

**Refurbishment of Carn Gwavel Primary School**

-

**MECHANICAL & ELECTRICAL  
SERVICES  
SCHEDULE OF WORK**

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## **1 GENERAL CONDITIONS OF SUB-CONTRACT**

### **1.1.1 General**

The contract covers the supply, delivery, installation, testing and commissioning of the works described in this Specification and associated Drawing for the individual Mechanical and Electrical Services Contractors.

### **1.1.2 Tender**

The Mechanical and Electrical services tenders are intended to be lump sum tenders for the specified work, in order to provide a measure of flexibility should it become necessary to omit some of the tendered works from the Contract, the Tenderers are to complete and forward their tenders to the Main Contractors using the copy of '**5 SUMMARY OF TENDER**' of this document.

### **1.1.3 Site Visit and Local Conditions**

The Contractor must allow for visiting the site and will be deemed to have satisfied themselves as to its accessibility, local conditions including the supply of labour and materials. No claim by the Contractor for additional payment will be allowed for non-compliance with this condition.

### **1.1.4 Schedule of Rates**

When requested, and before a tender can be accepted, the Tenderer shall forward to the Employer a priced and detailed Schedule of Rates, itemised as above and totalled to agree with the stated Tender Sum. The Rates used in the Schedule shall include material, labour and on cost elements.

Should any variations occur during the progress of the works, which cannot be priced from the Schedule of Rates, work shall be priced upon labour and materials basis.

The Tenderer shall confirm with his Schedule of Rates his current labour rates and the percentage on-costs for labour and materials by completing the Daywork Rates Schedule.

### **1.1.5 Site Facilities Provided by The Main Contractor**

The Main Contractor will provide all Welfare facilities as required by regulation.

### **1.1.6 Builder's Work**

The Main Contractor will carry out all associated builders' work.

The Contractor shall provide the Engineer with all details of builder's work requirements, based upon the Tender Drawings.

### **1.1.7 Contractor's Obligations**

The Contractor shall provide, at his own cost, all necessary plant, tools, accommodation, storage facilities, scaffolding, local lighting and all other such facilities to enable him to carry out the works or as otherwise agreed mutually between himself and the Employer. The Contractor shall be responsible for off loading and site transport of materials supplied by him. He shall be responsible for any damage caused to roads, floors and other parts of the work caused through off loading and site transportation.

Plant and materials shall not be deposited in positions which are likely to cause obstructions.

### **1.1.8 Fire Precautions**

The Contractor shall ensure that safe methods of working are followed when using any equipment, or, materials which may involve danger to life and property through fire and explosion

#### **1.1.9 Supervision**

The work shall be supervised by a qualified representative of the Contractor, satisfactory to the Engineer, who has all relevant Specifications and Drawings in his possession.

Should the Contractor find it necessary to change his representative during the progress of works, this fact shall be communicated to the Engineer before this change takes place, together with the name of the new representative.

#### **1.1.10 Instructions and Variations**

No claim for additional works shall be allowed unless the Contractor has obtained written instructions from the Engineer for the works to be put in hand. The issue of a Drawing or other document, other than a signed order, will not be recognised as, or construed as, an instruction for variations to the works.

Where a variation has been authorised the Contractor shall submit to the Engineer within fourteen days a price for carrying out this work.

#### **1.1.11 Programme, Co-Ordination and Co-Operation**

As soon as the Contractor has been advised that his tender has been accepted he must contact the Employer and agree dates for the start and completion of this work.

#### **1.1.12 Daywork**

Work shall not be undertaken at daywork rates unless the Engineer's permission has previously been obtained in writing.

Daywork record sheets shall be submitted to the Engineer within fourteen days of completion of the daywork, or at fortnightly intervals during the duration of the daywork. The signing of daywork sheets shall not in itself be an authorisation for the work but only as a record of the works which have taken place.

#### **1.1.13 Overtime**

The cost of any overtime necessary to complete the contract in the time specified shall be deemed to be included in the contract sum and no claim for such working will be considered.

#### **1.1.14 Prime Cost Sums**

All prime costs (PC) items included in the contract shall be expended only on written instructions of the Engineer.

#### **1.1.15 Provisional Sum**

Any provisional sum included in the contract shall only be expended or used as may be directed in writing by the Engineer.

#### **1.1.16 Defects Liability Period**

The defect liability period shall be twelve months from the date of practical completion. During that period the Contractor shall be responsible for remedying any defects when called upon to do so. Should it become necessary for the Contractor to replace or renew a defective portion of the works under this clause then the twelve months liability period for that work shall run from the date of such replacement or renewal.

**1.1.17 Construction (Design and Management) Regulations 2015**

The Principal Contractor shall co-operate with the Client & Principal Designer in the preparation of all information required in connection with the Construction (Design & Management) Regulations 2015, as and when requested to do so, and to submit his responses for inclusion in the Health & Safety Plan for the whole project.

The Principal Contractor shall plan, manage and coordinate the construction work including management of risks.

Client: -

Council for the Isles of Scilly

Principal Designer: -

Philip Roberts  
Stride Treglown Limited  
Norbury Court, The Millfields  
Plymouth  
PL1 3LL  
philiproberts@stridetreglown.com / 01752 202088

Principal Contractor: -

Successful tenderer / principal contractor

## **2 PARTICULAR SPECIFICATION**

### **2.1.1 General**

This part of the document must be read in conjunction with the tender drawings as scheduled within this document.

### **2.1.2 The Site**

The existing 16 bed Boswyns detox centre provides residential detox for drugs and/or alcohol. The centre is located rurally near Leedstown and was constructed in 2010. It is operated by Bosence Treatment Services on behalf of Bosence Farm Community Limited. Adjacent to the existing building it is proposed to construct a new 9 bed 'Family Wing'

A combined junior and senior school was recently constructed on a site adjacent to the Old Carn Gwavel Primary School. Part of the old primary school has since been demolished in order to accommodate a new Sports Hall. Other areas of the school have since been refurbished to provide usable areas including Lifetime Learning, Nursery, Memory Café etc.

It is now proposed to refurbish / extend the Nursery area by refurbishing the old junior school kitchen area and an extension to the existing building.

### **2.1.3 Scope of Work**

These works shall include the supply, installation, testing of these works, making good any defects that occur during the defects liability period and the provision of documents which include "as fitted" drawings and Operation and Maintenance documents.

These works shall also include a twelve months defects liability period following acceptance of the completed installation.

#### **2.1.3.1 Electrical Services**

The works associated with the Electrical Services include: -

- Stripping out and making safe the existing electrical services as required.
- New MCB panels, mains distribution and sub-mains.
- Earthing & bonding.
- Power and Lighting
- Emergency Lighting
- Power and controls wiring to mechanical plant (including accessories).
- Fire alarm panels / system
- Disabled Person Call System
- Data / BT outlets, cabling, telephone line adaptors, patch panels and wall mount enclosures.
- Inspection and testing
- Provision of temporary electrical supplies during the period of the contract.
- Testing, O&M manuals, instruction and training of Employer's staff in use of electrical and specialist installations.

### 2.1.3.2 Mechanical Services

The works associated with the Mechanical Services include provision of: -

- Heating system including an ASHP, underground pre-insulated heading mains, pumps, LPHW heating / distribution pipework, underfloor heating and LST radiators
- Water Treatment.
- Controls.
- Domestic water system including electric water heaters
- Ventilation
  - SF1 & EF1, Staff Room Ventilation System
  - SF2 & EF2, Utility & Sleep Room Ventilation System
  - SF3 & EF3, Nursery Room2 Ventilation System
  - EF4, Accessible WC Extract Fan
  - EF5, Child WC Extract Fan
  - EF6, Child WC Extract Fan
  - EF7, Staff WC Extract Fan
  - EF8, Kitchen Hood Extract Fan
- Insulation.
- Commissioning / balancing of water and air systems.
- Foul water & above ground drainage.
- Testing, operation and maintenance manuals, instruction and training of Employer's staff in use of mechanical and specialist installations.

### 2.1.4 Standards

The works shall comply with all current and relevant Statutory Instruments and Regulations including, but not limited to the following: -

- Regulations under the Supply Regulations 1937
- The Construction (Design & Management) Regulation 2015.
- The Health & Safety at Work Act (inc. COSHH Regulations)
- IEE Wiring Regulations and relevant British Standard Codes of Practice.
- Building Regulations
- Bye laws of the Local Water Undertaking
- BS 7074 Expansion vessels and ancillary equipment for sealed water systems
- BS 7593 Treatment of water in domestic hot water central heating systems.
- Building Regulations, Part M - Access and facilities for disabled people
- Design of buildings and their approaches to meet the need of disabled people – Code of practice BS 8300: 2001
- Fire alarm BS 5839
- Manufacturers stipulations and recommendations for installation and testing

An Electrical Installation Completion Certificate shall be provided for all new circuits installed / Periodic Inspection Report for circuits modified as appropriate. During the course of the Contract electrical supplies for construction and for equipment testing purposes shall be maintained.

