etc. shall be stripped out.

The School is currently served by an analogue addressable fire alarm system, with the main panel located within the Site Delivery reception. The panel serves the whole site via a number of Zones.

It is proposed to retain and modify the existing panel in order to provide a new detection system throughout the Science Block to a Category L2 system and BS 5839 Part 1 (To be confirmed by Building Control/Fire Officer). New fire alarm devices shall be provided throughout.

6.5 Data/Communications

All existing data points and associated power supplies, cabling, containment etc. shall be stripped back to the existing ground floor coms room.

A new data/communications containment system shall be installed throughout. This shall be served from the existing ground floor coms room within the locker room.

Final routes and locations for distribution equipment, containment cabling etc. shall be finalised during the design stage and following liaison with the Schools IT department.

6.6 CCTV

Existing external CCTV Systems are to be modified to suit the new installation. These shall consist of relocation of existing external cameras, power supplies, containment, cabling etc. Full requirements to be confirmed by Highgate School

6.7 Security

A new Security System installation shall be provided throughout the building, consisting of new movement detectors, door contacts, power supplies, containment, cabling etc. Full requirements to be confirmed by Highgate School.

6.8 Access Control

A new access control system installation shall be provided throughout the building, consisting of new local door controllers, doors fitted with proximity readers and magnetic door locks to control entry into the spaces. Push to exit buttons shall be installed where required. Green break glass units shall be installed to enable the users to manually override the magnetic door locks in case of an emergency.

6.9 Lightning Protection

The existing lightning protection system shall be modified to suit the new building layout and be in line with the requirements of BS EN62305-3:2011.

7.0 Identified Risks

By the very nature of the RIBA Stage 2 report we are at, there are questions to be answered and risks moving forward which will need team input during Stage 3. To make this clearly identifiable, these have been included below.

Risk	Response
1. Any live MEP services running through the refurbished areas will need to be identified, traced and surveyed prior to any works being carried out. Intrusive will be required out of term time.	
2. Fire Strategy will need to be confirmed to categorize Fire Alarm installation.	
3. Increased power requirement to Comms Room	
4. Increased power requirements to building for the ne ASHP's will need to be finalized and source of upgraded poer supply agreed.	

8.0 Conclusion

Based on the proposed architectural changes, current condition and high energy consumption of the MEP installation it is recommended that a full MEP refurbishment is carried out.

This will be a excellent opportunity to introduce low energy, sustainable technologies such as Air Source Heat Pumps, LED lighting & maximise natural ventilation which will in turn significantly reduce the carbon emissions and energy consumption for the Science Block.

Appendix I – Standard Limitations for Building Reviews

1. Scope of inspection

TB+A is not responsible for and shall have no liability as a result of or in connection with any events occurring after preparing the report and/or any other matters of which TB+A was not aware when preparing the report.

All comments relating to the condition of the building services are made on a purely visual inspection of visible and readily accessible parts of the system/building, without any destructive or exploratory investigations.

Accessible voids in the property e.g. riser ducts, floor voids and suspended ceilings, etc., can only be inspected at random and where practical without disturbing building occupants.

Identification or Inspection of asbestos or deleterious materials are excluded and we would recommend a specialist is engaged to obtain assurance in this respect.

All building fabric and structural form of the property is outside the scope of our expertise and inspection.

Any comments within the report with regard to compliance of the Building Services with current and statutory legislation, is to be taken as a guide and is based on the inspection undertaken. Nothing in this report is a guarantee of compliance with legislation. Where we have identified that there may be contraventions, the comments of the appropriate authority should be sought to assess the scope of remedial work or corrective measures needed to meet requirements.

2. Building services operation

The inspection is visual in nature and excludes specific tests to establish operational status and as such, no assurance can be given that these are free from operational defect. Only the visual condition and state of repair of visible and accessible parts of each system will be assessed and recommendations made for testing or recommissioning, at extra cost, where needed to determine operational condition.

Similarly water quality in closed systems where applicable is assessed from available records, which will be requested and reviewed. The prevailing water quality, condition of internal surfaces of pipework and equipment can only be established by intrusive analysis which would be by a specialist organisation, separately from this report.

3. Suitability of the Property

We are not responsible for commenting on or advising on the suitability for any use, fitness for purpose and performance of the Property and such commentary and advice is outside the scope of the Appointment. The client must therefore ensure that your legal advisors ascertain assurances in this respect, including planning permissions, approvals, permitted uses, limitations etc.

