

Hamson Barron Smith

HBS

Project:

Warren Cottage

Specification:

Building Services Engineering

Client:

Forestry Commission

Date:

Nov 2017

CONTROLLED DOCUMENT

Job No:			
Status:	Draft for comment	Doc No:	HBS-WC-00-RP-MEP-901
	Name	Signature	Date
Prepared by:	TK	Terry King	17/11/2017
Checked:			
Revisions:			
Rev No.	Date	By	Changes

CONTENTS

SECTION 1. INTRODUCTION	4
1.1 General	4
1.2 The Project	4
1.3 Objectives of the Project.....	5
1.4 Regulations and Standards	5
Section 2. DESIGN CRITERIA	6
2.1 External Conditions.....	6
2.2 Inside Conditions	6
2.3 Building Thermal Transmittance Values	6
2.4 Water Consumption	6
2.5 Lighting.....	7
Section 3. UTILITIES	8
3.1 Mains Water	8
3.2 LPG	8
3.3 Electricity.....	8
3.4 Telecommunications	9
Section 4. MECHANICAL	10
4.1 LPG	10
4.2 Boiler	11
4.3 Low Pressure Hot Water System (LPHW).....	12
4.4 Ventilation	13
4.5 Domestic Hot and Cold Water	14
4.6 Above Ground Drainage.....	17
4.7 Log Burner	17
Section 5. ELECTRICAL	18
5.1 LV Strip Out	18
The entire existing LV distribution back to the meter tails is to be completely stripped out and removed from the property. Following safe isolation from the main switch, the works shall comprise of the following:	18
5.2 PV System	19
5.3 Low Voltage (LV) Distribution.....	20
5.4 Small Power Service.....	22
5.5 Lighting.....	24
5.6 Fire and Security.....	26
Section 6. TESTING, COMMISSIONING AND DOCUMENTATION	27
6.1 Test Certificates	27
6.2 Record Drawings	27
APPENDIX A: DRAWING SCHEDULE.....	28
APPENDIX B: LOG BURNER QUOTATION	29

SECTION 1. INTRODUCTION

1.1 General

Hamson Barron Smith have been appointed to provide professional Mechanical & Electrical (M&E) engineering design services for the refurbishment Warren Cottage.

The scheme comprises a full refurbishment of a 3-bedroom cottage at the following address: Warren Cottage, Lynford, Thetford, IP26 5ET. This document describes the building services engineering scope of works required to complete the development and is to be read in conjunction with the mechanical, electrical and public health (MEP) design drawings, together with all other documents incorporated in the tender package.

The scope of work as described in this package shall comprise the supply, installation, testing and commissioning of the complete mechanical and electrical services for the project. The construction works shall comprise of the labour and, unless otherwise indicated, all the materials necessary to form a complete mechanical and electrical services installation with such tests, adjustments, commissioning and maintenance as may be required to give effective and safe working installations to the satisfaction of the Employer's Representative.

The word "complete MEP services installation" shall mean not only the major items of plant and apparatus described in this specification, but also the incidental sundry accessories and components necessary for the complete execution of the works, for the proper and safe operation of the installation together with their labour charges, whether or not these sundry accessories or components are mentioned in detail within the contract.

1.2 The Project

The full refurbishment of a 3-bedroom cottage, which comprise the following:

- Kitchen
- Dining Room
- Entrance Porch
- Living Room
- Rear Lobby / WC
- Utility Room
- Store
- 3 Bedrooms
- Upstairs W/C
- Bathroom

These will generally require the installation of small power service, installation of LPG gas system, lighting, domestic water, heating and above ground drainage.

1.3 Objectives of the Project

The objectives of the project in relation to the building services are summarised below:

- To arrange for new LPG supply to be installed for the property
- To cold water supply to located and brought into the building
- To provide new mechanical and electrical services throughout the building
- To provide good quality reliable plant and equipment with serviceable life not less than 15 years
- To use energy efficient plant and equipment to minimize energy consumption
- To provide flexibility with regard to comfort, control of plant and future use of space

1.4 Regulations and Standards

The design of the building engineering services, systems and installations shall comply fully with the latest editions of all relevant UK and local authority regulations, statutory requirements, design standards and codes of practice including the following:

- IEE Wiring Regulations BS 7671:2008, 17th Edition
- British Standards Institution Codes of Practice
- British Standards
- Building Regulations, England & Wales
- Gas Act 1995
- The Gas Safety (Installation and Use) Regulations 1998
- WRc Regulations & Water Authority Regulations
- Construction Design & Management Regulations
- Harmonised European Standards
- Local Building Control Requirements
- Environmental Health Requirements
- Fire Officer Requirements
- CIBSE & BSRIA Guides and Publications
- LPC Guides and Recommendations
- Relevant Health and Safety at Work Acts
- Local Electricity Company Regulations
- Electricity at Work Regulations

The above list of Standards, Regulations and Guidelines is not exhaustive and as such does not relieve the Contractor of their responsibilities to comply with all necessary Regulations and Standards relevant to the works being carried out. The Standards listed above should be considered as minimum requirement for the Contract Works.

SECTION 2. DESIGN CRITERIA

All systems have been designed to the scheduled criteria below. The following design criteria represent standard good practice and is outlined in CIBSE Guides and Building Regulations Part L1B for existing dwellings. Although some details have also been taken from Part L1A.