The electrical installer shall be a member of the Electrical Contractors Association and the National Inspection Council for Electrical Installation Contracting approved contractor.

The whole installation shall be carried out in accordance with the IEE Regulations, 17th Edition, and all relevant British Standards and in accordance with common codes of good practice.

New Fixed Wiring Colours - Cores shall be identified with the harmonized colours throughout. The complete installation shall be in accordance with Amendment No 2: 2004 to BS 7671: 2001 issued on 31 March 2004 (Section 514).

Disruption of services to other buildings on the site shall be minimised. Disruption shall not occur without prior notice and agreement.

Within the plant room the power and lighting installation shall be surface fixed and shall be contained within high impact PVC conduits. Wiring to lighting and power shall be via single insulated cables (6491B(H)) with mechanical protection via high impact PVC conduits.

Generally the installation throughout the new Family Wing shall be fully concealed i.e. all wiring shall be concealed within ceiling voids, roof spaces and wall chases. Generally all wiring shall be 6242B(H) (twin & earth PVC insulated cables).

The fire alarm system shall be wired using Pirelli FP200 heat resistant cable, or, equal and approved.

All cables shall be installed in a tidy discreet manner. Note – all cables shall be secured with metal clips required along escape routes.

Operating & Maintenance manuals shall be provided which shall include 'As Installed' drawings.

### 2.1.5 Drawings

The Tender Drawings form part of this Schedule of Works / Specification: -

Title	Drg No	Rev
<b>Mechanical &amp; Electrical Services</b>		
Heating & Domestic Water Layout	170717/M/01	-
Ventilation Layout	170717/M/02	-
Above Ground Foul / Waste / Vent Pipework	170717/M/03	-
Power, Data & Nurse Call Layout	170717/E/01	-
Mains Distribution	170717/E/02	-
Lighting Layout	170717/E/03	-
Fire Alarm Layout	170717/E/04	-

Provide CAD record drawings (3No hard copies & 3No CD's) showing the completed installation, including any deviations from the original layout and design. "As Installed" drawings shall be submitted at practical completion and the commencement of the defects liability period.

A copy of the tender drawings in DXF/ACAD format shall be made available for this purpose. All drawings shall be produced on AutoCAD release 2015 minimum.



#### **2.1.6 Operation and Maintenance Manuals**

Two sets of draft Operating & Maintenance covering the entire contract are to be provided to the Engineer one month prior to the intended commissioning of any plant. These will be used for commissioning and be reviewed by the CDM Planning Supervisor.

Following commissioning and review by the CDM Planning Supervisor three final sets of Operating & Maintenance manuals shall be provided which shall include 'As Installed' drawings.

Leaflets shall also refer to all equipment supplied and installed under the sub-contract.

THE WORKS WILL NOT BE DEEMED COMPLETED UNTIL THE OPERATING & MAINTENANCE MANUALS HAVE BEEN APPROVED AND ISSUED WHICH MAY DELAY PAYMENTS OF RETENTION MONIES.

The manuals shall satisfy the requirements of part L2, Section 3 (Building Regulations 2000) regarding provision of Building Log-Books.

#### **2.1.7 Notification of Commissioning**

The Mechanical and Electrical Contractors shall give the Engineer through the Main Contractor 2 weeks notice of their intention to commence commissioning the services installations so that the appropriate Building Regulation notices may be issued to the Local Authority.

#### **2.1.8 Maintenance Period (12 Months)**

Ensure due allowance is made for attending in a timely manner to any defects that occur during the 12 month period following 'handover', and provide an on-call service during the maintenance period to deal with emergency/urgent faults or defects that may arise.

### **3 ELECTRICAL SERVICES**

#### **3.1 GENERAL**

##### **3.1.1 New Fixed Wiring Colours**

Cores shall be identified with the harmonized colours throughout. The complete installation shall be in accordance with Amendment No 2: 2004 to BS 7671: 2001 issued on 31 March 2004 (Section 514).

##### **3.1.2 Disruption**

Disruption of services to other buildings on the site shall be minimised. Disruption shall not occur without prior notice and agreement.

##### **3.1.3 Type of Installation – Plantroom (External Store)**

Cables to the ASHP equipment within the store & plant compound areas shall be XPLE/SWA/PVC multi-core cables and shall be surface fixed on tray unless indicated.

Within the store the power and lighting installation shall be surface fixed and shall be contained within high impact PVC conduits. Wiring to lighting and power shall be via single insulated cables (6491B(H)) with mechanical protection via high impact PVC conduits.

Wiring to lighting and power shall be via single insulated cables (6491B(H)) with mechanical protection via high impact PVC conduits.

Surface mounted rotary isolators shall be provided locally for the: -

- Daikin outdoor unit (IP65 rated isolator req)
- Daikin indoor unit

##### **3.1.4 Type of Installation – Nursery Area**

Generally the installation throughout the new / refurbished Nursery Area shall be fully concealed i.e. all wiring shall be concealed within ceiling voids, roof spaces and wall chases. Generally all wiring shall be 6242B(H) (twin & earth PVC insulated cables (new colours)).

Wiring to all lighting and power points shall be as detailed on the electrical schematic drawing. Generally all wiring to lighting circuits shall be 1.5 mm. sq. and wiring to ring main power circuits to be 2.5 / 4.0mm sq. minimum unless otherwise stated.

##### **3.1.5 Type of Installation – General**

All cabling for final connections to the new plant shall be contained within flexible conduit.

Internal sub-mains shall be XPLE/SWA/PVC multi-core cables, earthing shall be provided via a separate CPC clipped to the sub-mains.

External sub mains shall be XPLE/SWA/PVC multi-core cables. Earthing shall be provided via an additional core within the cable.

The fire alarm system shall be wired using Pirelli FP200 heat resistant cable, or, equal and approved.

All cables shall be installed in a tidy discreet manner.

##### **3.1.6 Wiring**

All cabling to be installed as detailed in the I.E.E. Wiring Regulations.

## **3.2 ELECTRICAL MAINS & SUB-MAINS**

### **3.2.1 Incoming Electrical Supply**

The existing three phase electrical supply rises from underground within the existing plantroom, the WPD cut-outs and meter are located adjacent this point. The existing main distribution board is an MCCB panel board with spare outgoing ways (Eaton MEM EPBN1825, 8 Way TPN MCCB panel board, 2No 3pH & 2No 1pH ways are presently spare).

The existing 3phase supply to DB KP1 (Old Kitchen) shall be decommissioned.

Provide the following new supplies from the existing MCCB panel board: -

- 1phase (1x63A) supply to DB Nursery 1a (Lighting)
- 1phase (1x80A) supply to DB Nursery 1b (Power)

The existing 1phase supply to DB LP1 shall be reused to serve DB Nursery 2.

Allow for all necessary temporary works and attendance's to achieve these requirements.

### **3.2.2 Mains Distribution**

The existing main distribution board (MCCB) located in the existing plantroom shall serve the following new sub distribution boards via armoured sub mains: -

Ref	Location / Serves
DB 1a	Nursury1 Area (Lighting)
DB 1b	Nursury1 Area (Power)
DB 2	Nursury2 Area (Lighting & Power)

New distribution boards shall be as manufactured by MEM.

Existing sockets & lights within the External Store are presently served from DB KP1 which shall be decommissioned, allow for modifying these circuits so that they can be served from DB1a & DB1b.

Allow for a new 1phase meter to serve DB1a, allow for a new 1phase meter and enclosure to serve DB1b

## **3.3 SPARE CAPACITY**

Every endeavour is been made during the design period to ensure a spare capacity of 20% is achieved on all distribution boards.

## **3.4 EARTHING & BONDING**

Provide all earthing and bonding of equipment, pipes and other extraneous metal items in accordance with IEE Regulations, 17th Edition.

The main earthing conductor to the main earthing terminal and the earthing conductors from the distribution boards to the main earthing terminal shall be 16mm<sup>2</sup>.

Main equipotential bonding shall be 10mm<sup>2</sup>.

Supplementary bonding shall be 4mm<sup>2</sup>.

Note – requirements for earthing and bonding all kitchen equipment / extraneous metal.

## **3.5 INSPECTION & TESTING**

An Electrical Installation Completion Certificate will be required for all new electrical works.

All Testing and Inspection to be in accordance with the IEE Wiring Regulations 17th Edition.

### **3.6 LIGHTING**

#### **3.6.1 Parameters**

Light fittings shall be supplied and installed as detailed on the drawings and within this particular specification.

