Wedmore Village Hall

Heat Decarbonisation Site Report

An energy and decarbonisation survey of Wedmore Village Hall was undertaken by E3 Sustainability Ltd. on the 10th of March 2025 to offer advice on how the building can be more energy efficient, provide a sustainable and comfortable environment, and move towards net zero carbon.

Energy and Carbon Savings Summary

Wedmore Village Hall has a number of ways in which it can be more energy efficient and a clear path towards net zero carbon. Our key recommendations have been summarised in the table below and are described in more detail later in this report. It is recommended that this table and the route to net zero carbon diagram below are used as the action plan for the building in implementing these recommendations over the coming years.

Savings Recommendations	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	% Energy Reduction	Estimated Capital Cost	Simple Payback (years)	CO_2 saving (kgs of CO_2e/year)
Contact suppliers to arrange for the meters to be changed to smart meters	Helps monitor use and savings	None	N/A	Nil	N/A	N/A
Install SavaWatt devices on fridges and freezers	560	£148	1.85%	£220	1.5	126.2
Change existing lighting for low energy lamps/fittings	872	£230	2.88%	£4,274	18.6	196.4
Install PIR motion sensors on selected lighting circuits	23	£6	0.08%	£198	32.1	5.3
Top up roof insulation from 100mm to 270mm	517	£42	1.71%	£1,531	36.1	94.5
Adjust settings on existing PIRs	49	£13	0.16%	£550	42.5	11.1
Install local electric point of use hot water heaters near to taps to decarbonised hot water heating	3,585	£78	11.85%	£4,620	N/A	678.0
Install an Air-to-Air Source Heat Pump to replace the existing heating	12,450	£375	41.15%	£26,235	N/A	2,126.1

system served from the Main Boiler Room						
Move to Electric / Induction Kitchen Appliances	None (Fuel Switch)	-£553	0.00%	£18,700	N/A	-129.1
Replace single glazed and poor thermal quality doors for double glazed units	350	£29	1.16%	£3,025	N/A	64.0
Add secondary glazing to windows	1,120	£92	3.70%	£33,104	N/A	204.8
Allowance for Main Contractors OHP (12%)				£11,095		
Allowance for Project Management and Design (8%)				£7,397		
Contingency (10%)				£11,095		
TOTAL	19,525	£459	64.53%	£122,043	265.67	3,377.23
Savings from gas standing charges once hall achieves Net Zero and removes gas meter	N/A	£641	N/A	Potential £400 charge for meter removal	N/A	Part of above

The above costs exclude and VAT.

Figures in the table are based on current contracted prices of 25.618p/kWh (blended) for electricity and 7.64p/kWh for mains gas respectively. The carbon figures are based on the DEFRA 2023 carbon emission factors of 0.22499 for electricity and 0.18 for gas. Do note that as energy prices vary, payback periods will also vary.

The VAT rules have recently changed in respect of energy saving measures for charitable buildings used for non-business purposes. The full details are contained in VAT Notice 708/6 (https://www.gov.uk/guidance/vat-on-energy-saving-materials-and-heating-equipment-notice-7086) This essentially advises that contractors should zero rate VAT for certain energy savings measures installed before April 2027 (after which time the VAT should be charged at 5%). These measures include: Controls for heating and hot water systems, draught proofing, insulation, solar PV panels (including batteries and smart divertors), air source and ground source heat pumps (including air to air systems). This is when these measures are both supplied and installed (it does not apply to the purchase of the materials only without installation).

Our review has found that the energy usage could be reduced by 65% saving £459 and 3,377 kgs of emissions per year. Many of the measures have quick paybacks and therefore saving energy and responding to the climate crisis is also good business.

Outline of Current Position

An energy survey of Wedmore Village Hall, Cheddar Rd, Wedmore BS28 4EQ, was completed on the 10th of March 2025 by David Legge. David is an experienced energy auditor with over 10 years' experience in sustainability and energy matters in the built environment. David is a fully qualified ESOS lead assessor with CIBSE and a CIBSE Low Carbon Consultant and a fully qualified ISO50001 lead auditor.