2.1 External Conditions

Winter design	-4°C dB/100% RH
Summer design	30°C db / 20°C wb

2.2 Inside Conditions

The following desired temperatures and air changes have been used:

AREA	SUMMER °C	WINTER °C	AIR CHANGE
Living / Dining	No direct control	21°C	1.5 ac/hr
Hallway / Landing	No direct control	18 °C	1.5 ac/hr
Bedrooms	No direct control	18 °C	1.0 ac/hr
Separate WC	No direct control	18 °C	2.0 ac/hr
Kitchen	No direct control	18 °C	2.0 ac/hr
Bathroom	No direct control	22 °C	2.0 ac/hr

Note: Generally, all temperatures are dry resultant temperatures and are subject to a +/- 2K swing. No humidity control has been designed, although it is generally expected to be within 30-70% RH range.

2.3 Building Thermal Transmittance Values

The following thermal transmittance performance values have been used;

ELEMENT	U-VALUE (W/m ² K)
External Wall	0.55
Windows	1.7
Floor	0.25
Roof	0.18

2.4 Water Consumption

The design basis for the hot, cold and drinking water services shall be based on average usage of 142ltr per person per day:

- General design criteria standards: BS 6700, IOP Plumbing Engineering Design Guide and CIBSE guides.

The recommendations within CIBSE guide, TM13 'Minimising the risk of Legionnaires Disease' shall be adhered to. All domestic hot & cold-water pipework to be installed in accordance with ACoP L8 Guidance, tested, chlorinated and flushed in accordance with BS 6700.

Summary of Proposed Fitting Types:

Type	Description	Min Flow Rates, Volumes	Qty
Taps	Bathroom Mixer	5 litres/min	1
Bath	Bathroom Bath	185 litres to overflow	1
Dishwashers	TBC	1.25 litres/kg	1
Washing Machines	TBC	8.17 litres/kg	1
Showers	Bathroom Shower Mixer	11 litres/min	1
WC's	Ground Floor	6 / 3 litre flush vols.	1
	First Floor	6 / 3 litre flush vols.	1
Kitchen / Utility Taps	Mixer	5 litres/min	2

2.5 Lighting

The following desired minimum lighting requirements are as follows:

AREA	LUX LEVEL	LIMITING GLARE INDEX	MINIMUM COLOUR RENDERING (R _A)	LIGHTING CONTROL METHOD
Living / Dining	150	n/a	80	Wall Switches
Hallway / Landing	100	n/a	80	Wall Switches
Bedrooms	100	n/a	80	Wall Switches
Separate WC	150	n/a	80	Wall Switches
Kitchen	200	n/a	80	Wall Switches
Bathroom	150	n/a	80	Wall Switches

SECTION 3. UTILITIES

The Employer requires the property to be provided with water, LPG, electrical and British Telecommunication services. All work shall be carried out in accordance with the requirements of the relevant Authority.

3.1 Mains Water

The cold water to the property is provided from the borehole and pump plant at the rear of the property. The water is pumped from the pump house to each dwelling locally. The incoming water supply pipe to Warren Cottage cannot be found within the property and requires further investigation to locate.

Works required to locate and bring the water supply into the building are listed under Section 4.5 'Domestic hot and cold-water services'. Any works are to be carried out in accordance with the employer's requirements, and in accordance with UKWTA guidance and Private Water Supply Regulations 2009.

3.2 LPG

A new LPG service is to be installed at the property. The LPG tank, installation and commissioning shall be carried out separately to this contract but needs to coincide with the building works.

Calor Gas works shall comprise of the following:

- Supply and Delivery of the 2100 litre tank
- Installation of tank in pre-dug pit
- Running of pipework from cylinder, underground in pre-dug pit to ECV located at the rear of the property
- All testing a commissioning

The contractor as part of these this tender shall be responsible for all civil works required prior to the delivery of the new LPG tank. These works will comprise of the following:

- Civil works to excavate the pit ready for the tank
- Civil works to excavate trench from the pit to the rear of the property for gas pipes
- Reinstatement and making good of all civil works following installation and commissioning.

Descripted details of the works required by the contractor in required to the LPG services can be found in Section 4.1 'LPG Fired Boiler'

3.3 Electricity

The building currently has a 60a single-phase supply to the property from a pole located in the front garden. Existing incoming supply is to be utilised.

The contractor shall instruct a specialist photovoltaic supplier installer for the installation of a new photo-voltaic system (PV) is to be carried out. The new PV system is to be installed on the South Facing side of the pitched roof. The PV System is to be selected by registered installer and be able to generate a minimum of 1.5Kw of power, however, panels have been recommended here within.

The internal electrical works consist of a total re-wire of the LV distribution inside the property. The works to required are listed under Section 5 – Electrical, of this document.

All electrical works must be carried out by a qualified electrical and in accordance with the latest edition of IET BS7671 17th Edition.

3.4 Telecommunications

The property currently has a single telephone wire connection, provided from the nearby telegraph pole and connects to the BT master socket located in the entrance porch. The existing master socket also connects to slave socket located in the dining room.

The slave socket is to be removed and the master socket is to be relocated to the living room as shown on the internal detailed design drawing. The relocation of the master socket is to be carried out by BT Open Reach.

SECTION 4. MECHANICAL

This section of the specification identifies the Mechanical Engineering Services, which shall be installed, tested and commissioned by the Contractor.