Although steps have been taken to co-ordinate the location of light fittings with other services, the contractor shall make allowances for rechecking the positions with other trades, prior to installation.

The contractor shall ensure all light fittings are correctly supported, and where required additional supports shall be built into the building fabric during construction.

#### **3.6.2 Lighting Control**

Generally, all light switches shall be plate switch type, and wall mounted within flush boxes. Wiring accessories to be visually contrasting.

Generally, all lighting shall be manually switched, location of switching generally as indicated on drawings.

Lighting within the following areas shall be 'switch dimmable' and reactive switches shall be provided: -

- Nursery Rm1
- Nursery Rm2
- Sleeping Rm

External lights (adjacent Nursery doors & beneath canopy) shall be switched via PIRs, switches to be installed internally to provide manual over ride on / off.

#### **3.6.2.1 Light Fitting Description**

All light fittings shall be supplied and installed as detailed in the luminaires' schedule that is located on the drawings.

Lamps, diffusers/louvers or controllers shall be fitted to luminaires as detailed, and shall be the correct type for each luminaire.

#### **3.6.2.2 Special Instruction(s)**

The contractor shall ensure all light fittings when handed over to the client, are clean inside and out.

All light fittings are to be complete with lamps (Phillips).

#### **3.6.2.3 Footpath Lighting**

Allow a provisional sum of £750.00 for footpath lighting – details to be advised.

### **3.7 EMERGENCY LIGHTING**

#### **3.7.1.1 General**

Provide emergency lighting throughout the buildings and external egress routes in accordance with BS5266 and as shown and specified on the drawings.

#### **3.7.1.2 Parameters**

Light fittings shall be supplied and installed as detailed on the drawings and this specification.

Emergency light fittings to comply with BS7671: 1992.

The emergency lighting system to comply with BS5266: Part 1: 1988.

Within any room the emergency lighting circuit shall be on the same phase as the local lighting circuit.

All emergency lighting to be co-ordinated with ceiling layouts, including other ceiling mounted systems.

**3.7.1.3** *Light Fitting Description*

All light fittings shall be supplied and installed as detailed on the drawings and where possible shall be **auto self test type**.

Self-contained emergency light fittings to be ICEL approved with a 3Hr-battery back up.

Illuminated exit signs to be provided in accordance with BS5266. The exit signs also to be ICEL approved, maintained, with a 3Hr battery back-up and running man symbol as per Euro-legend standard.

**3.7.1.4** *Special Instruction*

All external emergency luminaries shall be suitably IP65 rated.

Feedback from residents regarding the emergency lights in the existing bedrooms is that the glow from the LEDs is disruptive to sleep. Prior to fitting the new bedroom emergency lights – allow for opening up the fittings and masking the LEDs to prevent excessive light leakage.

**3.7.1.5** *Testing and Commissioning*

Test in accordance with BS7671 : 1992 and BS5266

The contractor shall demonstrate the system during the hours of darkness, to verify light levels during the discharge duration in accordance with BS 5266-1:1999.

The contractor shall schedule the results and include all in the operations and maintenance manuals.

### **3.8 POWER**

#### **3.8.1 General**

Final circuit power installation to socket outlets, isolators, fuse connection units and any other fixed electrical equipment to be installed to provide a system which is safe and easy to use.

All circuits to be protected by RCBO's.

##### **3.8.1.1 Parameters**

To supply and install the general power installation as indicated on the drawings to form a flush electrical installation throughout – except plantrooms.

No cable less than 2.5mm<sup>2</sup> to be used.

### **3.9 ACCESSORIES**

#### **3.9.1 General**

Ensure that all mounting heights shall be in accordance with: -

- Building Regulations, Part M - Access and facilities for disabled people
- Design of buildings and their approaches to meet the need of disabled people – Code of practice BS 8300: 2001
- Wiring accessories to be visually contrasting.

Within the Kitchen, Staff Room and Utility Room areas – refer mounting heights indicated on drawings, where there is a discrepancy with the above then liaise with the Architect / PM.

All accessories shall be of good quality such as those manufactured by MK (or equal): -

- All areas (except plantroom), all accessories shall be as manufactured by Crabtree Electrical (Corinthian range) or MK (Logic Plus range)
- Plantroom, all accessories shall be from the MK Metalclad Plus range (or equal).
- External Plant Compound, all accessories shall be IP65 rated.

Grid type switches shall be provided where indicated on the drawings.

The locations of accessories as shown on the tender drawings may be revised before installation can proceed and the Contractor shall allow for this when pricing the works.

Lateral positions must not be scaled off drawings and must be co-ordinated with other trades and agreed with the Architect at marking out stage. If this procedure is not adopted, the Electrical Contractor shall have to bear the expense of rectification.

##### **3.9.1.1 Socket Outlets**

All socket outlets shall comply with the BS 1363: Part 2 1995.

All socket outlets either single or twin to be double pole switched c/w 3 pin operated safety shutter.

Mounting heights for socket outlets to be:

- General 450mm AFFL
- Kitchen 150mm Above work surface and where indicated 300mm below the work surface.

Within the Kitchen, Staff Room and Utility Room areas – refer mounting heights indicated on drawings.

### **3.9.1.2 Light Switches**

All light switches shall conform to BS 3637: Part 1: 1959.

All light switches shall be of the grid modular range with switch modules rated at 20Amp.

Mounting heights for switches:

- Grid switches 1050mm AFFL

### **3.9.1.3 Switched Fused Spurs**

All switched fused spurs shall conform to BS1363: Part 4:1995.

All switched fused spurs must be 20Amp rated, double pole and comply with BS 3676: Part 1: 1989.

### **3.9.1.4 Dado Trunking**

Dado trunking shall be provided within the Office.

Dado trunking to be MK Prestige Compact.

Bottom of dado trunking to be 870AFL.

### **3.9.2 Plantroom (External Store)**

Provide all wiring accessories as indicated on the tender drawings. Unless stated otherwise, all accessories shall be MK metalclad or approved equal.

## **3.10 MECHANICAL SERVICES WIRING**

### **3.10.1 Plantroom (External Store)**

Allow for all wiring and controls wiring associated with the mechanical services installation including: -

- ASHP
- Two port zone valves
- Programmer / room stat
- Electric water heater

Local isolation shall be provided via fused connection unit, or, plug and sockets as indicated on the tender drawings, or, rotary isolators. Final connections to be via flex, or, flexible conduit as appropriate as indicated in the cable schedule on the tender drawings.

### **3.10.2 Other Areas**

Allow for all wiring and controls wiring associated with the mechanical services installation – refer **Error! Reference source not found. Error! Reference source not found.**, also, fan isolators and SELV transformers for: -

- SF1 & EF1, Staff Room Ventilation System
- SF2 & EF2, Utility & Sleep Room Ventilation System
- SF3 & EF3, Nursery Room2 Ventilation System
- EF4, Accessible WC Extract Fan
- EF5, Child WC Extract Fan
- EF6, Child WC Extract Fan
- EF7, Staff WC Extract Fan
- EF8, Kitchen Hood Extract Fan
- Electric water heaters No1-7
- R12 Hydronic Kickspace Heater

Provide independent time clock control of SF1/EF1, SF2/EF2 & SF3/EF3 i.e. 3No ST9100C 7 Day Single Channel Time Switches.





### **3.11 FIRE ALARM**

#### **3.11.1 Existing Fire Alarm System**

The existing analogue addressable fire alarm is located in the Sports Hall reception area, type Kentec Syncro AS, existing devices are from XXXXX range.

Devices within the refurbished / extended Nursery area shall be commissioned onto the existing system.

#### **3.11.2 Proposed Fire Alarm Systems**

Extend the existing fire alarm system to serve the refurbished / extended Nursery area, allow for providing all necessary items to form a complete system (including automatic detectors, call points, sounders, xenon strobes and wiring).

The completed fire alarm system shall be fully compliant with BS 5839: Part 1 2002.

#### **3.11.3 Fire Alarm Control Panel**

As existing.

#### **3.11.4 Signalling**

As existing.

#### **3.11.5 Detectors**

Generally automatic detectors shall be of the optical 'smoke' type, however, in the kitchen / staff room areas and plantroom areas they shall be 'heat / fixed temperature type. Automatic detectors shall be as manufactured by Appollo type XXX.

#### **3.11.6 Call Points**

Call points shall be breakglass units. Call Points shall be as manufactured by Appollo type XXX.

#### **3.11.7 Sounders**

Loop powered sounders rather than bells shall be installed. Sounders shall be as manufactured by Appollo type XXX.

#### **3.11.8 Cabling**

Wiring shall be Pirelli FP200 gold, red insulated cable (or equal).