The building is a village hall, located on the northern outskirts of Wedmore village in a rural location. The original building comprises the main village hall and stage which was constructed in 1882 with a new extension in 1983 which added the small hall, WCs, catering kitchen and servery. The building is used sporadically throughout the week for between 2 and 3 hours at a time and there are also periodic activities including the theatre and opera groups throughout the year. Heating is provided by 2no.Worceter gas fired boilers to cast iron column and steel K2 panel radiators throughout the building. Hot water is provided by a dedicated direct gas fired boiler to the kitchen sinks and all wash hand basins. There is both incoming mains gas and three phase electricity supplied to the site.

The lighting is mixed with 91% of the fittings being LED and others being relatively inefficient PLL fluorescent fittings at high level. The building has the usual array of kitchen appliances and other plug-in loads, but these were noted to be used efficiently and not left on.

The walls of the main building appear to be of solid stone construction with Bath stone dressings with no signs of insulation being retrofitted into them. There are mainly pitched tiled roofs to the original building and flat roofs to the extension. There are single glazed metal framed windows throughout the original building, with uPVC double glazed units to the extension.

There is currently an existing roof mounted solar PV array providing on site electrical generation.

In recent years there have been energy saving works undertaken that comprise of retrofit LED lighting to most areas.

Energy Usage Details

Wedmore Village Hall uses 4,445 kWh/year of electricity per year, and 25,812 kWh/year of gas. The total carbon emissions associated with this energy use are 5.72 tonnes of CO_2e, contributing to the current climate crisis.

This data has been taken from the annual energy invoices provided by the suppliers of the site and summarised on email by the hall.

The energy meters on the site are as detailed below:

Utility	Meter Serial	Type	Pulsed output	Location
Electricity	24M0194275	3 phase 100A	Full AMR Connected	Kitchen
Gas	E016 K07974 19D6	BK-G10E	Pulse Block but no AMR	Hall

It is recommended that the client consider asking their suppliers to install smart meters so that the usage can be monitored more closely, and the patterns of usage reviewed against the times the building is used.

Lighting

The lighting around the building consists mostly of LED lighting, however there are several PLL fittings that are remaining. It is recommended that all this lighting be replaced with new LED units.

Recommendation: Change all the remaining fluorescent lighting to LED.

Most of the lighting has no lighting control and is switched on and off using a simple light switch. There are several lights which currently remain on all the time in areas such as the lobby, corridors, and the like. Some of these areas are only used occasionally and for a short amount of time and as such, the light does not need to remain on constantly. There are also spaces which benefit from a good amount of natural daylight coming in through the windows where artificial lighting is not required for much of the year during the day.

It is recommended that a motion sensor is installed on these specific lighting circuits so that the lights come on only when movement is detected in the space and turn off approximately two to five minutes after the last movement has been detected (note that the duration of the time lag after which the light goes off needs to be considered alongside the type of light that is fitted. LED lights are much more suited to being switched off after only a short duration than some fluorescent lights). These movement sensors (commonly called PIRs) also have light sensors integrated into them so they can be used to make sure that the light does not come on if there is already sufficient daylight in the space.

Recommendation: Install PIR motion sensors on selected lighting circuits.

Several of the lighting circuits within the building already have motion / daylight sensors installed on them. However, it was noted during the audit that these sensors are not currently set up to work to their full potential.

It is recommended that the existing lighting sensors installed within the building are reviewed and optimised so that the time lag before they turn off the lights, and the light level at which they allow the artificial light to be turned on is adjusted so that it is suitable for the space. Depending on the type of light fitting installed it is normally recommended that areas such as storerooms and cleaners' cupboards switch off after just 1 minute, corridors and stair lobbies after 2 minutes and WCs after 5 minutes. Generally lighting levels should be around 300lux but it is highly dependent on the use of the space.

The careful optimisation of the existing lighting controls can be undertaken without any disruption to the use of the building, and we would be happy to support you with implementing this.

Recommendation: Install PIR motion sensors on selected lighting circuits.

SavaWatt

Across the site there are various domestic refrigeration units such as fridges within the kitchens. These units run 24/7 and contribute to the baseload electrical consumption of the building.

To reduce the electrical consumption of these appliances it is recommended that they are all fitted with a SavaControl unit. These units work by automatically detecting the load of the compressor and turning down the power when it is not in full load. This reduces the energy consumption of the refrigeration unit by around 18% while maintaining the cooling of the appliance. It does this by reducing the voltage delivered to the unit when it is idling but allowing the full energy to the unit when it is required.

The installation does not cause any significant disruption to operations and can be undertaken during normal operating times.

Recommendation: Install SavaWatt SavaControl units on to all refrigeration devices.