The mechanical services for the project shall comprise the following:

- LPG Fired Combination Boiler
- LPHW Heating
- Ventilation
- Domestic Hot and Cold Water
- Above Ground Drainage

The following mechanical services scope of works is to be read in conjunction with the design drawings.

4.1 LPG

Following the connection of the new incoming LPG service by Calor gas. The contractor shall carry out all works necessary to connect the combination boiler to the ECV located at the rear of the property.

4.1.1 General

Plumbing shall comply with BS EN806-4:2010 in respect of the design of the installation, testing and maintenance of services created. All works shall be carried out in accordance with the Local Water Authority's Bye-laws and requirements.

From the new LPG ECV connection situated on the rear façade of the property, the contractor shall route 22mm copper gas pipework through the fabric of the building to the location as shown on the design drawings. Where the pipe travels through the fabric of the building, the pipe is to be sleeved and sealed accordingly.

From this point, gas pipework shall be distributed to the gas fired combi boiler complete with any required isolation valves. The gas pipe is to be reduced from 22mm – 15mm or as per the boiler manufacturer guidelines.

The contractor shall be responsible for the final gas pipe sizing, connections and routes. All gas works shall be carried out in accordance with current Gas Regulations, BS 6891:2015. All gas works must be completed by a Gas Safe and LPG Registered Engineer.

Following completion and final connections of the gas installation. the property shall be commissioned and tested as per The Gas Safety (Installation and Use) Regulations.

All gas pipework shall be tested upon completion of the works and a Landlord's Gas Safety Test Certificate provided prior to handover. Acid flux shall not be used on copper gas installations.

4.2 Boiler

The boiler shall be thermostatically controlled, wall mounted condensing boiler located in the kitchen. The heating system shall serve radiators located in all rooms and circulation areas, sufficient to provide heating in accordance with the requirements detailed herein.

The boiler is required to provide both Low Pressure Hot Water (LPHW) and domestic hot water services. The select boiler manufacture and model recommended is:

Worcester Greenstar 30i Combi Boiler

The flue is to be installed and as per the boiler manufactures recommendations. The flue shall pass through the fabric of the building. The flue shall be sleeved and sealed, and include an external diffuser.

The condense pipe is to be installed and as per the boiler manufactures recommendations. The Internal condensate drainage pipework shall be in copper and must be a minimum of 19mm ID (typically 22mm OD) plastic pipe and this should "fall" at least 45mm per metre away from the boiler and include a 75mm trap prior to taking the shortest practicable route to the termination point.

Condensate drainage pipe should be terminated at the internal foul water discharge point (internal stack) as shown on the detailed design drawings.

A mains cold water connection is required to feed the boiler. A 15mm connection is to be made to the mains cold water supply within the kitchen. Separate isolation valves are to be installed to allow for local isolation.

The installation shall incorporate a separate controller which provides separate and independent operation of hot water and heating with the capability of 3 on/off settings in a 24-hour period. The programmer shall be sited on the boiler.

The contractor shall also supply a separate wireless wall mounted thermostat with weather compensation control unit.

4.2.1 General

The Boiler shall comply with a minimum Dry NOx level (Mg/kWh) 70 i.e. Boiler Class 5 (BS EN 297:1994).

A Carbon Monoxide Detector / Alarm shall be provided. (See section 5.5)

Boiler overflow shall be extended through external walls at low level to avoid hazard and potential scalding to passers-by.

The boiler shall be provided with separate flow and return connections and automatically operated diverter valves for hot water installations. The Contractor shall, where required, consult with the boiler and radiator manufacturers with regard to the location and type of air admittance valves installed (if required)

Both the CO and Combustion rating of the boiler must be tested and recorded on the Boiler benchmark commissioning checklist in accordance with Technical Bulletin 143 issued by Gas Safe. The ratios should be well within the acceptable limits and in the absence of manufacturer's guidance for specific boilers, Manufacturers have agreed that the safe ratios should fall within the following range:

CO level should be less than or equal to 350ppm and Combustion ratio less than 0.0040

This level will confirm the boiler is considered safe. Should manufacturer's guidelines state that the CO or Combustion ratio should be less than those noted above, the manufacturer's guidelines and limits must be adhered to. The figures recorded at testing should be recorded on the benchmark commissioning checklist to ensure the boiler is warranted by the manufacturer and in accordance with all necessary associated Building Regulations.

4.3 Low Pressure Hot Water System (LPHW)

LPHW heating is to be provided by copper pipe flow and return pipework from the combination boiler within the kitchen to each radiator within in the property as show on the detailed design drawings. The contractor shall be responsible for the final pipe runs and connections. All of which shall be shown on the as installed drawings to be issued at handover.

The flow and return connections are 15mm compression fittings and to be of copper material with final connections being 15mm.

LPHW Flow and Return pipework shall be run within ceiling voids and drops as indicated. Pipework routes can be seen in the design drawings; however, the contractor shall confirm final pipe routes upon installation. All pipework drops are to be boxed, plastered and decorated to match existing surroundings.

Adequate number of drain valves shall be provided at all low points to enable the entire system to be drained. The contractor shall install all pipework with the least number of joints as possible. Where connections including T's and elbow joints have been made, suitable access is to be made available to allow for quick access for inspection or repair. Locations to be identified on the as installed drawings.

Radiators shall be pre-finished enamelled pressed steel Kite marked radiators. Radiators shall be securely fixed to walls/partitions and level and fitted to permit ease of decoration to adjacent window

boards. The bottom of radiators shall not be less than 125mm from finished floor level and 50mm from a window board.