Your legal advisors should advise on whether the Property and or its use, complies with statutes and local byelaws and is not subject to any outstanding enforcement orders or other such notices or proposals

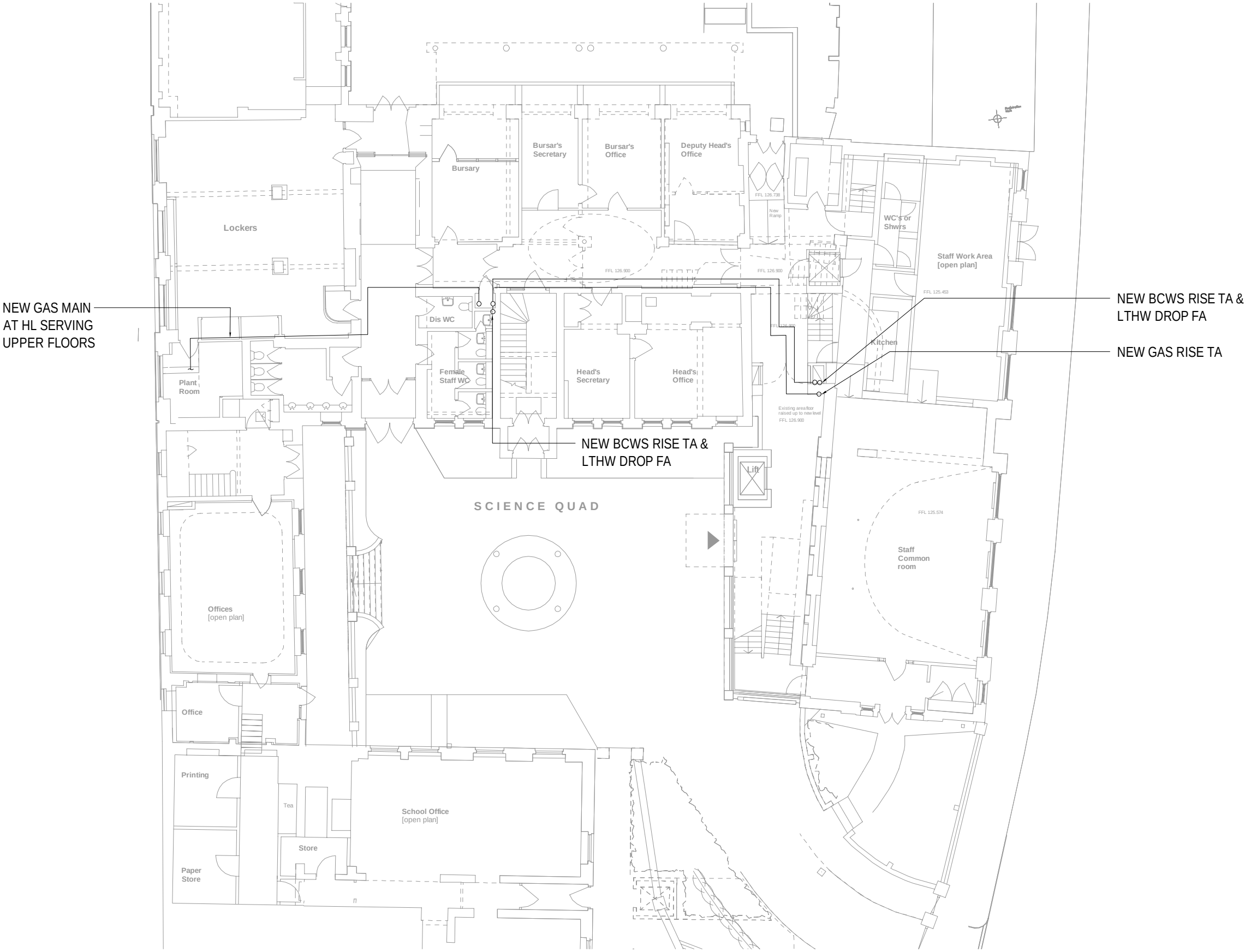
4. Ground conditions and environmental matters

We will not be investigating/reporting on ground conditions and environmental matters in any respect.

5. Budget costs

Any indication of cost is approximate only and relative to the anticipated costs of replacement or repair of a particular piece of building services equipment – it is given as an opinion without detailed measurement or consideration as to how the relevant price of equipment may be packaged and procured in the marketplace. The Client must test such costs by specifying the work in detail and obtaining competitive quotations from appropriate contractors and an exercise of this nature is outside the scope of this Appointment

