Planning Support Document

Proposed Works

To accompany the Listed Building Application for the and upgrading/improvement works to Brookside House

Hurstbourne Tarrant
Hants
SP11 0AE

Date 19th December 2023 Rev J

Brookside House lies within The Hurstbourne Tarrant and Ibthorpe Conservation Area which was originally designated on 8th September 1976 in recognition of its special architectural and historic interest.

Brookside House is a Grade II listed building (1303225), listed in 1987.

'House. Early C19. Brick and slate. Symmetrical front (south-west) of 2 storeys 3 windows. Low-pitched hipped roof with a wide eaves. Red brickwork in Flemish bond with blue headers Dutch flat arches stone cills, Sashes in reveals. C20 brick porch with parapet and flat roof. C20 single-storeyed wing set back at the south-east side. Included for group value.'

Proposed Works

<u>New single storey extension</u>

Built in the late 1970's, this extension is of modern cavity wall construction, with trussed rafters.

The existing has been used as the kitchen and a home office. The extension also incorporates a ground floor W/C, and lobby area.

The proposed works include the re-configuration of the internal walls, and the blocking up of the external door entrance. The area in provide a new kitchen, and W/C.

The existing windows to this section, which are modern softwood stormproof timber casement windows will be removed and replace with slimline powder coated aluminium casement windows.

The existing window referenced GW4 will be replaced with a set of slimline powder coated slimline aluminium casement doors referenced GD13.

<u>Outbuilding</u>

To the South Side of the property, to the South East side of the single storey element, there is currently an old timber framed structure that is roofed and clad with corrugated galvanised metal sheeting. It is back by a brick and flint wall, that forms the boundary. The roof of the structure is in a very bad structural state, and is currently being propped to prevent total collapse.

The structure itself will be removed, leaving the boundary wall at the rear in position. Pictures of this structure have been included within Appendix A.

<u>Main House</u>

The proposal described in the accompanying drawings and details is to undertake alteration and repair works to modernise and insulate the house for comfortable C21st family accommodation.

Historic England has provided much information, guidance and recommendations in respect of draught proofing suspended ground floor timber floors. Suspended timber floors have gaps between floorboards that allow draughts through.

A thorough understanding of a building and its context will ensure improvements are suitable, proportionate, timely, well-integrated, effective, and manage the risks of unintended consequences. A whole building approach can identify balanced solutions that save energy, sustain heritage significance, and maintain a comfortable and healthy indoor environment.

Building repair and maintenance, reducing infiltration losses, improving efficiency of building services and ensuring their effective use, are lowest cost and lowest risk place to begin increasing energy efficiency in historic buildings. Many actions, often considered outside the scope of 'retrofit' projects, can be taken ahead of fabric improvements to provide significant energy and carbon-reduction potential (Wise, 2022). Maintenance, periodic renewal, and conservation-focused refurbishment have the potential to save between 30 and 50% of carbon emissions, and along with this, up to 40% savings in energy consumption (Ritson, 2020).

Where thermal upgrades are feasible and appropriate (considering need, material compatibility, moisture risk, climate hazards), primary focus should be ensuring thermal continuity to avoid creation of thermal bridges. Targeting upgrades to instances that provide the maximum relative thermal improvement, while not undermining resilience, will be most effective and cost efficient. For example, upgrading thin brick structures will be more beneficial in relative terms than upgrading mass solid walls. Mass solid wall buildings also have a great propensity to buffer fluctuations and extremes in temperature, humidity, and weather events.

The proposals are to improve the thermal performance of floors by adding insulation. The majority of older buildings have either a suspended timber floor or a solid floor which might have a finish such as tiling or stone. Often these types of floor are used in different parts of the same building.

Suspended timber floors can be a significant source of heat loss particularly if there are gaps between floorboards allowing draughts.

Draughts between boards can be removed relatively easily by filling gaps. Adding insulation can be more difficult as invariably this involves taking up most of the boards to access the void below. Many older floors can be easily damaged so great care needs to be taken when removing and replacing boards.

The ground below a suspended timber ground floor can often be damp so the timber is protected by being physically separated from the sources of this moisture. In later Victorian and 20th century buildings the ground may have been covered over with a concrete slab or screed. This was usually to control the ingress of pests and vermin and is rarely any impediment to ground moisture.