Radiators shall be fitted with a thermostatic valve and a lock shield valve except for those sited in bathrooms and the area where the room thermostat is located.

Radiator in the bathroom shall be chrome towel rail type and must be located away from the WC position to prevent burns to users.

Prior to handover, all systems shall be run hot, drained, re-filled with a proprietary cleanser, run hot, drained and finally re-filled with clean water incorporating Fernox or similar approved corrosion inhibitor.

The Employer reserves the right to have an independent test of the plumbing and heating installations and where applicable, any reasonable points raised shall be dealt with prior to handover.

4.4 Ventilation

Mechanical Ventilation units are to be installed in the bathroom and utility areas as shown on the design drawings.

Cooker hood extracts are to be selected by the kitchen specialist and where provided shall be recirculating.

Power supplies to the bathroom and utility extract shall be linked to the light / switch via an isolation switch situated above door. Bathroom and W/C extract fans shall have an overrun setting of a minimum of 15 minutes after use.

Extract fan is to be ducted through either the wall or the ceiling void to external louver.

4.4.1 Extract Systems

The following extracts have been selected to be used:

- Bathroom – Nuair - NA150T – Wall mounted, ducted through to external louver.
- Utility – Nuair - NA150T – Wall mounted, ducted through to external louver.
- Kitchen – The kitchen extract is to be recirculating and selected by the kitchen specialist.

All extract fan systems shall be fitted as per the manufactures instructions and qualified electrician.

4.4.2 General

The Contractor shall allow for all necessary builders' work including the provision of slim-line ducting, sleeves to brickwork, airbricks and cladding to ducts. Vertical ducts shall be insulated and affixed with suitable condensation traps and waste outlets where rising through roof voids or false ceiling voids.

4.5 Domestic Hot and Cold Water

The Contractor shall install new domestic hot and cold-water services to all appliances / outlets as shown on the design drawings.

4.5.1 Domestic Cold Water

The contractor shall allow to track and trace the cold-water supply pipe at the rear of the property and carry out the necessary adaptations required to extend the supply pipe and bring into the building as shown on the detailed design drawings.

Any extension to the existing cold-water pipe or laying of new cold-water pipe shall be laid at a depth at no less than 750mm. The contractor shall allow for all excavation and reinstatement works required to carry out the required works.

From the incoming service, a 22mm cold water pipe shall be run into the incoming point within the kitchen as shown on the design drawings. At the incoming point, the pipe shall convert from blue PE to copper, with a main stop clock tap, drain valve and double check valve.

Within the property, the potable cold-water supply shall be run in 22mm copper pipe to serve the boiler, sanitary appliances, kitchen sink, utility sink, domestic appliances and outside tap. The final connections shall be sized appropriately and in accordance to manufacture recommendations. Local isolation valves shall be installed prior to all final connections to allow for localised isolation.

4.5.2 Domestic Hot Water

The contractor shall run copper pipe to serve the kitchen sink, wash hand basins, bath and shower. The pipework shall be sized to ensure that adequate pressure is delivered at each outlet. In general, this would be 22mm connections to baths and showers and 15mm elsewhere. Final pipework sizes and pipe runs to be determined by the contractor.

Thermostatic mixing valves or mixer taps with integral thermostatic control shall be installed on the hot water supply bath and shower in accordance with the requirements of the Building Regulations, Approved Document Part G. All thermostatic mixing valves shall be installed in accordance with the manufacturers' recommendation and commissioned in accordance with Water Regulations. The contractor shall check the final sanitary ware specification for the taps to ascertain whether the models have integral thermostatic control. Where this is the case, separate TMV's shall not be installed to the respective water supplies.

Where this is the case, separate TMV's shall not be installed to the respective water supplies.

4.5.3 Appliance and Sanitary Connections

Unless supplied with suitable inbuilt backflow protection devices, all washing machines and dishwasher's connections shall include double check valves. Supplies to washing machines and dishwashers, in the positions indicated on the internal layout drawings shall be provided with quarter turn isolating valves with hose connection outlets, located in positions that enable isolation of the services without prior removal of the appliance.

A cold-water feed shall be provided to the appropriate spaces within the property and shall be suitably marked to identify each appliance. The cold-water feed must be provided with temporary sealing caps for future connection of appliances by occupants. The cold-water supply shall incorporate a non-return valve, which shall be chrome plated where located in visible locations.

A PVCu waste standpipe shall be provided and connected to the drainage system incorporating a removable cap on a chain.

Alternatively, a trap may be utilised provided appropriate measures are taken to prevent back-flow of wastewater into the washing machine/dishwasher.

Isolation valves shall be fitted prior to final connections to allow for local isolation.

The installer shall refer to the sanitary ware schedule if available. If bath taps, bath mixer taps, bath/shower mixers or separate shower valves are not thermostatically controlled with automatic high temperature cut out; the installer shall provide separate fail-safe thermostatic blending valves to limit the delivery water temperature. (TMV).

If separate thermostatic blending valves are to be provided these shall be concealed from view, in an accessible location that will enable future access for inspection, repairs and cleaning of integral inlet filters. Blending valves shall be complete with inlet strainers, check valves and isolating valves.

Ball valves shall be installed in accordance with the local Water Authority's requirements. All floats shall be plastic and all linkages shall be non-ferrous. (Plated ferrous linkages are not acceptable.)