Kitchen

The procurement of replacement and new equipment offers an opportunity to improve the energy efficiency and it is recommended that the following is considered at the time of replacement:

Buy induction hobs or ranges and hot plates which only provide heat when a pan is placed on top of them. Such specifications are now becoming more common in top professional kitchens. (i.e. Dinner by Heston Blumenthal at the London's Mandarin Oriental and Glynn Purnell's Michelin-starred restaurant in Birmingham) (https://www.thecaterer.com/articles/343115/induction-10-years-on)

Review the annual energy consumption of all new units, including refrigeration units which remain on all the time. As an example, the Gram Superior Plus K72 uses around half the energy when compared to similar models from other manufacturers such as Foster over the course of a year https://www.eco-catering-equipment.co.uk/gram-superior-plus-k72-single-door-upright-refrigerator-cabinet-2-10c/

Locate ovens and chillers away from each other to avoid heating and cooling conflicts within the area.

Recommendation: Move to Electric / Induction Kitchen Appliances.

Building Insulation

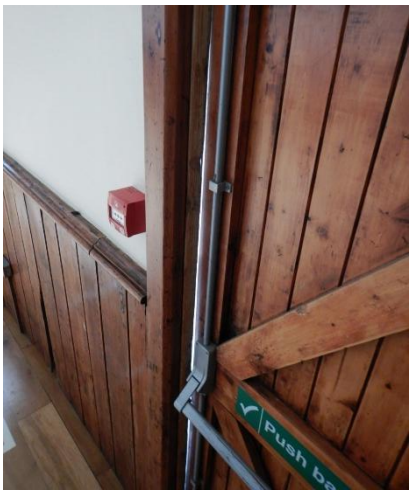
The loft void above the ceiling was inspected as part of this audit and found to have little insulation present. In all cases where there is 100mm or less of insulation within accessible roof spaces it is recommended that insulation be added to prevent heat loss and create a more comfortable environment for the occupants of the building.

Because heat rises, the ceiling/roof of a building is the largest contributing area to heat loss from a building. The insulation of such spaces can therefore have a dramatic impact on both the efficiency of the heating system and the temperature of the space below. Insulation measures such as this also need to be combined with control measures such as TRV's or room sensors to ensure that the space does not overheat because of the additional insulation.

A free survey and quotation for the supply and installation of insulation to the loft spaces can be arranged through ESOS Energy Ltd (contact Adrian Newton 0117 930 9689, adrian@esos-energy.com).

Recommendation: Top up roof insulation from 100mm to 270mm.

Windows and Doors



The fire doors were inspected as part of the audit and found to have poor thermal qualities both in terms of their construction and their sealing to the surrounding frame.

The introduction of new double glazed units would considerably reduce the heat loss from the building and improve thermal comfort. The use of a high quality doors will also reduce external noise transfer and provide added security.

It is recommended that these doors are replaced with modern, thermally efficient, and well-sealed units. Any glazing panel should be double glazed, and the door should be well sealed to its surround so that there are no draughts. It is suggested that any door installation is undertaken by a FENSA Approved Installer www.fensa.org.uk

Recommendation: Replace single glazed and poor thermal quality doors for double glazed units.

The windows of the hall building are singled glazed with metal frames and whilst double glazing could be installed, it is not considered that this is viable with the building in a conservation area.

The introduction of secondary glazing would considerably reduce the heat loss through the existing windows and improve both thermal comfort and noise levels as well as providing added security.

Any possible installation would need to be carefully specified, and companies such as https://www.selectaglaze.co.uk/heritage-listed-buildings can provide very discrete and appropriate systems for all types of spaces.

Recommendation: Add secondary glazing to windows.

Existing Electrical Capacity available for Decarbonised Heat Provision

The site currently has one main electricity incomer which is a 100amp 3 phase supply located in the mains electrical intake cupboard. The maximum available capacity for the site is 69kVA and the maximum demand is not recorded by the meter.

Therefore, there appears to be sufficient available electrical capacity on the site at present to support future heat decarbonisation. Increases in supply capacity can be reviewed and quoted for by the local electricity District Network Operator (DNO) in the area.

The DNO in your area is thought to be National Grid (formerly Western Power Distribution) - www.nationalgrid.co.uk; 0800 0963080 (East Midlands, West Midlands, South Wales & South West England)

Hot Water Decarbonisation

The building is currently provided with hot water from a dedicated direct gas fired boiler located in the main kitchen providing hot water to all kitchen and WC sinks.