#### **3.11.9 Testing and Commissioning**

The completed installation shall be fully commissioned by a suitably qualified person who will be required to demonstrate the completed system to the Employer at handover and to provide all test reports and documentation.

Provide 3No (A3 size) drawings indicating locations of all automatic detectors, call points, panels, xenon strobes etc. throughout each of the buildings – one copy shall be laminated and fixed adjacent the fire alarm panel.

### **3.12 DISABLED / CALL ASSISTANCE ALARM**

#### **3.12.1 Existing Disabled / Call Assistance Alarm**

Within the existing building there are three disabled toilets within each one there is a disabled / call assistance alarm.

The disabled / call assistance alarm systems have been interfaced with the fire alarm system so allow an audible alert throughout the building.

#### **3.12.2 Proposed Disabled / Call Assistance Alarm**

Within the refurbished / extended Nursery area allow for a disabled / call assistance alarms to serve the Accessible WC. Systems shall be as manufactured by manufactured by C-TEC, type NC951 comprising: -

- NC943B                      Single zone call controller c/w onboard 12V PSU
- NC809DBBT              Remote Reset Point c/w Sounder.
- NC806CS                 Overdoor Light c/w Sounder.
- NC807C                  Ceiling Pull incorporating a red confidence indicator.

### **3.13 ELECTRIC HAND DRIERS**

Allow for providing electric hand driers in the Staff WC / Baby Change and Accesible WC areas (as indicated on the drawings), type Tekflo Edge.

### 3.14 DATA / TELEPHONE

#### 3.14.1 Generally

The system shall be a comprehensive, flexible and reliable structured cabling system providing a fully certified high performance infrastructure which the Client will require to fulfil its communication needs.

#### 3.14.2 Data Outlets

Allow for providing the number of data outlets indicated within each of the following areas within the new Family Wing: -

Room	Occupancy	No of Outlets
Office	n/a	2
Nursery Rm2	n/a	1 @ h/l for WAP
Nursery Rm1	n/a	1 @ h/l for WAP
Staff Rm	n/a	2
	<b>Sub Tot</b>	<b>6</b>

WAP units shall be supplied and fitted by the Clients IT specialist.

Generally, double data outlets shall be installed to provide the number of outlets identified in the table above and as shown on the drawings, outlets shall be c/w back boxes and **Cat 6 shielded** double socket RJ45 ethernet network type outlet plates. Generally one outlet shall be used for Data and the second outlet shall be used for Voice.

#### 3.14.3 Nursery Distribution Patch Panel

Relocate the existing Nursery area floor distribution panel (24port, 1U) to the new store room, position generally as indicated on the drawings.

#### 3.14.4 Nursery Distribution Cabinet

Relocate the existing Nursery area floor wall mount enclosure to the new store room, position generally as indicated on the drawings.

#### 3.14.5 Existing Building Distribution Cabinet

The existing main building distribution cabinet is located in the Sports Hall store (adjacent Sports Hall MCB panel)

#### 3.14.6 Horizontal Floor Distribution Data Cabling

Provide Cat 6 cabling from all Data / Voice outlets to the Nursery distribution Patch Panel, all cabling shall be Low Smoke Zero Halogen (LS0H). Allow for final connections to the outlet plates and terminating cables into the new Patch Panels.

ADC Krone (or equal) – Cat6 UTP 4pr

#### 3.14.7 Building Backbone Data Cabling

Take care to protect the existing fibre cable during the course of the works. Surplus cable arising due to the relocation of the Nursery patch panel shall be retained and coiled neatly.

#### 3.14.8 Site Backbone Data Cabling – N/A

#### 3.14.9 Hierarchical Cabling Systems

For ease of identification, generally data cabling shall be coloured as follows: -

- Blue - Site Backbone
- Orange - Building Backbone
- Green - Horizontal Floor Distribution

#### **3.14.10 Ethernet Switch, Building Backbone Patch Panel & Fibre Link**

As existing.

#### **3.14.11 Existing / Proposed Telephone System**

In the extended / refurbished Nursery phone lines will be required in: -

- Office
- Staff Room

All data / phone lines within the extended / refurbished Nursery shall be taken back to a patch panel, within the patch panel there will be a network switch which will be connected back to the switch in the Sports Hall via the fibre link, from there the lines will be connected to the IP addressable phone system. Configuring the phone lines will be carried out by the Clients IT specialist.

### **3.15 BUILDERS WORK**

#### **3.15.1 General**

Generally the main contractor will carry out all 'builders work' within the buildings and trenching / ducting between the buildings. The main contractor shall provide all chases, holes through floor slabs etc.

#### **3.15.2 Chases**

The electrical contractor shall mark all wall chases for all cable drops/risers, to sockets, light switches etc. to enable the main contractor to cut the chases that are required.

All chasing shall be done using a chasing machine to cut smooth chases in the wall. The main contractor shall provide all chases for back boxes and all other wiring accessories as directed.

#### **3.15.3 Holes In Walls**

The electrical contractor shall provide all holes through the walls up to 50mm diameter.

All larger holes shall be core drilled by the main contractor.

DO NOT form a hole through a wall using a lump hammer and chisel.

#### **3.15.4 Cable Trenches**

All cable ducts and trenches shall be provided for the electrical contractor by the main contractor. The contractor shall liaise with the main contractor prior to and during the execution of these works.

## **4 MECHANICAL SERVICES**

Disruption of services to other buildings on the site shall be minimised. Disruption shall not occur without prior notice and agreement.

### **4.1 EXISTING HEATING**

#### **4.1.1 Existing Heating**

Heating and hot water within the existing building is provided by electric panel heaters c/w timeclock controls.

#### **4.1.2 Existing Controls**

Generally, the heaters are manually switched on / off at the start / end of the day, or, as required.

#### **4.1.3 Existing Heating Distribution**

None.

### **4.2 PROPOSED HEATING**

#### **4.2.1 Proposed Heating**

Provide a new high temperature air source heat pump, programmable thermostat, pipework, radiators, underfloor heating etc to form a complete system. The refurbished Nursery area shall be served by LST radiators. The new Nursery area shall be served by under floor heating.

#### **4.2.2 Air Source Heat Pump**

Provide a Daikin Altherma High Temperature heat pump including: -

- Daikin outdoor unit ERRQ016AAV1 c/w Blygold treatment
- Daikin indoor unit EKHB RD016ADV1

Works associated with the heat pump shall be carried out by an MCS accredited installer.

Allow for providing all necessary supporting information and assist Client with their RHI application.

#### **4.2.3 Controls**

Independent timeclock control shall be provided for the area served by the radiator circuit and the area served by the underfloor heating. Allow for providing the following Honeywell controls: -

- 1No ST9500C : 2 Zone Programmer
- 1No T6360B1028 : Room thermostat
- 2No V4043H1106 : 22 or 28mm 2 port zone valves
- 1No DU144A1001 : 22mm straight auto bypass valve

#### **4.2.4 Radiators**

Provide radiators as detailed on the tender drawings – refer Radiator Schedule.

Notes: -

- LST radiators to be Stelrad LST i Plus type c/w remote sensing TRV & LSV.

#### **4.2.5 Underfloor Heating**

Allow for Employing a Continental Underfloor heating approved specialist underfloor heating installer to provide a Continental underfloor heating system: -

- Nursery Rm1, Child WC and Staff WC / Baby Changing - to suit screeded floor (insulation over slab) inc. underfloor heating pipework, clips, edge insulation (inc. tape), ufh controller, heating manifold, loop actuators, circulation pump and room thermostats to form a complete system.

Generally: -

- Continental multi layer pipe constructed from cross-linked polyethylene (PE-Xc) sandwiching a layer of aluminium.
- Pipework to be clipped direct to the floor insulation (by others).
- Pitch c/c of 200mm, to suit maximum flow temperature of 50degC
- Pipes should be kept 150mm from the edge insulation of walls.
- The system shall be designed to operate with a temperature difference of 20°C between flow and return with a maximum flow temperature of 65°C
- The system shall be designed for a nominal output of 100W/m2
- The underfloor section of the system shall be pressure tested for 24 hours at 6bar before the floor screed is laid. A pressure gauge shall be provided on each manifold for monitoring the pressure during installation of screed.

#### **4.2.6 Heating System Expansion Vessel**

Integral with ASHP

#### **4.2.7 Heating Distribution Pump**

Integral with ASHP

#### **4.2.8 Magnaclean**

Provide a Magnaclean Professional 2 unit on the distribution pipework return to protect the internal ASHP unit from debris in the distribution system.

### **4.3 LPHW HEATING**

#### **4.3.1 Heating & Distribution Pipework**

Heating distribution pipework shall generally be copper Table X – 4.3.4.1 Pipework

Provide all pipework, valves, sensor pockets, pumps, measuring stations, magnaclean etc. necessary to form a complete system.