4.5.4 General

The domestic services installation must be in accordance with The Water Supply (Water Fittings) Regulations 1999. All domestic water services shall be generally installed in copper tube BS EN 1057 Type R250 with end feed capillary fittings to BS EN 1254.

Pipework shall be supported at 600mm centres vertically and 600mm horizontally at low level, all fittings requiring dismantling for maintenance purposes shall incorporate compression fittings. The route of all pipework services is indicated on the design drawings.

The use of systems incorporating non-metallic pipework for hot and cold-water supplies will not be permitted.

The position of pipework services shall be clearly marked on the floors above and access in proprietary floor systems shall be provided to all pipes. Where pipes are laid across joists, these shall be set on felt pads. Notches shall not exceed 12.5% of the joist span and shall be kept away from the centre of spans and located in the top of joists only, pipes passing through joists must be sleeved. All hot and cold pipes located within ducts shall be insulated to avoid condensation or excessive shrinkage of casement.

Drain valves shall be provided at all low points to enable the entire system to be drained.

The cold-water installations shall comply with BS6700 in respect of the design of the installation, testing and maintenance of services for the property.

All pipework concealed within ceiling voids and dropper casings shall be thermally insulated, all joints shall be taped and all services identified in accordance with BS 1710. Surface run visible pipework shall be painted with primer/undercoat and at least two finishing coats.

Servicing valves for local isolation of the water supply at each appliance shall be supplied and installed.

All pipes carrying drinking water shall be joined using lead free fittings and solder

Where acid flux is used the outside of the pipes are to be thoroughly clean to prevent discoloration

The installation shall be designed to allow for full draining down which shall be designed to avoid air locks. All pipe runs shall be kept as short as possible and an adequate flow to all taps shall be achieved without undue starvation where more than one fitting is used simultaneously.

The use of systems incorporating non-metal plumbing for hot and cold-water supplies will be subject to the Employer's approvals.

Overflows shall be of plasticised PVC with solvent welded joints laid to falls and fully supported. Where hot water may pass through overflows or similar, copper shall be provided and externally turned back to the face of the brickwork or directly to a gully. All ground floor overflows shall be either sleeved or run in copper to prevent damage.

The domestic water pipework shall be installed to maintain the wholesome quality of the water and all necessary air breaks and back flow prevention devices will be provided. The Contractor must also ensure that water sampling is undertaken to check for pseudomonas in all water bearing open and closed systems; also, provision must be made for pressure testing, flushing, chemical cleaning, chlorination and commissioning in compliance with current British Standards. The contractor shall provide test certificates for inclusion in the O&M documents.

All metallic pipework systems shall be earth bonded to comply with the requirements of the current edition of BS 7671.

The Employer reserves the right to have an independent test of the plumbing and heating installations and where applicable, any reasonable points raised shall be dealt with prior to handover. The Contractor shall ensure that in compliance of Regulation 5 of The Water Supply (Water Fittings) Regulations 1999.

Where pipework passes through walls, floors or ceilings, tubular pipe sleeves of a non-combustible material compatible with the pipework shall be fitted. The internal diameter of the sleeve shall, except where necessary to allow for expansion and contraction or where otherwise specified, not exceed the outside diameter of the pipework by more than one pipe size and shall project 3mm beyond the finished surfaces.

On completion, the Contractor shall clean all completed pipework, fittings, support steelwork and brackets and make good thermal insulation. Prior to the application of thermal insulation, the new installation shall be pressure tested and the relevant certificate issued as verification. This certificate should be included within the record documentation.

4.6 Above Ground Drainage

The works shall comprise modifications to the above ground drainage services, collecting the effluent from all new sanitary fittings and fitments, for discharge to the properties waste system.

The works shall include for making final connections to the sanitary fittings, with sufficient access incorporated into the pipework installation to facilitate full testing and cleaning out of the installations. Cleaning eyes shall generally be provided at the end of soil and waste pipes, and on stacks, above the flood level of the sanitary fittings. Where pipes pass through floors and walls, they shall be provided with sleeves built into the wall, with wall or floor plates in finished areas.

4.7 Log Burner

A log burner is to be installed within the living room fire place and is to be supplied and installed by others. The log burner and installation will comprise of the following:

- 3.5 – 5Kw Stockton log burner
- 6" flexi liner to be dropped down existing chimney
- Roof access
- Register Plate and flue capping and bird guard
- Flue liner / chimney filled
- Back and front adaptations if required
- Chamber Opening if required

The installation of the log burner and certification must be carried out and signed off by a HETAS registered engineer.

The contractor shall instruct the selected supplier and installer as per the quote appended.

SECTION 5. ELECTRICAL

The electrical installation shall fully comply with all current British Standards and Regulations, Local Authority requirements and pertinent European standards in their entirety; this includes the latest issue of the IET Wiring Regulations, BS 7671:2008+A3:2015 17th Edition.

The electrical services for the project will comprise the following:

- Strip out of existing Low Voltage (LV) distribution and services
- New 1.5Kw PV system to be installed
- New Low Voltage (LV) distribution services (inclusive of earthing and equipotential bonding)
- New Small power service
- New Lighting
- New Fire and Security

All installers undertaking electrical works shall be enrolled with the National Inspection Council for Electrical Installation Contracting (NICEIC). All electrical installations shall comply with the requirements of the IET Regulations and the Local Electricity Authority.