A decarbonised and more efficient method of generating hot water would be to remove the dedicated gas boiler and to have small, local electric point of use hot water heaters installed within each WC and kitchen area. Units such as https://www.zipwater.co.uk/shop/hot-water/zip-inline-instantaneous-hot-water-heater-6kw-es6 heat the hot water only when the tap is turned on and does not have any stored hot water element and are very suitable for individual sinks or units such as https://www.ariston.com/en-uk/products/electric-gas-water-heaters/electric-storage-water-heaters/andris-lux-eco have a small water storage element and are better for multiple sinks with one unit possibly serving back to back male and female sinks. As such it is very energy efficient, and it only ever heats the hot water that is required. It has additional advantages that it is 'always on' so does not require to have timings reset for ad hoc uses and as it does not have any stored water element it represents the lowest possible legionella risk profile. Installing electric hot water units will remove the need for the gas boiler and associated pumps to have to operate outside of the heating season and will assist in the transition to net zero carbon as the hot water is no longer served by burning of fossil fuels on site.

The installation of electric point of use hot water units and the removal of the gas hot water system can be undertaken by any competent mechanical engineer.

Location	Number of PoUs required if not centralised
Bar	1
Main kitchen	1
WCs	1
TOTAL	3

Recommendation: Remove the gas fired hot water system and replace with electric point of use hot water heaters throughout the building

Heat Decarbonisation

The building is currently heated from 2no. Worcester gas boilers which provide hot water into the heating system. The use of fossil fuels for heating means that it will not be possible for the building to become zero carbon without changing the heating system. A boiler also has heat and other efficiency losses within it, which means that the efficiency of a boiler in converting the gas into the heat is typically around 80 to 95% (depending on the age and type of boiler).

Boilers	Main Boiler Room
Heating Fuel	Gas
Make	Worcester
Model	Greenstar 30CDi Conventional
Type	Condensing
Year of install	2008
Expected life cycle	5 years
Number of Boilers	2

Total Output (kW)	60

The existing boilers are approaching the end of their serviceable life, and it is therefore recommended that the replacement of the existing boilers for air source heat pumps is considered.

The various options for a decarbonised heating solution have been reviewed in the table below.

Decarbonisation Heating Solution	Viable
Air-to-Water Source Heat Pump	No – unsuited to current heating pipework and heat emitters and use of building
Air-to-Air Source Heat Pump	Yes – preferred heating arrangement
Water Source Heat Pump	No – no water source locally
Ground Source Heat Pump	No – significant capital cost, does not suit use of building
Electric Panel Heaters (to provide supplemental heating only)	No – not required
Over Door Air Heater (to provide supplemental warmth at the door)	No – not required
Overhead Infra-Red Heaters	Yes – to servery only. Visual intrusion to the hall, higher running costs than AASHP, poorer thermal comfort than AASHP
Heated Chair Cushions	No – other solutions preferred

There is a reported leak in the heating system within the extension block which requires attention and currently no heat is provided to the servery area. The desired pathway is to move away from the existing wet heating system to a more flexible system where localised areas can be heated and therefore funding remedial works to the existing system is not recommended but instead the servery may be better served by 2no. overhead far infrared panel heaters to provide localised heat to this space.

Within the small and main halls, the recommendation is therefore that the village hall consider installing an air to air source heat pump to the hall as the preferred heating solution. Further details about these recommendations are given below.

Air source heat pumps use electricity to power the heat pump which takes heat from the air and puts this into water which can then go into the heating system. An air to water heat pump can create around 3 units of heat for every one unit of electricity whereas an air to air heat pump can provide higher efficiencies, creating around 5 units of heat for every one unit of electrical input.

A new air to air source heat pump (essentially an air conditioning system run in heating mode) is currently considered to be the most appropriate form for decarbonised heating for building. The external units for this could be located adjacent to the extension building within the car park at the NW corner of the site. An air to air system would require a new internal fan units to be installed but this would be considered to be easier and more robust than upgrading the wet heating system and also provides the capability to be used for cooling in summer. The existing electricity capacity supplied to the site should be sufficient for this type of heat pump.