#### **4.3.2 LPHW Insulation**

Provide thermal insulation on all LTHW pipework – refer 4.5.6 Insulation to Pipelines

##### **4.3.2.1 Plant Room & Distribution Insulation**

All distribution pipework within the refurbished / new Nursery shall be insulated with pre-formed mineral rock fibre insulation with a factory applied reinforced aluminium foil laminate and taped joints.

**All valves within the plantroom shall be insulated with flexible valve jackets**

Refer 4.3.4.2 Insulation to Pipelines

#### **4.3.3 Water Treatment**

Allow for chemically cleaning / flushing the system and dosing with inhibitor. Dose with Fernox Universal corrosion inhibitor MB-1.

#### **4.3.4 LPHW General**

##### **4.3.4.1 Pipework**

Expansion-Pipework expansion shall wherever feasible be taken up by changes of direction, natural deflection, and/or cold draw.

Pipework supports-Pipework shall be supported from the building structure using Flamco components. Details shall be agreed with the engineer prior to installation commencing.

##### **Valves**

- Isolating valves shall be Crane D171A lever arm ball valves.
- Regulating valves shall be double acting regulating pattern Crane or Hattersley.
- Drain cocks shall be Crane D171 HULS plus cap.
- Air vents shall be Hattersley 425.

##### **Accessories**

- Install in the positions indicated on the tender drawings temperature gauges (range 0-120C, 100mm dial) complete with immersion pocket.
- Install in the positions indicated on the tender drawings pressure gauges (range 0-4bar, 100mm dial) complete with gauge cock and siphon.
- Install in the positions indicated on the tender drawings safety valve and discharge line set at 2.5 bar

##### **Valve labels**

- Valve labels shall be installed within the boiler room and shall be 50mm dia traffolyte, drilled 3mm for securing to valve with chain or nylon tie-wrap, and be engraved with 8mm black letters on white.

##### **Pre-insulated Underground Heating Mains:**

- (Rauthermex Duo (32+32/126)), pre-insulated heating mains between the external plant compound to the plantroom (existing store) to the new plantroom
- Ensure pre-insulated heating mains are securely bracketed / clamped at the points where it rises from the ground in the external plant compound and adjacent the plantroom (existing store).
- Rauthermex Duo to change to copper via Rauthermex pipe couplings & pipe clamps.
- Allow for 'lead in bends' and 'couplings / shroud sets' and 'heat shrink shrouds' at either end of the heating mains.
- Pressure test, leak test in accordance with DIN 1988, Part 2.

##### **Copper Pipelines:**

- Tube: To BS EN 1057, Kitemark certified:
- General use: Half hard temper R250, nominal wall thickness 0.7mm.
- Jointing generally: Integral lead free solder ring capillary fittings to BS EN 1254-1, Kitemark certified.
- Connections to appliances and equipment: Compression fittings to BS EN 1254-2, Kitemark certified or fittings with threaded ends to BS EN 1254-4.
- Supports: Brass munson rings with back plates on exposed pipework, on proprietary support rings and drop rods in ceiling voids.
- Fix securely and true to line at not more than the following centres:
- Pipe o.d. (mm)      Horizontal (mm) Vertical (mm)
- 15 and 22            1200            1800
- 28 and 35            1800            2400
- 42 and 54            2400            3000
- Provide additional supports as necessary within 150mm of connections, junctions and changes of direction.

- Cut pipes square using a wheel cutter, remove burrs and make neat, clean, fully sealed joints, ensuring that pipe ends enter joint fittings to full depth.
- Do not use formed bends on exposed pipework except for small offsets. Form changes of direction with radius fittings unless otherwise approved.
- Use purpose designed adaptors for connecting dissimilar materials: do not improvise.
- Protect background and plastics pipes and fittings from heat damage when forming soldered joints. Clean off all flux residue. Do not use 'self-cleaning' fluxes.
- Sleeves and cover plates shall be fitted on all pipework passing through walls, ceilings and partitions.

#### 4.3.4.2 *Insulation to Pipelines*

- To BS 5970 2001.

- Required Pipework Thermal Conductivity:

The following table indicates the maximum allowable thermal conductivities required from the insulation against the mean temperature of the fluid in the pipework.

<u>Mean Temperature °C</u>	<u>K value W/m °C</u>
0	0.033
20	0.034
40	0.036
60	0.038
80	0.040
100	0.043

- Required Insulation on thickness for pipework and associated equipment:

LTHW Heating Services:

Temperature of Contents

<u>Bore of Pipe</u>	<u>10 °C</u>	<u>0 °C</u>
15-25mm	25mm thick	40mm thick
40-100mm	30mm thick	50mm thick
150-250mm	40mm thick	50mm thick

- Pipework in Plant Room:

To be insulated with pre-formed **rock fibre** pipe sections, having density of not less than 100kg/m<sup>3</sup>, with a factory applied **reinforced aluminium laminate**; and to comply with BS 5970: 2001 water vapour permeance and Building Regulations Class 'O' definition.

Joints to be securely taped with minimum 50mm wide soft foil tape - both longitudinal and butt joints. Further finished and protected with 22 gauge stucco **embossed aluminium sheeting**, secured by means of pop rivets at approximately 150mm centres. Bends to be formed in swaged segments.

Pump casings, flange joints, unions, valves, strainers etc. on LTHW heating systems shall have **flexible valve jackets** as manufactured by PWL Thermotex (or similar).

- Pipework within the Building:

To be insulated with pre-formed mineral **rock fibre** pipe sections, having a density of not less than 100 kg/m<sup>3</sup>, with a factory applied **reinforced aluminium foil laminate**; to comply with BS 5970: 2001 water vapour permeance and building regulations Class 'O' definition.

Joints to be securely taped with minimum 50mm wide soft foil tape to both longitudinal and butt joints. To be further retained in position by light gauge aluminium bands at no less than 300mm centres.

Valves and Flanges Outside Plant Rooms Generally Concealed from View:

Shall have **flexible valve jackets** as manufactured by PWL Thermotex (or similar).

- Other requirements:



The thermal insulation work, shall be carried out only by an approved Specialist Thermal Insulation Sub-contractor. Only skilled operators shall be employed.

The thermal insulation Specialist shall be acquainted with all of the conditions of work, including Specification, programming, hours of working etc., and he shall complete the work within programme.

The thermal insulation work shall not be commenced, unless otherwise approved in writing by the Engineer, until the whole of the installation has been completed tested and witnessed as set out in the relevant commissioning, pipework, plant and air distribution section of this Specification.

The Sub-Contractor shall allow for his thermal insulation specialist to complete sections of the installation in phases if required to do so in accordance with the contract programme.

#### 4.4 MAINS WATER SUPPLY

The plantroom (external store) previously accommodated oil fired heating plant, cold water storage tanks were located in the roof void above, all redundant plant was stripped out some time ago, CWSTs are understood to have been removed and the domestic water system converted to mains pressure water. A significant MWS supply therefore exists within the plantroom, allow for connecting to this supply and using it to serve all outlets in the new / refurbished Nursery areas.

An additional MWS supply is understood to enter the building in Nursery Room2 (adjacent proposed radiator R6), allow for capping / plugging this supply.

#### 4.5 DOMESTIC HOT & COLD WATER

All domestic water pipework shall be installed in Yorkshire copper tube and fittings – refer 4.5.5 Copper Pipelines.

##### 4.5.1 Hot Water Heaters

Hot water shall be provided to all outlets within the new / refurbished Nursery by local mains pressure hot water heaters. Water heaters (No1-7) to be type Heatrae Sadia unvented Hotflo10 2.2kW water heater c/w: -

- temperature pressure relief valve (pack U6 )
- blending valve (pack U3 )

##### 4.5.2 Hydroboil Unit

Allow for providing an instantaneous water heater in the Staff Rm for making hot drinks: -

- Zip Hydroboil Plus HP103, 3L, 1.5kW Stainless Steel

##### 4.5.3 Insulation

Provide thermal insulation on all domestic water pipework – refer 4.5.6 Insulation to Pipelines

##### 4.5.4 Legionella Risk Assessment – N/A

##### 4.5.5 Copper Pipelines

- Tube: To BS EN 1057, Kitemark certified:
- General use: Half hard temper R250, nominal wall thickness 0.7mm.
- Jointing generally: Integral lead free solder ring capillary fittings to BS EN 1254-1, Kitemark certified.
- Connections to appliances and equipment: Compression fittings to BS EN 1254-2, Kitemark certified or fittings with threaded ends to BS EN 1254-4.
- Supports: Brass munson rings with back plates on exposed pipework, on proprietary support rings and drop rods in ceiling voids.
- Fix securely and true to line at not more than the following centres:
- Pipe o.d. (mm)      Horizontal (mm) Vertical (mm)
- 15 and 22              1200              1800
- 28 and 35              1800              2400
- 42 and 54              2400              3000
- Provide additional supports as necessary within 150mm of connections, junctions and changes of direction.
- Cut pipes square using a wheel cutter, remove burrs and make neat, clean, fully sealed joints, ensuring that pipe ends enter joint fittings to full depth.
- Do not use formed bends on exposed pipework except for small offsets. Form changes of direction with radius fittings unless otherwise approved.
- Use purpose designed adaptors for connecting dissimilar materials: do not improvise.
- Protect background and plastics pipes and fittings from heat damage when forming soldered joints. Clean off all flux residue. Do not use 'self-cleaning' fluxes.