Appendix 2 – Drawings



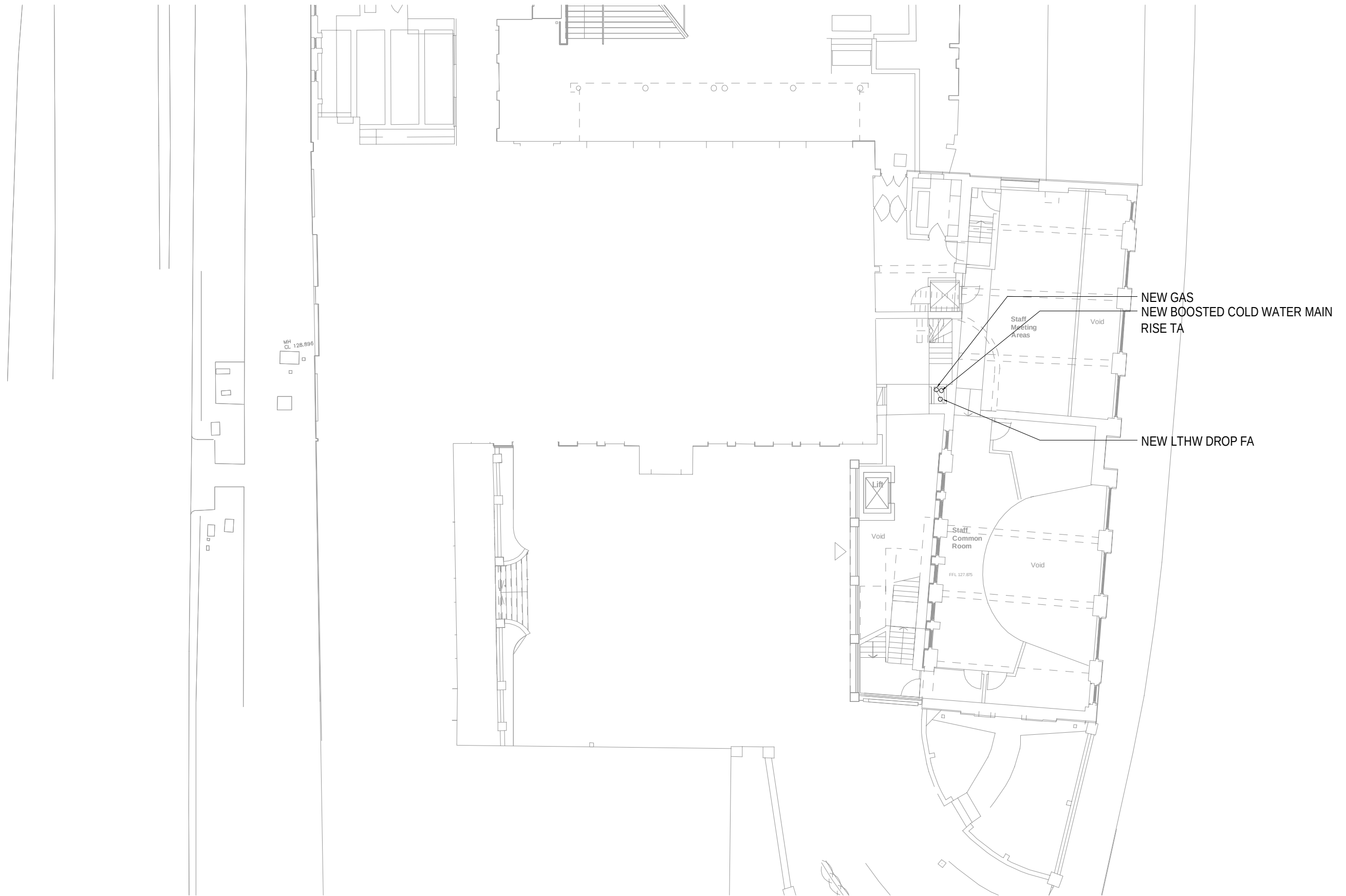
HIGHGATE SCHOOL SCIENCE BLOCK
GROUND FLOOR PRIMARY PIPEWORK DISTRIBUTION LAYOUT
LH0498-SK-M-00-001
SCALE 1:200@A3

Plant Room

CWS TANK
4m³ 2mx1mx2m

BOOSTER SET
1500x800
APPROX.