The installation(s) shall comply with all relevant statutory instruments and regulations and in particular with the current editions of the IET Requirements for Electrical Installations (BS7671-latest addition)

Any specialist Regulations issued by, or requirements of the Local Electricity, Gas or Water Undertakings. Where necessary, arrange for any tests required by them and include for expenses incurred by such tests.

The contractor shall ensure that all works are carried by a qualified electrician in accordance with latest edition of BS7671 and all British Standards and Codes of Practice current at the time of tender.

5.1 LV Strip Out

The entire existing LV distribution back to the meter tails is to be completely stripped out and removed from the property. Following safe isolation from the main switch, the works shall comprise of the following:

- All wires and cables to be from the meter tails onwards to be stripped out and removed.
- All existing socket outlets, switches, lamp holders and existing CCU to be removed
- All existing trunking and conduit to be stripped out and removed including any support brackets or clips.

5.2 PV System

The contractor shall arrange for a new Photovoltaic system to be installed. The contractor shall employ a registered / qualified supplier and installer to install a PV system capable of generating a minimum of 1.5Kw across one side of the roof space of approximately 24.5m².

Install complete system PV array on existing near south facing roof of the building. The system is to be complete with DC/AC inverter connection through an Ofgem approved electricity meter and connection to a local distribution board.

The installation should be completed with all isolators and surge arrestor devices & the PV panels should maintain the correct separation distance from any building mounted lightning protection conductors.

Example of PV module to be considered:

Output kWh	Technology	Panel Size (mm)	No. of Panels	Roof Space (m²)
10-15 Deg/annum	Solarworld 250wp Mono black PV	1645 L x 983 W	6 +	24.5m ²

The supplier and installer shall include the following as part of the works / installation but is not be limited to the following:

- 6 x Solarworld 250wp Mono black solar PV modules (or similar & approved)
- Support frames and mountings
- DC cabling & fixings (ducted if needed)
- 2 x SMA SB3600TL inverter (or similar)
- DC lockable disconnect switch
- AC lockable disconnect switch
- Trunking where required
- All connectors, clips & junctions
- Check meter
- Inform distribution network operator (DNO)
- Inform Building Control
- Assistance with FiT application
- Scaffolding
- Labour
- Test & Commissioning

The PV installer shall supply, install and commission the installation with the main electrical contractor installing the sub main cable from the inverter output isolator to the dist. board in main building.

5.3 Low Voltage (LV) Distribution

The low voltage (LV) distribution is for all electrical connections from the meter outwards. From the meter, the Meter Tails shall be run to the new consumer unit.

Within domestic (building) premises, consumer units and similar switchgear assemblies shall comply with BS EN 61439-3 and shall:

- have their enclosure manufactured from non-combustible material, or
- (ii) be enclosed in a cabinet or enclosure constructed of non-combustible material and complying with Regulation 132.12

Consumer units shall be located within the properties per the design drawing. Units shall accommodate appropriate rated fuse protection supplied with RCBO's. A minimum of 2No spare ways shall be allowed and all RCBO's shall be clearly labelled with purpose made adhesive labels.

The Consumer Unit proposed to be used is MK Sentry K5666 sMET 16 way.

Minimum of 50mm segregation of the following wiring types shall be strictly adhered;

- LV circuits (230V and 400V),
- Security / data / communications,
- Life safety systems (fire alarm).

The contractor / electricians shall be responsible for the correct order of the CCU, breakers. selection of fixings and calculating the required quantity of supports for the containment system at 100% capacity, (not the cable capacity occupied at the time of installation).

5.3.1 General

The property is to be completely re-wired from the new consumer unit. The cables shall be routed as such to ensure that no surface mounted trucking is require, and cables are run in either ceiling voids or chased into the wall.

All electrical cables are to be a minimum of PVC insulated and shall be of British manufacture and shall comply with the latest British Standard, however, LSF is recommended.

A separate circuit for the lighting and power is required. No power outlets are to be spurred from the ring main, with the exception of the Fused Connection Units (S/F) required for the Boiler, Electric Heaters / shower and appliances as shown on the design drawings.

Cables within timber floors shall be located a minimum of 50mm from the top or bottom of the joist to avoid mechanical damage. Where unattainable, steel conduits shall be used.

Vertically run cables in ducts, on walls, trays or ladder racks shall be supported at centres of not more than 1000mm by correctly sized cable cleats. All cable drops shall be protected by capping and be covered by wall finishes.

Cables passing through or laid in walls, partitions, floors, ceilings and bulkheads, etc. shall do so in accordance with the latest version of the IEE and building regulations. Holes shall be carefully formed, suitably lined to prevent abrasive wear to the cable.

Care shall be taken to ensure that the cable is properly supported either side of the wall/partition and that no load is imposed on the cable passing through. After the cable is installed in the final position, the hole shall be made good with a material that is not corrosive to the armouring or the sheath of the cable.

All internal small power and lighting cabling is to be carried out using Flat Thermoplastic (PVC) or thermosetting insulated and sheathed cable.

The following cables sizes shall be used for the application;

- 2.5mm twin and earth – Ring main power circuits
- 2.5mm twin and earth – Radial power circuits
- 1.5mm twin and earth – Lighting circuit
- 1.5mm twin and earth – Fire Detection
- 10mm twin and earth – Cookers, hobs and showers (as required)

Where a low voltage cable is installed under a floor or above a ceiling it must be run in such a position that it is not liable to be damaged by contact with the floor or ceiling or the fixing thereof.