Good local renewable companies can be contacted for further detailed assessment of heat pumps and quotes. To enable a high quality funding application for such measures some design development work should be considered to be undertaken to work up an accurate heat loss model for the building, size and specify the internal and external units and to make initial contact with the DNO and planners over any requirements for additional power and/or planning permission.

There are currently government incentives available for installing air to water heat pumps, but these are subject to future change and adaption so should be reviewed at the time of implementation.

Air-to-Air Source Heat Pumps

Air-to-Air Source Heat Pumps (AASHP) work by having an external unit which sucks air in and extracts the heat from it. The pumps concentrate this heat and put it into a refrigeration gas (in the same way as a fridge or freezer works). This refrigeration gas is then piped inside the building in a small pipe where is it then allowed to expand in an internal unit with a fan. This heat is then blown out into the space. This system is identical to an air conditioning system, but it works in reverse to heat the space. As warm air is blown into the space this type of system can heat spaces from cold relatively quickly. AASHPs provide around 4.5 units of heat for every 1 unit of electricity used in the heat pump; they therefore have a Coefficient of Performance (CoP) of up to 4.5.

The Centre for Sustainable Energy model[1] can be used to estimate heat load for the building.
Heat Load (kW) = Volume V (m^3) x Insulation Factor

Insulation Factors

Condition	Factor kW/m^3
Poorly insulated with open or broken windows, draughty doors (add 5%)	0.034
Poorly insulated (assume no interventions)	0.033
Some insulating features	Estimate value
Well insulated	0.022
Insulated to 2010 regulations	0.013

Area	Volume m^3	Insulation Factor kW/m^3	Heat Required (Space heating) kW
Village Hall	2,036	0.026	52.93

Therefore, a heat pump of 53 kW would be required.

AASHPs require the installation of external units which look like air conditioning modules in well-ventilated external locations. These external units will need an electricity supply and pipework running from them to the heating system. They will also need a drain nearby as the back of the units can build up moisture, which condenses and sometimes freezes on the coils. The larger units do create some low-level noise and therefore the location and baffling of the units may need to be considered carefully.

Examples of external units for AASHP comprising of three smaller 3kW units and two larger 10kW units.

Internal units come in a variety of styles as illustrated below.

[1] www.cse.org.uk/local-energy/download/estimating-the-heat-demand-of-a-hypothetical-community-building-79

FUA-A - Under ceiling cassette air conditioning unit

Unique under ceiling cassettes for high rooms with solid ceilings or false ceilings with a shallow void. Suitable for all types of commercial applications.

The FUA-A range provides comfortable heating and cooling even for rooms with high ceilings and has individual louvre control flexibility to suit every room layout.

FTXM-R - Wall mount air conditioning unit

Attractive, wall mounted design with perfect indoor air quality. 2 area motion detection sensor: air flow is sent to a zone other than where the person is located at that moment; if no people are detected, the unit will automatically switch over to the energy-efficient setting.

FVXM - Floor Mount Air Conditioning Unit

Designed to fit rooms of any size and shape, it blends well with the interior due to the new design which incorporates more flowing lines and softer edges. These units are ideal when it is not possible to fit a high level wall mount unit for aesthetic or practical reasons.

They are suitable for a wide range of applications including domestic, small to medium offices and commercial uses.

All these units do have a fan element within them and therefore a small amount of fan noise is emitted. This tends to be less than a fan convector heater on a boiler-based system and similar to the noise from a fridge or freezer. Air conditioning units are commonplace in hotel rooms, indicating that the noise is low enough even to be suitable for sleeping environments.

Overhead Infrared Heaters

In smaller areas which may not be suitable for an air conditioning cassette, an option for heating the people is to use overhead infrared heaters. These come in a variety of forms from the traditional models that emit a visible red-light glow, to ceramic units and the more modern 'black heat' units which emit no visible light. In most cases the distance from the heater to the people being heated needs to be no more than around 2.5 to 3m, although this varies slightly between heater types (therefore a mounting height of between 3m to 4m is typical). Units mounted outside of their heating range are likely to give poor performance.

This form of heating provides heat from above and can leave lower limbs and feet feeling cold; therefore, some people find this form of heating less comfortable, especially for longer periods of time. Comfort perceptions tend to improve in spaces where people are standing and more able to move around but reduce in areas where they are sitting in a fixed position for more than around 30 minutes. Some of these units can also have extremely high surface temperatures, and care should be taken not to mount them directly next to historic timbers or fabric that may be impacted by high heat levels.