HIGHGATE SCHOOL SCIENCE BLOCK
GROUND FLOOR CWS TANK PLANT LAYOUT
LH0498-SK-M-00-002
SCALE 1:20@A3



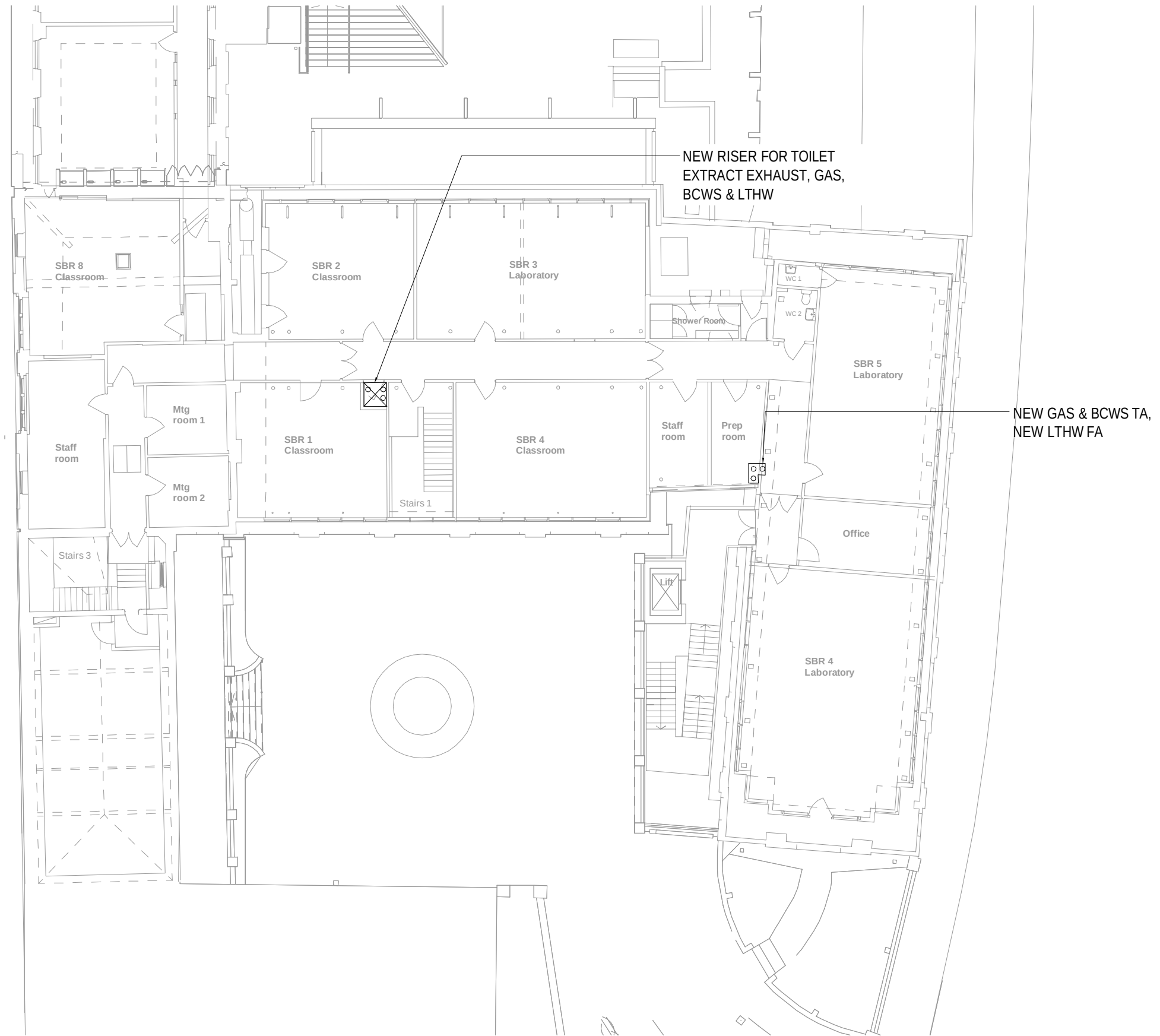
HIGHGATE SCHOOL SCIENCE BLOCK
MEZZANINE PRIMARY PIPEWORK DISTRIBUTION LAYOUT
LH0498-SK-M-MZ-001
SCALE 1:200@A3