- Sleeves and cover plates shall be fitted on all pipework passing through walls, ceilings and partitions.

#### Valves

- Isolating valves shall be DZR ¼ turn full bore lever arm type Hattersley or Crane

#### Accessories

- Install in the positions indicated on the tender drawings temperature gauges(range 0-120C,100mm dial complete with immersion pocket.
- Install in the positions indicated on the tender drawings pressure gauges(range 0-4bar,100mm dial)complete with gauge cock and siphon.

#### Valve labels

- Valve labels shall be installed within the boiler room and shall be 50mm dia traffolyte, drilled 3mm for securing to valve with chain or nylon tiewrap, and be engraved with 8mm black letters on white.

#### Accessories

- Install in the positions indicated on the tender drawings pressure gauges(range 0-4bar,100mm dial)complete with gauge cock and siphon.

#### 4.5.6 Insulation to Pipelines

- To BS 5970 2001.
- Pipework in Plant Room:  
To be insulated with pre-formed **rock fibre** pipe sections, having density of not less than 100kg/m<sup>3</sup>, with a factory applied **reinforced aluminium laminate**; and to comply with BS 5970: 2001 water vapour permanence and Building Regulations Class 'O' definition.

Joints to be securely taped with minimum 50mm wide soft foil tape - both longitudinal and butt joints. Further finished and protected with 22 gauge **stucco embossed aluminium sheeting**, secured by means of pop rivets at approximately 150mm centres. Bends to be formed in swaged segments.

Pump casings, flange joints, unions, valves, strainers etc. on domestic water pipework shall have **flexible valve jackets** as manufactured by PWL Thermotex (or similar).

- Pipework within the New Family Wing:  
To be insulated with pre-formed mineral **rock fibre** pipe sections, having a density of not less than 100 kg/m<sup>3</sup>, with a factory applied **reinforced aluminium foil laminate**; to comply with BS 5970: 2001 water vapour permeance and building regulations Class 'O' definition.

Joints to be securely taped with minimum 50mm wide soft foil tape to both longitudinal and butt joints. To be further retained in position by light gauge aluminium bands at no less than 300mm centres.

Valves and Flanges Outside Plant Rooms Generally Concealed from View:  
Shall have **flexible valve jackets** as manufactured by PWL Thermotex (or similar).

- Other requirements:  
The thermal insulation work, shall be carried out only by an approved Specialist Thermal Insulation Sub-contractor. Only skilled operators shall be employed.

The thermal insulation Specialist shall be acquainted with all of the conditions of work, including Specification, programming, hours of working etc., and he shall complete the work within programme.

The thermal insulation work shall not be commenced, unless otherwise approved in writing by the Engineer, until the whole of the installation has been completed tested and witnessed as set out in the relevant commissioning, pipework, plant and air distribution section of this Specification.

The Sub-Contractor shall allow for his thermal insulation specialist to complete sections of the installation in phases if required to do so in accordance with the contract programme.

**4.5.7 Polyethylene Pipelines for Use Below Ground**

- Tube: Blue polyethylene to BS 6572, Kitemark certified.
- Polyethylene pipes for use below ground: MDPE Blue, up to DN 63 to BS 6572, DN 90 and above to WRC-WIS-04.32.03, manufactured by a BSI Kitemark Licensee, with electrofusion joints and fittings. Pipework to be installed at the depth of 750mm below finished ground level.
- Warning marker tape to be 150mm wide blue polyethylene with stainless steel trace wire, with ends raised above ground level and securely fixed to building fabric at low level with ivory label installed adjacent to the termination worded "Connection Point for Tracing Underground Cold Water Pipe". Warning marker tape to be installed at the depth recommended in the Water Regulations.
- Jointing: Electrofusion joints and fittings.
- Seal both ends of pipeducts with an approved non-hardening, non-cracking, water resistant compound to a depth of not less than 150mm.

## **4.6 VENTILATION**

### **4.6.1 Staff Room Ventilation System (SF1 & EF1)**

Provide a supply / extract ventilation system to serve the Staff Room, system to be c/w: -

- Ductwork
- 2No Systemair RAW 200/250 roof cowl
- 1No Systemair FFR 150 filter cassette
- 2No Systemair Prio 150EC circular duct fan
- 1No Systemair 150 supply valve
- 1No Systemair 150 extract valve
- 2No Systemair 150dia x 600 silencer
- 1No Systemair 0-10K speed controller

Ventilation system to be concealed within pitched roof void above the Staff Room.

Supply ductwork shall be insulated to prevent condensation.

### **4.6.2 Utility & Sleep Room Ventilation System (SF2 & EF2)**

Provide a supply/extract ventilation system to serve the Utility & Sleep Room, system to be c/w: -

- Ductwork
- 2No Systemair RAW 200/250 roof cowl
- 1No Systemair FFR 150 filter cassette
- 2No Systemair Prio 150EC circular duct fan
- 1No Systemair 150 supply valve
- 1No Systemair 150 extract valve
- 2No Systemair 150dia x 600 silencer
- 1No Systemair 0-10K speed controller

Ventilation system to be exposed at high level within the Utility & Sleep Rms.

Supply ductwork shall be insulated to prevent condensation.

### **4.6.3 Nursery Rm2 Ventilation System (SF3 & EF3)**

Provide a supply / extract ventilation system to serve Nursery Rm2, system to be c/w: -

- Ductwork
- 2No Systemair RAW 200/250 roof cowl
- 1No Systemair FFR 250 filter cassette
- 2No Systemair Prio 2p50EC circular duct fan
- 8No Systemair 150 supply valve
- 8No Systemair 150 extract valve
- 2No Systemair 250dia x 600 silencer
- 2No Systemair 200dia OBDs
- 1No Systemair 0-10K speed controller

Ventilation system to be concealed within pitched roof void above Nursery Rm2.

Supply ductwork shall be insulated to prevent condensation.

#### **4.6.4 EF4, Accessible WC Extract Fan**

Independent extract system, comprising ceiling mounted SELV extract fan (Vent Axia Lo-Carbon Response with timer), flexible insulated ductwork, condensate trap, universal cowl, to discharge vertically through roof via weathered slate / curb as appropriate. Operation of fan to be triggered via the light switch, run on to be provided by internal timer.

#### **4.6.5 EF5, Child WC Extract Fan**

Independent extract system, comprising ceiling mounted SELV extract fan (Vent Axia Lo-Carbon Response with timer), flexible insulated ductwork, condensate trap, universal cowl, to discharge vertically through roof via weathered slate / curb as appropriate. Operation of fan to be triggered via the light switch, run on to be provided by internal timer.

#### **4.6.6 EF6, Child WC Extract Fan**

Independent extract system, comprising wall mounted SELV extract fan (Vent Axia Lo-Carbon Response with timer), flexible insulated ductwork and cowed wall outlet. Operation of fan to be triggered via the light switch, run on to be provided by internal timer.

#### **4.6.7 EF7, Staff WC Extract Fan**

Independent extract system, comprising wall mounted SELV extract fan (Vent Axia Lo-Carbon Response with timer), flexible insulated ductwork and cowed wall outlet. Operation of fan to be triggered via the light switch, run on to be provided by internal timer.

#### **4.6.8 EF8, Kitchen Hood Extract Fan**

Independent extract system, comprising Vent Axia Milano (600mm wide) s/s extractor hood with telescopic chimney, flexible insulated ductwork, condensate trap, universal cowl, to discharge vertically through roof via weathered slate / curb as appropriate. Fan to be operated manually / as required via built in controls.

#### **4.6.9 Ductwork**

Generally as indicated on drawings. Ductwork to be hot dip galvanised sheet to BS 2989, Grade Z2 coating type, installed in accordance with: -

- HVCA DW/143, DW/144, DW/171 & DW/172
- Ductwork Classification - Low
- Air Leakage - Class A.

Note - access doors on supply and extract ductwork required (every 2m) for annual cleaning.

## **4.7 COMMISSIONING**

### **4.7.1 Generally**

Commissioning / balancing of air systems shall be carried out in accordance with Commissioning Code, Series A – Air Distribution Systems, High & Low Velocity.