A cable passing through a joist or ceiling support must:

- Be at least 50mm from the top or bottom, or
- Have earth armouring or earthed metal sheath, or
- Be enclosed in earthed steel conduit or trunking, or
- Be provided with mechanical protection.

A cable concealed in a wall or partition must;

- Be at least 50mm from the surface, or
- Have earthed armouring or an earthed metal sheath, or
- Be enclosed in earthed steel conduit or trucking, or
- Be provided with mechanical protection, or
- Be installed either horizontally within 150mm of the top of the wall or partition, or vertically within 250mm of the angle formed by two walls.

5.4 Small Power Service

The contractor shall supply a small power installation, which shall include general power socket outlets, fused connection units, isolators, and other equipment shown on the design drawings, which shall include the items of specialist design, which are to be developed through the project.

Where the accessories are located below ceiling level these shall be recessed flush mounted accessories.

The earthing conductors and terminals within the power sockets within all areas shall satisfy the high integrity earthing requirements in accordance with the latest edition of IET BS7671

The power installation shall include, but not necessarily limited to the following services/supplies to:

- Power socket outlets
- Lighting / Switches
- Extract supply
- Kitchen Appliances / Boiler supply
- Fire / Carbon Monoxide Detectors
- TV / Telephone connections

5.4.1 Small Power Schedule

The small power service installation shall be installed in the property as per the internal small power service drawings and include but not limited to the following schedule:

Entrance Porch:	1No. Battery Operated doorbell (Byron) or similar 1No. double socket
Living Room	7No. x double sockets 2No. TV Connection 1No. BT Master Socket (installed by BT Open Reach TBC)
Dining Room:	2No. x double sockets
Kitchen:	3No. double sockets located above worktop 1No. double socket on wall 1No. SFC for Cooker 1No. SFC for Cooker Hood 1No. Switched Fused Connection unit for boiler. Mechanical extractor hood. (To be selected by kitchen specialist)

Cupboard:	<p>1No. single socket</p> <p>1No. 16way MK K5666 sMET Consumer Unit</p> <p>PV Invertor, meter and associated equipment</p>
Rear Lobby:	<p>1No. double socket</p>
Rear W/C:	<p>A guarded tubular heater with switched fused connection unit with neon indicator inside the W/C.</p> <p>1No. 2FT Dimplex Thermostatic Tubular Heater ECOT2FT 80W complete with AIANO Classic guard STG21.</p>
Utility:	<p>2No. double sockets located above worktop</p> <p>2No. single sockets located below the worktop for appliances with 2No. above counter SFC.</p> <p>1No. single socket connection for fridge/freezer</p> <p>Mechanical ventilation fan connected to fan isolator and lighting.</p>
Store:	<p>1No. double socket</p>
Landing:	<p>1No. double socket</p>
Bedroom 1:	<p>4No. double socket outlets</p>
Bedroom 2:	<p>3No. double socket outlets</p>
Bedroom 3:	<p>2No. double socket outlets</p>
W/C	<p>A guarded tubular heater with switched fused connection unit with neon indicator inside the W/C.</p> <p>1No. 2FT Dimplex Thermostatic Tubular Heater ECOT2FT 80W complete with AIANO Classic guard STG21.</p>
Bathroom	<p>1No. Dual voltage shaver socket</p> <p>1No. SFC for electric shower (pull chord or switch)</p> <p>Mechanical ventilation fan connected to fan isolator and lighting.</p>

All socket outlets, switches, TV / Telephone connections and fused connection units shall be in white and selected from the MK range.

Switched socket outlets shall all be MK not be less than 13 Amp rating flush finished in white with rocker type switches where required.

Points on party walls to bedrooms and living rooms shall generally be avoided where possible. Sockets shall be easily accessible and generally shall 450-600mm wide tolerance from finished floor level all at the same height.

High-level outlets above worktops in kitchens shall be 150mm from worktop level (and this shall include the location of remote switches to appliances). All measurements are taken from the base of the fittings.

The electrical contractor shall ensure that during the installation, all fire alarm cabling, security cabling, data cabling and coaxial TV cabling etc. is suitably segregated to avoid interference or EMF between different circuits, 50mm parallel runs with 90° crossovers.

All TV installations must be connected to the building's main earth (MET) via a minimum of a 4mm² copper cable.

5.4.2 General

The mechanical extra fan for the bathroom and utility shall be connected to fan isolators situated as shown on the design drawing and connected to the lighting circuit for the room. Fan isolator shall be three pole PL/SL/N.

The installations within all areas where possible shall be completely flush with flush mounting accessories used throughout. Alternatively, slightly raised accessories maybe acceptable following client's approval.

CCU shall be MK Branded and be provided with the appropriate 'labels' on completion including details of the next inspection date and shall be signed by the installer/tester.

A minimum of two spare ways shall be incorporated in all distribution boards/consumer units for future extensions.

All TV installations shall be tested to ensure they are capable of receiving all terrestrial/digital channels.

5.5 Lighting

The Contractor shall provide a complete and functional lighting installation to suit all internal and external areas of the development. All lighting installations, equipment and accessories shall be designed for continuous operation at 230 volts, 50Hz.

The internal lighting has been designed and shall be installed to in accordance with the CIBSE Lighting Guide.