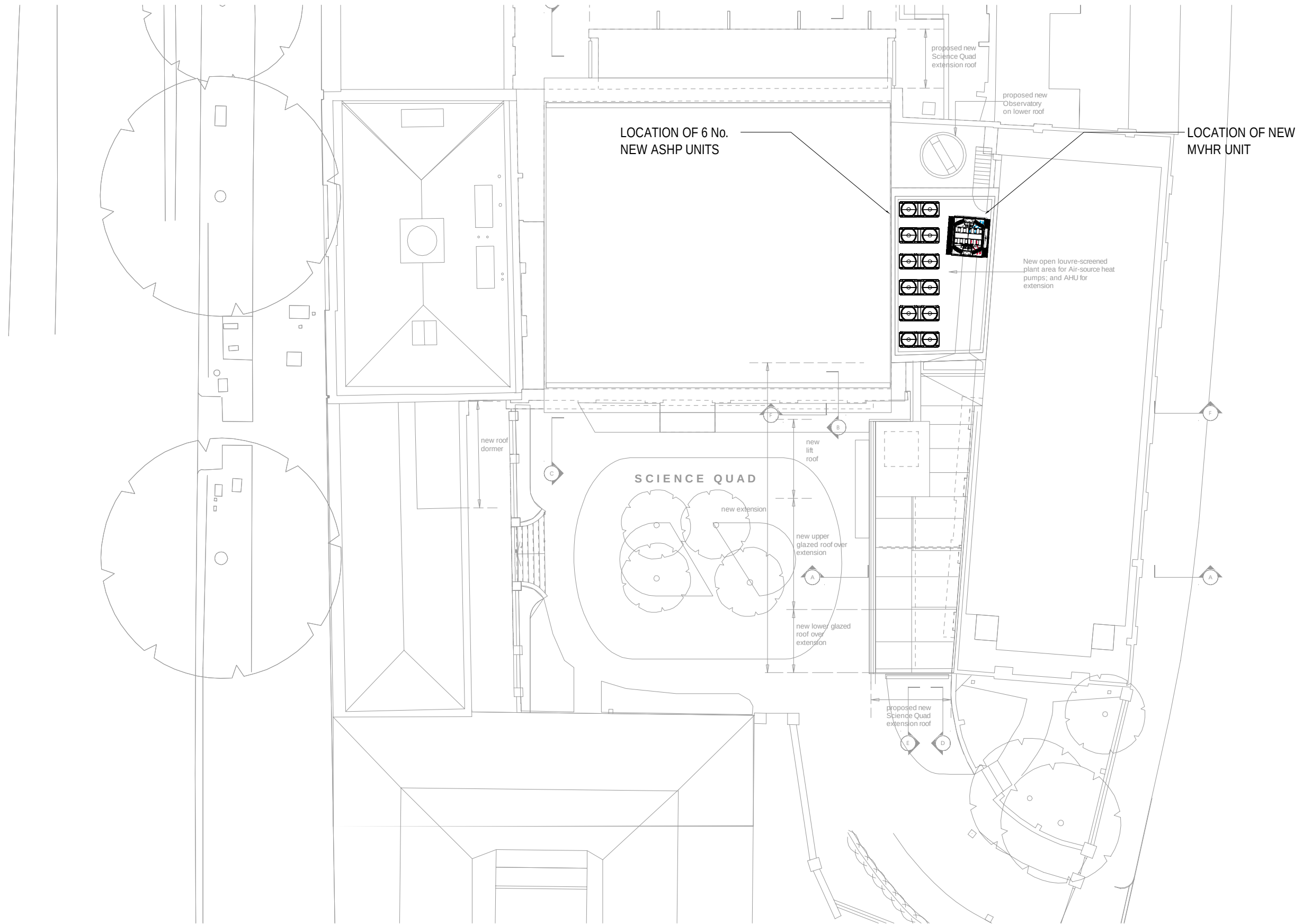
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SCALE 1:200@A3



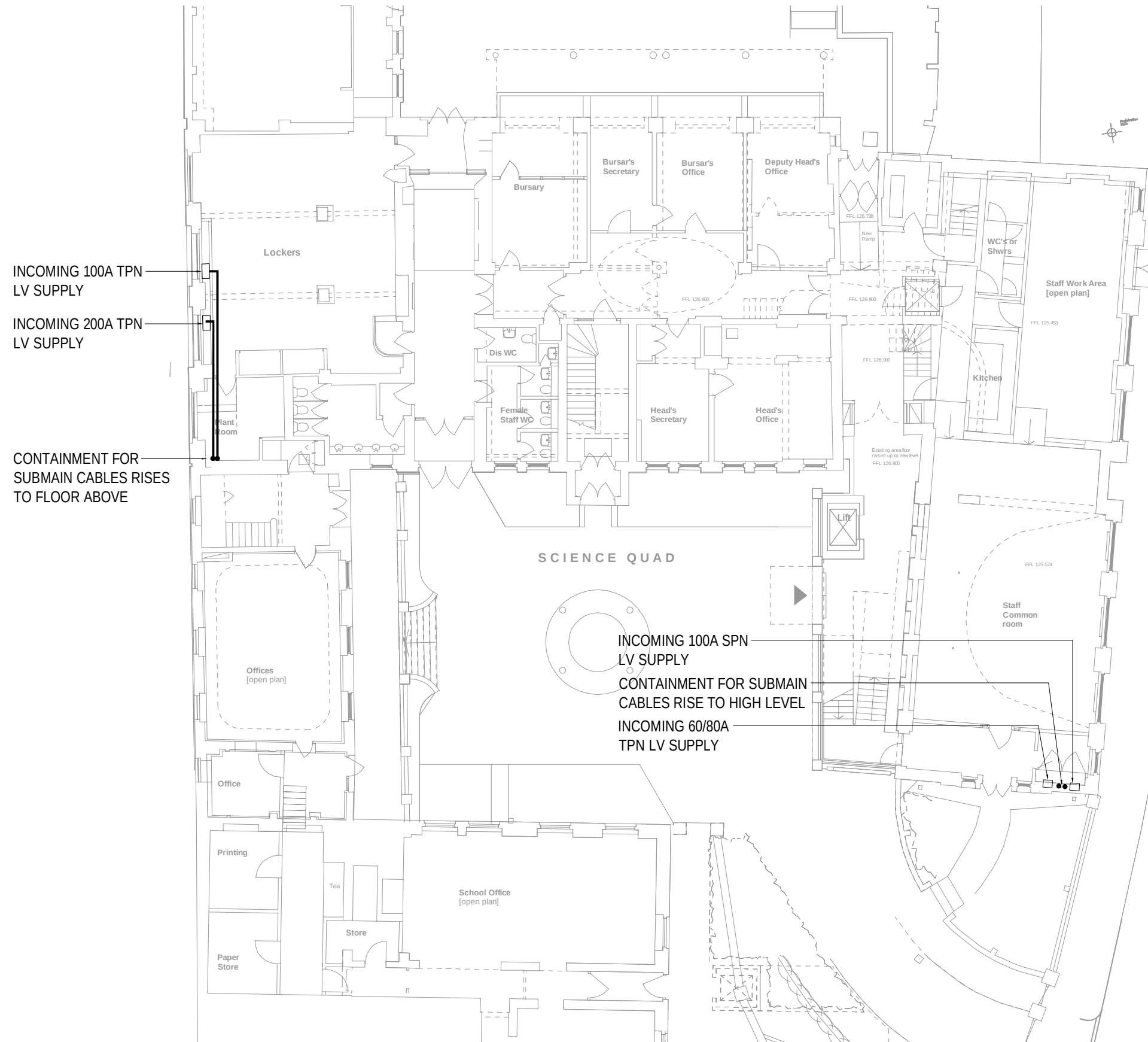
HIGHGATE SCHOOL SCIENCE BLOCK
SECOND FLOOR PRIMARY PIPEWORK DISTRIBUTION LAYOUT
LH0498-SK-E-02-001
SCALE 1:200@A3