Commissioning / balancing of water systems shall be carried out in accordance with Commissioning Code, Series W – Water Distribution Systems.

### **4.7.2 Heating Plantroom**

Carry out a 'hand' proportional balance of the radiator system within the new / refurbished Nursery area. Commission the heating distribution pumps and regulate commissioning valve CV1 to achieve a flow rate of 0.25 l/s to the radiator circuit and CV2 to achieve a flow rate of 0.15l/s to the underfloor heating manifold.

### **4.7.3 Ventilation**

Measure and record the ventilation rates of extract fans EF1 – EF6.

Check the Staff Room ventilation system (SF1&EF1) for correct operation, set the speed control unit to provide adequate ventilation rate / noise levels.

Check the Utility & Sleep Room ventilation system (SF2&EF2) for correct operation, carry out a 'hand' proportional balance of the supply / extract valves in the two rooms, set the speed control unit to provide adequate ventilation rate / noise levels.

Check the Nursery Rm2 ventilation system (SF3&EF3) for correct operation, set the two OBDs to balance the system equally between the two parts of the room, carry out a 'hand' proportional balance of the supply / extract valves, set the speed control unit to provide adequate ventilation rate / noise levels.

## **4.8 FOUL WATER & ABOVE GROUND DRAINAGE**

### **4.8.1 Generally**

Provide all foul drainage above ground pipework to serve the new sanitary appliances and other drainage outlets throughout the new / refurbished Nursery area down to ground level, for connection to the below ground drainage systems.

Provision of Sanitaryware is included within the architects / main contractors package – refer section N13.

Allow for waste outlets and traps where not already included within section N13

Base the above ground foul drainage design on System III as defined in BS EN 12056-2 and using the tabulated discharge units as shown in Table 2 within this BS EN document.

Install the foul drainage installation to meet the performance objectives stated in BS EN 12056, the Building Regulations and all other technical manuals and guides applicable, including, but not restricted to, the documents shown below.

Install the system using the minimum pipework and fittings necessary to carry away all foul discharges from the building to the below ground drainage system, quickly, quietly and with freedom from nuisance or risk of injury to health. Prevent air from the discharge pipes from entering the building.

Clearly identify all pipelines in accordance with BS 1710.

Install all drainage pipework to convey discharges without crossflow, backfall, leakage or blockage.

Adequately test, clean and maintain the system at all times throughout the construction process.

### **4.8.2 Grease Trap**

Allow for providing an above ground type grease trap within the kitchen area, type LG450 as manufactured by Filtratrap.

### **4.8.3 Design Parameters**

Comply fully with the edition (including amendments) of each of the following, current at the time of tender.

- The Building Regulations
- The Water Supply (Water Fittings) Regulations
- BS 416 Discharge and ventilating pipes and fittings, sand-cast or spun in cast iron
- BS 476 Fire tests on building materials and structures
- BS 1710 Specification for identification of pipelines and services
- BS 3868 Specification for prefabricated drainage stack units in galvanised steel
- BS 4118 Glossary of sanitation terms
- BS 6100 Building and civil engineering. Vocabulary
- BS 6465 Sanitary installations
- BS 7671 Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition
- BS EN 598 Ductile iron pipes, fittings, accessories and their joints for sewerage applications. Requirements and test methods
- BS EN 752 Drain and sewer systems outside buildings
- BS EN 877 Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings. Requirements, test methods and quality assurance



- BS EN 1057 Copper and copper alloys. Seamless, round copper tubes for water and gas in sanitary and heating applications
- BS EN 1329 Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Unplasticized poly (vinyl chloride) (PVC-U)
- BS EN 1451 Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polypropylene (PP)
- BS EN 1566 Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Chlorinated poly(vinyl chloride) (PVC-C)
- BS EN 12056 Gravity drainage systems inside buildings
- BBA British Board of Agrément Certificate as appropriate.
- CIBSE Guide G Public health engineering
- IOP Institute of Plumbing & Heating Engineers Design Guide

Install the public health foul drainage above ground systems in accordance with all statutory requirements, the Building Regulations and BS EN 12056.

Ensure that the WC overflows are the internal type as permitted within the current Water Regulations.

The design of the underground drainage system will be undertaken by the civil/structural engineer, and all details relating to this drainage will be provided by them. The above ground foul drainage will connect to the underground drainage via connections/couplings provided by you. Any gullies, channels, outlets, pipework etc. at or below ground floor slab level, will be detailed and specified by the civil/structural engineer.

#### **4.8.4 System Description**

Base the design of the foul drainage above ground system on the primary ventilated stack or modified primary ventilated stack principles as defined in BS EN 12056-2. Convey all effluent from various sanitary appliances, drainage outlets, etc. by gravity to the connection to the underground drainage systems at ground floor level.

Install main ventilating pipework to suit the design of both the above and below ground drainage systems as necessary, terminating to atmosphere at roof level.

Provide adequate drainage facilities for the mechanical services equipment and plant. Discharge all drainage from plant rooms and mechanical equipment into trapped floor gullies, connected to the foul drainage above ground system.

Install all soil floats above the level of the slab that it serves. Soil floats below the slab level in ceiling voids are not acceptable.

Install WC outlets to the main discharge pipes utilising a HDPE manifold system. Ensure that the main floats have a minimum fall of 1 degree (18mm/metre) and connect to the horizontal outlet of the WC's via purpose made and angled WC connectors. Ensure that the angle of each connector is specific to suit the location of the WC to the float height. Terminate access provision to the ends of WC floats above the spill over level of connected WC appliances on that floor. Do not use telescopic WC connectors.

Do not use short radius bends in the foul drainage above ground system.

Make all branches to horizontal discharge pipework at high level any floor using 45° branches swept in the direction of flow where possible.

Install all discharge pipework to gradients strictly in accordance with the requirements of BS EN 12056, as a minimum.

Install access doors or caps on sanitary pipework to facilitate rodding and maintenance access to installed pipework. Co-ordinate access through Architectural casings with pipe accessories.

Provide access doors to all main discharge pipes in accordance with the Building Regulations and BSEN 12056, as follows:

**Vertically**

- 1 at lowest floor level, at topmost floor level and every 3<sup>rd</sup> level, as a minimum, located at floor level plus 1200mm at each installed position, to the centreline of the access fitting
- 2 on stub stack connections at floor level plus 1200mm to the centreline of the access fitting or above the fittings spill-over level
- 3 as required to facilitate access for testing
- 4 on vertical pipework above and below any offset

**Horizontally**

- 1 where shown on the public health systems drawings
- 2 all changes in direction
- 3 on all horizontal floats

Ensure all traps to appliances have deep seals in compliance with BS EN 12056 and the Building Regulations.

Where ventilating pipework is necessary to suit either the below or the above ground drainage systems, terminate through the roof to meet architectural and technical requirements.

Design all discharge and ventilation pipework installation within designated service ducts or integrated ceiling voids. Co-ordinate removable access panels with the drainage access points to enable maintenance to discharge pipework. Where pipework is designed to be exposed, install to a high standard, true to line, with adequate support fixings.

Test all discharge and ventilation pipework at various stages and on completion of the installation to ensure compliance with the requirements of the Building Regulations and BS EN 12056.

Continuity bond and test all new metal drainage systems pipework to ensure earth continuity in accordance with BS 7671 and this specification.

**4.8.5 Control Requirements**

N/A

**4.8.6 Fire safety**

Provide and install protection of openings and fire stopping in accordance with the Building Regulations, Part B.

Provide and install an intumescent firesleeve on all plastic pipework exceeding 40mm internal diameter passing through fire compartment floors or walls. Ensure that the firesleeve has an appropriate Agrément Certificate. Ensure that the firesleeve has a fire rating compatible with the wall, floor or cavity barrier to which it is fitted.

**4.8.7 System Components**

The above ground foul drainage pipework materials will comprise the following, unless detailed or specified otherwise:

- ~ Main large diameter discharge and ventilation pipework and fittings shall be HDPE to BSEN 1329 and BSEN 1566, refer to drawings for locations.
- ~ All small diameter discharge and ventilation pipework and fittings shall be HDPE to BS EN 1329, BS 5255 and BS EN 1566.

#### **4.8.7.1 General**

Provide for any or all of the following, notwithstanding the more detailed instructions or requirements contained in other parts or sections applicable to sanitary systems of the specification.

#### **4.8.7.2 Pipework**

Free pipework of burrs, rust, scale, throating, flattening rippling and any foreign matter or defects and thoroughly cleaned prior to erection. Obtain all components for each type of pipework from the same manufacturer unless otherwise indicated.