5.5.1 Lighting Schedule

The lighting installation shall be installed in the property as per the internal small power service drawings and include but not limited to the following schedule:

Entrance Porch:	1No. pendant light fitting and switches, 2-way switched between the front door, and first floor landing
Living Room	2No. pendant lighting fittings with switch
Dining Room:	1No. pendant lighting fittings with switch
Kitchen:	1No. 4 spot chrome track light on ceiling with 2-gang-2way switches
Cupboard:	1No. pendant lighting fittings with switch
Under stairs:	1No. pendant lighting fittings with switch
Rear Lobby:	1No. pendant lighting fittings with switch
Rear W/C:	1No. pendant lighting fittings with switch
Utility:	1No. pendant lighting fittings with switch
Store:	1No. pendant lighting fittings with switch
Landing:	1No. pendant light fitting, switched as with the hall (above)
Bedroom 1:	1No. pendant lighting fittings with switch
Bedroom 2:	1No. pendant lighting fittings with switch
Bedroom 3:	1No. pendant lighting fittings with switch
W/C:	1No. pendant lighting fittings with switch
Bathroom:	1No. 2D fitting, switched by rocker from inside door
External:	Low energy security light with PIR operation and daylight sensor. (2No. Philips Capricorn IR LED Wall Light –IP44 – PIR – 6W). Powered by own supply from CCU protected by 3

5.5.2 General

Wiring for lighting circuits shall be carried out using the 'looping in and out' system with not more than 3 cables being bunched at each terminal.

Light switches where possible shall be flush with rocker type switches set at 1100mm above finished floor level. Bathrooms and WCs, shower rooms, etc. shall have switches sited outside of the room. Two-way + 3-way light switching shall be used to landings and hallways or where a room has two or more access doors.

Security lighting shall be installed to the front and rear of the property switched by passive infrared detectors, subject to photoelectric cell.

5.6 Fire and Security

The property is to have heat and smoke detection with sounders fitted as shown on the design drawings.

5.6.1 Fire and Security Schedule

The fire and security installation shall be installed in the property as per the internal small power service drawings and include but not limited to the following schedule:

Hall:	1No. hard wired linked optical smoke Alarm – Kidde – 2SFW
Living Room:	1No. Hard wired carbon monoxide alarm – Kidde – 4MCO
Kitchen:	1No. Hard wired carbon monoxide alarm – Kidde – 4MCO 1No. hard wired linked heat alarm – Kidde – 3SFW
Landing:	1No. hard wired linked Ionisation smoke alarm – Kidde – 1SFW

5.6.2 General

Smoke / heat detectors in accordance with BS5446-7:1982 shall be provided in the property on each floor and shall be mains fed with battery backup and trickle charging facility. (*Batteries shall be sealed in, non-removable, lithium type with 10-year guarantee).

Detectors shall be inter-connected and sound simultaneously in the event of operation and shall be wired to a dedicated circuit on the consumer unit. Carbon Monoxide, Smoke and heat detectors are to be hard wired and installed as per the design drawings. Fire alarm equipment and installations must comply with BS 5839-6:2004.

SECTION 6. TESTING, COMMISSIONING AND DOCUMENTATION

On completion of all the Mechanical & Electrical services installations, the contractor shall in line with all relevant legislation and requirements carry out the inspecting, testing and commissioning of all services, providing all the necessary certificates and operation manuals.

6.1 Test Certificates

The contractor shall ensure the following tests and certificates are issued on completion:

- Boiler commissioning certificate
- LPG test & commissioning certificate
- HETAS installation / safety certificate
- PV installation & test certificate
- Gas Safe certificate for the gas installation / Landlords Gas Safe Certificate
- NICEIC Installation Test certificates
- Pipework pressure test certificates
- Pipework chlorination certificates
- Radiator balancing certificate
- Drainage pressure test certificate
- TV Aerial / SAT system commissioning certificate – test of the signal strength and making sure the aerial is earth bonded
- Fire / smoke alarm test certificate
- Air permeability test
- Energy Performance Certificate

Certificates to be completed in full including the design section, with both plot number and postal address indicated, ECA Certificates will also be accepted.

6.2 Record Drawings

Prior to the issue of the Practical Completion Certificate, a set of 'As Installed' drawings shall be issued the contractor for approval. These drawings shall be to a scale not less than the Contract Drawings, clearly showing the layout of the plant and services, etc., and marked 'As Installed'.

The Practical Completion Certificate will not be issued until these drawings are approved and relevant operational manuals have been provided.

When approved, the above drawings shall be supplied as one set on disc produced in CAD format and one in PDF.

APPENDIX A: DRAWING SCHEDULE

DRAWING NO.	DRAWING REF:	DRAWING TITLE
1	HBS-DR-M-(50)-001	Proposed Ground Floor Mechanical Services
2	HBS-DR-M-(50)-002	Proposed First Floor Mechanical Services
3	HBS-DR-E-(60)-003	Proposed Ground Floor Electrical Services
4	HBS-DR-E-(60)-004	Proposed First Floor Electrical Services
5	HBS-DR-E-(60)-005	Proposed roof PV layout
6	HBS-DR-M(50)-006	LPG Civil works sketch

APPENDIX B: LOG BURNER QUOTATION

**Hamson
Barron
Smith**

Hayworthe House
Market Place
Haywards Heath
West Sussex
RH16 1DB