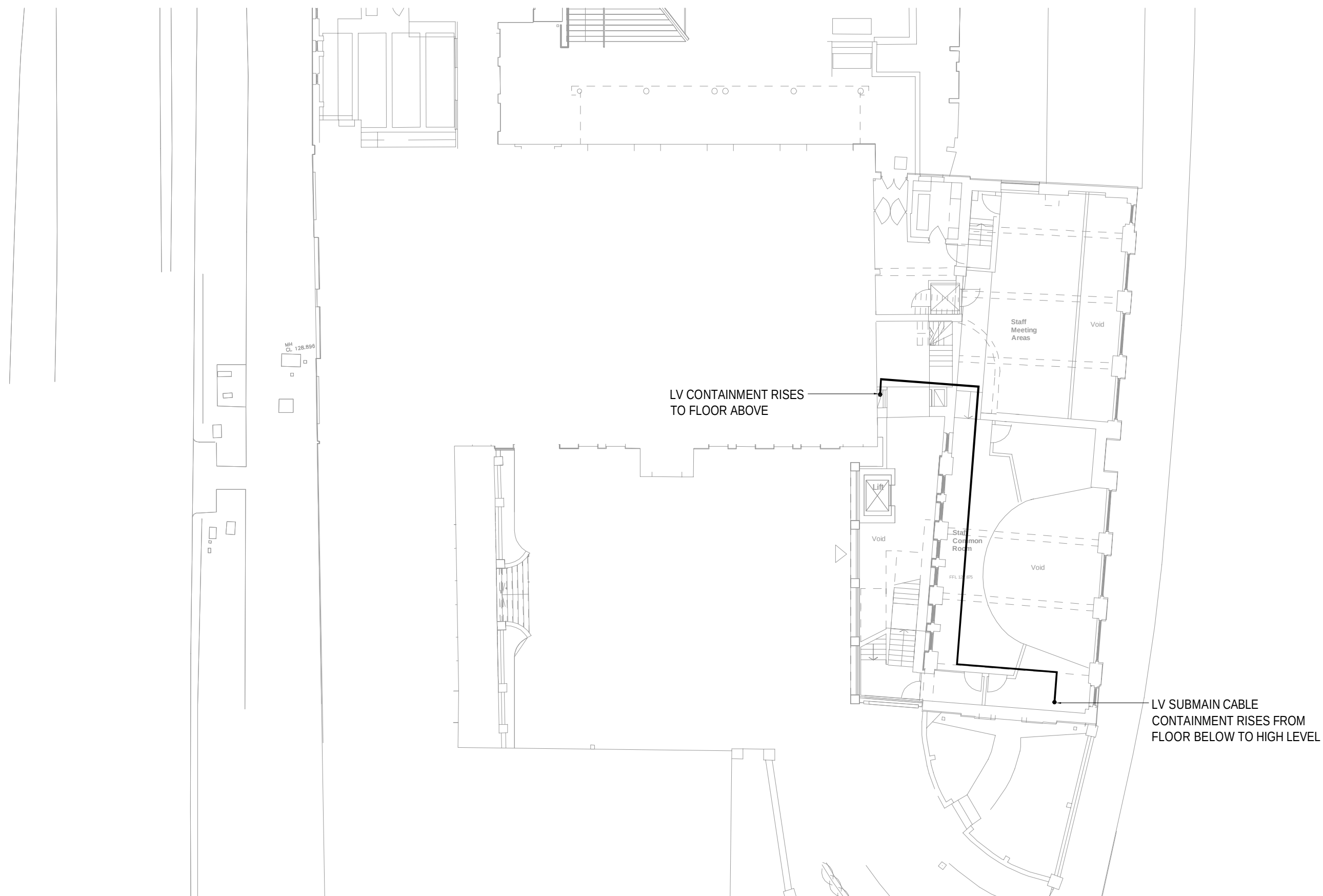
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THIRD FLOOR PRIMARY PIPEWORK DISTRIBUTION LAYOUT
LH0498-SK-M-03-001
SCALE 1:200@A3