In this building it is recommended that an overhead radiant heater in a panel/ceiling tile format could

provide a useful heating solution to the servery area.

Recommendation: Consider replacing the existing boilers with an Air-to-Air Source Heat Pump with new internal fan units.

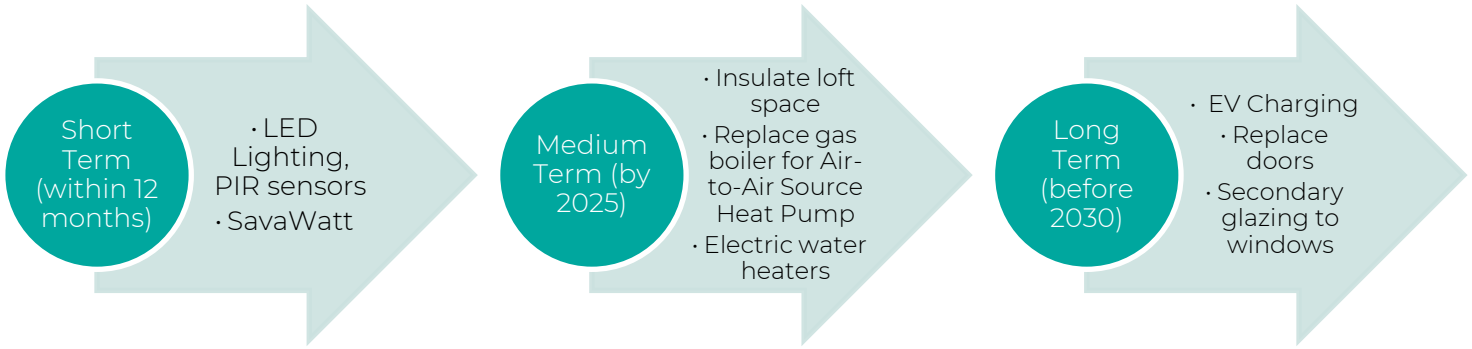
Electric Vehicle Charging

There is a parking area located to the side of the building. In order to facilitate sustainable transport choices, it is recommended that an electric vehicle charging point is fitted. This would enable any staff and visitors that have an electric car to be able to charge while at the building and it would also facilitate staff and other visitors to transition to electric vehicles over time.

Installing a unit such as a Rolec Securi-Charge would allow the organisation control over who is allowed to use the unit with simple mobile phone operated system. Or given the type of use of the building and control over the usage of the car park as a whole a simple 32 amp type 2 wall pod type charger without the need for a key may be most suitable. These are widely available through many suppliers such as http://www.rolecserv.com/ev-charging/product/EV-Charging-Points-For-The-Home. As the building is a place of work installation grants are available through the work place charging scheme https://www.gov.uk/government/publications/workplace-charging-scheme-guidance-for-applicants-installers-and-manufacturers which will fund 75% of the installation cost up to £500.

Recommendation: Consider installing EV charging points.

The decarbonisation plan for this building therefore comprises:



Next Steps

In order to be able to present the best possible project for future potential funding rounds it is recommended full market supply and installation quotations are obtained for:

An electrical package combining LED Lighting, PIR, SavaWatt, and EV Chargers.
An insulation package combining loft insulation.
Secondary glazing for windows and replacement doors
Electric point of use water heaters.

The design of a potential air source heat solution should also be developed to include creating an accurate heat loss model for the building, sizing and specifying the internal and external units and making relevant contact with the DNO and planners.

Appendix 1 – Lighting Replacement Schedule

Location	Existing Type	No of fittings	Recommended Upgrade	Saving (£)	Total Cost	Payback (years)
Main hall	PLL	7	600 x 600 32W HO Panel (AG)	£230	£2,798	12.16

Note: the costs in the table above are for the supply and installation of the number of light fittings in that space. They do not include wider project costs such as management, access equipment and the like which is included in the costs in the main table of this report.

Appendix 2 – Secondary Glazing to Window Schedule

Location	Height (m)	Width (m)	Number	Area
Main hall	2.24	1.47	4	13.1712
End window	3.55	3	1	10.65
Stage sides	3.5	2.83	2	19.81
Stage rear	2.22	1.47	2	6.5268
Main hall	2.24	1.47	4	13.1712
End window	3.55	3	1	10.65
TOTAL			9	50.158

NB: Window replacement costs have been priced on an average installed cost of £550/m^2