#### **4.8.7.3 Gradients**

Install discharge pipes and ventilating pipework to gradients strictly in accordance with BS EN 12056 to provide self-cleansing velocities. Agree minor adjustments of gradient required by practical on site fixing, size of fittings or through co-ordination with other services with the engineer prior to installation. Where discharge pipework is installed in a tenant space there are strict limitations imposed. Ensure that all pipework is installed in accordance with the specification requirements.

#### **4.8.7.4 Open ends**

Where open ends of pipe, fittings, etc. are left exposed during the progress of the work and prior to completion, temporarily but firmly fix a suitable proprietary plug or cap to such open ends as to prevent the ingress of any foreign matter.

#### **4.8.7.5 Damage**

Provide suitable approved protection to afford protection to pipe, fittings or other equipment whether required on a temporary or permanent nature and where any parts or part are liable to be exposed to damage from other trades or any causes whatsoever. Immediately replace, at your own expense, any pipework fittings, valves, sanitary fittings unduly marked by tools or otherwise damaged or distorted and rejected by the engineer.

#### **4.8.7.6 Examination**

Inspect components carefully before fixing and reject any which are defective. Ensure cut ends of pipes are clean and square with burrs removed. At the engineer's direction on site, and at no extra cost to the Employer, remove, submit for his inspection and re-fix after, any length of pipe, valve or fitting already fixed. If the inspection reveals neglect on your part, to conform to the requirements of the specification the engineer may direct the removal and replacement without extra cost to the Employer, the whole or any part of the installation.

#### **4.8.7.7 Greasing**

Ensure that all working parts requiring lubrication are properly greased or lubricated at all times and left in good working order.

#### **4.8.7.8 Obstruction**

Remove of any foreign body or matter, liable to cause stoppage or faulty operation of any of the sanitary pipework / fittings.

#### **4.8.8 HDPE Discharge Stacks & Pipework**

Install the discharge pipes in the positions indicated on the engineer's drawings. The pipes and fittings are to be spigot HDPE manufactured in accordance with BS EN 1519 or British Board of Agrément. Ensure that they are straight, smooth, of true cylindrical bore, free from lamination flaws and other imperfections. All pipes are to be black in colour with a minimum of 2% carbon black to prevent UV degradation. Ensure that all pipes have been tempered to

reduce the risk of shortening (reversion) from high temperature discharges. Ensure that the pipes and fittings bear the relevant BS marking or carry the BBA certificate number.

Joint the pipes and fittings as follows:

Either butt or electro-fusion sleeve welded all joints except where expansion joints are required when you are to use the manufacturer's purpose made seal ring joint expansion fitting (anchored).

Unless the guide rail system is employed, provide expansion joints at a maximum of 5 metre intervals and/or at changes in direction more than a metre apart, unless supports are positioned to allow movement. Provide intermediate sliding supports in accordance with the manufacturer's installation instructions.

Install a flexible coupling either side of the joint where a pipe crosses a building expansion joint. Where differential settlement may be expected provide the "rocker" pipe with increased fall to prevent a back-fall occurring.

Provide access by the installation of purpose-made bolted access doors. Accommodate changes in pipe diameter in the horizontal by the use of taper reducers with soffits level.

#### **4.8.9 HDPE Ventilation Stacks, Pipework and Fittings**

Ensure all HDPE ventilation pipes and fittings are as specified for HDPE discharge stacks and pipes.

#### **4.8.10 EQUIPMENT**

##### **4.8.10.1 Ventilating pipes**

Pass ventilating pipes terminating to atmosphere through the roof with a proprietary roof vent connector and purpose made weathering slate to suit the roofing material. Carry this out in accordance with BS EN 12056 and the Building Regulations. Locate the ventilating pipes to avoid ventilation duct inlets and exhausts.

##### **4.8.10.2 Air Admittance valves**

Where air admittance valves are to be installed, install in accordance with the Building Regulations and the manufacturer's requirements. Ensure that all air admittance valves that are to be used have a current British Board of Agrément Certificate ( BBA ). Locate air admittance valves to allow full access for maintenance and replacement.

##### **4.8.10.3 Floor outlets / gullies**

Included within architects / main contractors package

##### **4.8.10.4 Traps**

Provide traps to sanitary fittings. Ensure that the deep seal traps are complete with a pipe to wall extension piece and wall cover flange (as necessary). Supply and install the necessary pipe adaptors.

Ensure all traps have seal depths and diameters in accordance with BS EN 12056, and that they bear the British Standard Kite Mark. Ensure that they are fitted with a universal compression outlet, e.g. as

indicated below:

~ wash hand basin – 32mm deep seal bottle trap, chrome plated.

~ sink – 40mm deep seal tubular trap

~ urinal – 40mm deep seal tubular trap

~ bath – 40mm deep seal tubular trap

~ gullies – 100mm trap with bottom access

Bottle traps are acceptable for use on WHBs only. Ensure that they are of the re-sealing type, and that the re-sealing insert is removable.

#### **4.8.10.5 Overflows**

Install all overflows to meet the requirements of the Water Supply (Water Fittings) Regulations 1999. Ensure that WC overflows are the internal type within the cistern that allows discharge through the flush pipe into the WC pan.

#### **4.8.11 CLEANING**

Properly clean all pipework, fittings and valves.

### **4.9 BUILDERS WORK**

#### **4.9.1 General**

Generally the main contractor will carry out all 'builders work' within the buildings and trenching / ducting between the buildings. The main contractor shall provide all chases, holes through floor slabs etc.

#### **4.9.2 Holes In Walls**

The mechanical contractor shall provide all holes through the walls up to 50mm diameter.

All larger holes shall be core drilled by the main contractor.

DO NOT form a hole through a wall using a lump hammer and chisel.

#### **4.9.3 Trenches**

All ducts and trenches shall be provided for the mechanical contractor by the main contractor. The contractor shall liaise with the main contractor prior to and during the execution of these works

## 5 SUMMARY OF TENDER

### 5.1 SUMMARY OF TENDER – ELECTRICAL SERVICES

	Electrical Services	Total
<b>A</b>	Electrical Mains and Sub-Mains	.....
<b>B</b>	Earthing & Bonding	.....
<b>C</b>	Lighting & Emergency Lighting	.....
<b>E</b>	Power	.....
<b>F</b>	Accessories	.....
<b>G</b>	Mechanical Services Wiring	.....
<b>H</b>	Fire Alarm System	.....
<b>I</b>	Disabled Persons Call System	.....
<b>J</b>	Electric Hand Driers	.....
<b>K</b>	Data / Voice	.....
<b>L</b>	Inspection & Testing	.....
<b>M</b>	O&M Manuals	.....
<b>N</b>	Builderswork	.....
	<b>SubTotal (Exc. VAT)</b>	.....

	Provisional Sums	
<b>O</b>	Footpath Lighting	£750.00
	<b>SubTotal (Exc. VAT)</b>	<b>£750.00</b>

**SUBTOTAL (Exc. VAT)** .....

**Add 1/39 MCD** .....

**TOTAL (Exc. VAT)** .....

**5.2 DAYWORK RATES – ELECTRICAL SERVICES**

Skilled: per hour:

Unskilled: per hour:

based on Monday to Friday 0800 to 1630

% addition to above rates for

Saturday working %

Sunday working %

Percentage uplift on materials used on dayworks %

Name of Contractor .....

I/We hereby agree to carry out the above works in accordance with the M&E Services Schedule of Work / Specification and associated Tender Drawings.

Signed.....

Date .....

**5.3 SUMMARY OF TENDER – MECHANICAL SERVICES**

	Electrical Services	Total
<b>A</b>	Heating	.....
<b>B</b>	Mains Water Supply	.....
<b>C</b>	Domestic Hot & Cold Water	.....
<b>D</b>	Ventilation	.....
<b>E</b>	Insulation	.....
<b>F</b>	Commissioning	.....
<b>I</b>	Foul Water & Above Ground Drainage	.....
<b>J</b>	O&M Manuals	.....
<b>K</b>	Builderswork	.....
	<b>SubTotal (Exc. VAT)</b>	.....

	<b>Provisional Sums</b>	
	None	£0
	<b>SubTotal (Exc. VAT)</b>	<b>£0</b>

**SUBTOTAL (Exc. VAT)** .....

**Add 1/39 MCD** .....

**TOTAL (Exc. VAT)** .....



**5.4 DAYWORK RATES – MECHANICAL SERVICES**

Skilled: per hour:

Unskilled: per hour:

based on Monday to Friday 0800 to 1630

% addition to above rates for

Saturday working %

Sunday working %

Percentage uplift on materials used on dayworks %

Name of Contractor .....

I/We hereby agree to carry out the above works in accordance with the M&E Services Schedule of Work / Specification and associated Tender Drawings.

Signed.....

Date .....