HIGHGATE SCHOOL SCIENCE BLOCK
ROOF LEVEL MECHANICAL PLANT LAYOUT
LH0498-SK-M-RR-001
SCALE 1:200@A3



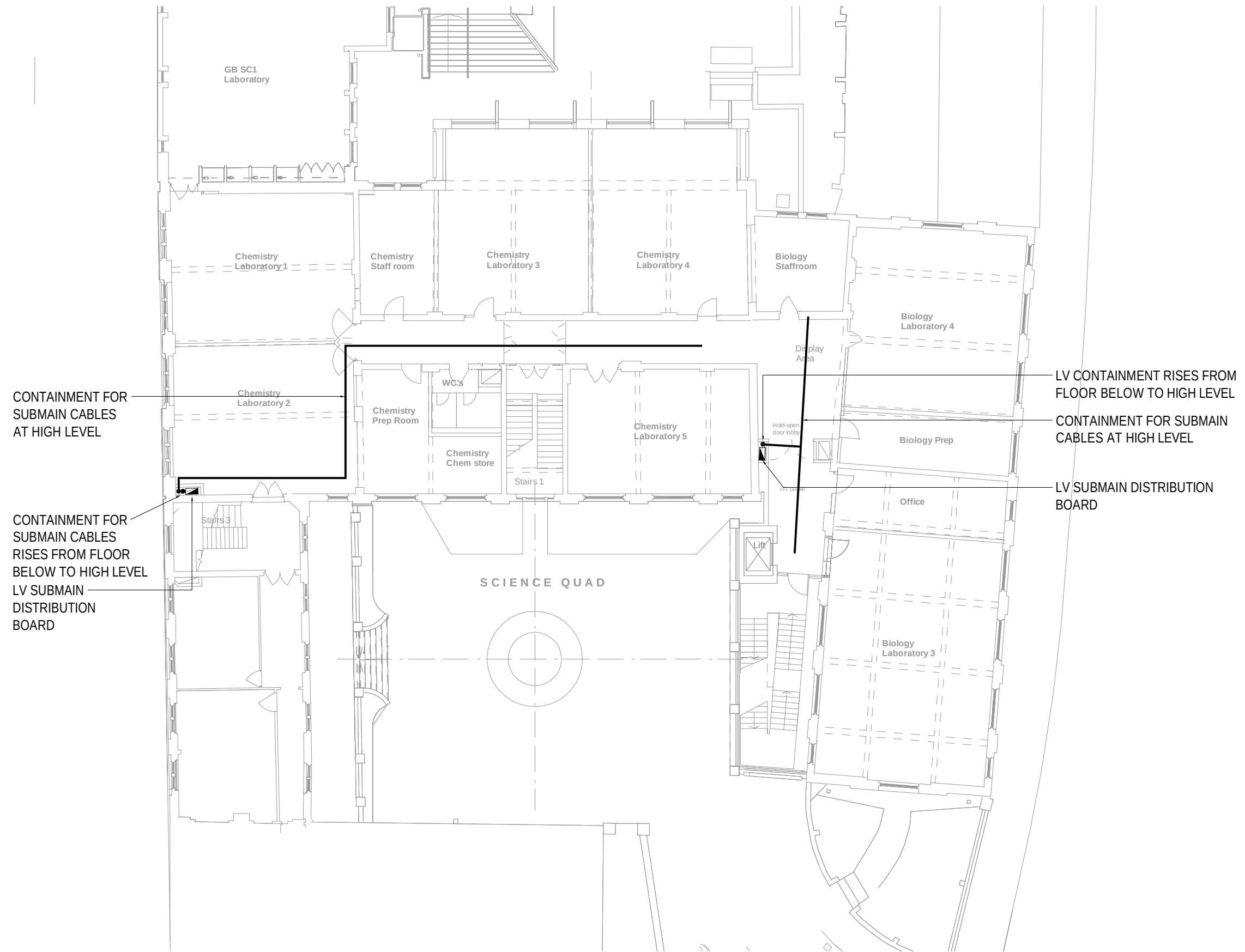
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PRIMARY GROUND FLOOR ELECTRICAL LV DISTRIBUTION ROUTE LAYOUTS
LH0498-SK-E-00-001
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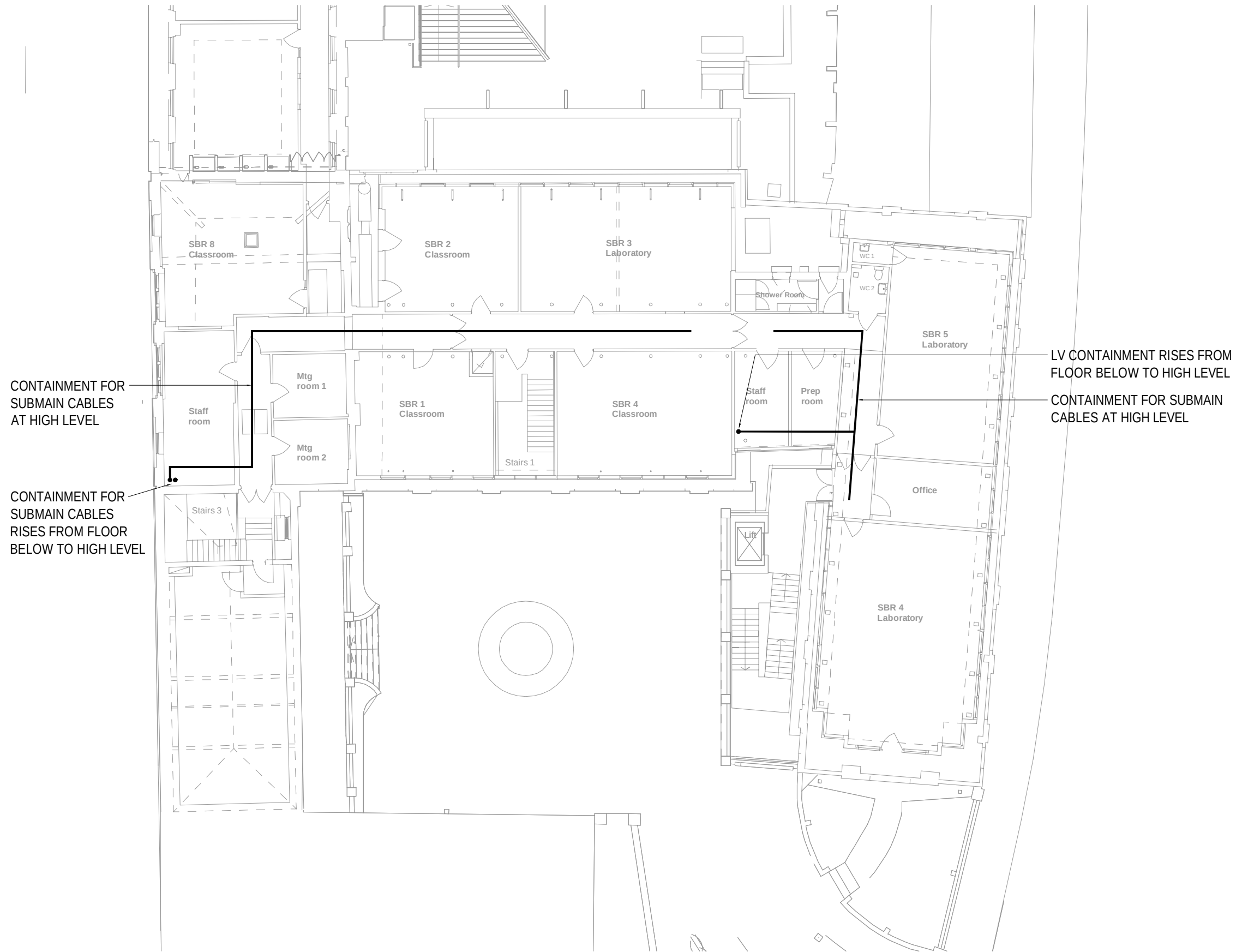
HIGHGATE SCHOOL SCIENCE BLOCK
PRIMARY MEZZANINE LEVEL ELECTRICAL CONTAINMENT ROUTES LAYOUT
LH0498-SK-E-MZ-001
SCALE 1:200@A3



HIGHGATE SCHOOL SCIENCE BLOCK
PRIMARY FIRST FLOOR ELECTRICAL CONTAINMENT ROUTES LAYOUT
LH0498-SK-E-01-001
SCALE 1:200@A3



HIGHGATE SCHOOL SCIENCE BLOCK
PRIMARY SECOND FLOOR ELECTRICAL CONTAINMENT ROUTES LAYOUT
LH0498-SK-E-02-001
SCALE 1:200@A3



HIGHGATE SCHOOL SCIENCE BLOCK
PRIMARY THIRD FLOOR ELECTRICAL CONTAINMENT ROUTES LAYOUT
LH0498-SK-E-03-001
SCALE 1:200@A3

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