The timber is further protected from the moisture below by the ventilation of the sub-floor void, normally via airbricks set in the perimeter walls. Cross-ventilation of the space is necessary to prevent any air stagnation. This ventilation keeps the relative humidity here low and the timber structure in sound condition, but it is also a significant source of heat loss from rooms above, particularly if the boarding is butt-jointed with open gaps.

The wall plates onto which the timber joists are set will also need to be protected from rising damp and this is normally achieved with damp proof courses of slate or bitumen. However, in earlier construction these may not be present, in which case the only protection on offer is that of the ventilation keeping the timber as dry as possible by carrying moisture away from permeable construction below.

Most traditional buildings are made of permeable materials and do not incorporate the barriers to external moisture such as cavities, rain-screens, damp-proof courses, vapour barriers and membranes which are standard in modern construction. As a result, the permeable fabric in historic structures tends to absorb more moisture, which is then released by internal and external evaporation. When traditional buildings are working as they were designed to, the evaporation will keep dampness levels in the building fabric below the levels at which decay can start to develop. This is often referred to as a 'breathing' building.

If properly maintained a 'breathing' building has definite advantages over a modern impermeable building. Permeable materials such as lime and/or earth based mortars, renders, plasters and limewash act as a buffer for environmental moisture, absorbing it from the air when humidity is high, and releasing it when the air is dry. Modern construction relies on mechanical extraction to remove water vapour formed by the activities of occupants.

As traditional buildings need to 'breathe', the use of vapour barriers and many materials commonly found in modern buildings must be avoided when making improvements to energy efficiency, as these materials can trap and hold moisture and create problems for the building. The use of any modern materials needs to be based upon an informed analysis where the implications of their inclusion and the risk of problems are fully understood. It is also important that buildings are well maintained, otherwise improvements made in energy efficiency will be cancelled out by the problems associated with water ingress and/or excessive draughts.

Before lifting any floorboards, it is important to establish the structural performance of the floor, the type of floorboards, the number of layers and the method of fixing. All these factors will guide the approach that can be adopted.

As the lifting of floorboards can cause unavoidable damage, especially with secret nailed boards, many higher status floors which are historically significant should be left in place if at all possible. In such cases insulation can only be added from beneath where access is available, such as in cellars or where there are voids and access hatches. If no alternative access is possible it may be preferable to leave these floors un-insulated. It is noted here that the floor boards in this particular instance have been fixed through the face using traditional cut nails.

Boards which are unusually wide are often older and historically significant, and may not have been disturbed before. Wide floorboards can be particularly difficult to lever up in one piece without splitting, so lifting them is to be either avoided or carried out with the utmost care. Boards like this should only be lifted by a careful and particularly skilled carpenter or joiner. They should, wherever possible, be subsequently replaced in their original positions. It is noted that the floor boards in the existing hallway are wider than the rest in the property, and therefore must be lifted appropriately.

It is also noted that much debris has accumulated between the timber floor joists particular in the rooms closet to the front driveway, thus preventing the most basic of underfloor ventilation. All this this debris must be removed to allow for at least 150mm of clear ventilation space.

To reduce avoidable and unnecessary damage:

- Ascertain the historical significance of the floor and the original fixing method
- Identify and label all floorboards individually before any works start

- Draw a plan showing the positions of all the boards
- Lift the floorboards carefully, using an appropriate method for their size, age and fixing method
- Make sure that all lifted boards are stored safely in an area with appropriate environmental conditions
- Provide protection to the exposed areas to prevent people or tools from falling through and causing injury or damaging historic ceilings and finishes
- Provide safe work and storage areas with temporary boarding.

Use the opportunity offered by the removal of the floorboards to inspect the floor structure and carry out any necessary repairs.

- Retain any significant features, for example early examples of sound insulation or fire protection, but remove any loose debris within the floor structure, particularly if it is flammable
- Where the floor structure has been weakened by the inappropriate cutting of holes and notching for central heating or other service pipes, the floor will require strengthening
- Sloping or springy floors may be due to either the failure of the supporting structure or to movement caused by a defective timber. When considering the type of repair or strengthening required aim for maximum retention of historic fabric with simple carpentry techniques
- Where defects are found in the timber floor joists, beams or wall plates, make sure the cause of the defect is found so the correct remedial repairs are carried out
- Ensure as far as possible that any new timber used for the repair of wall plates or other locations in contact with masonry below or without a damp proof course are separated from sources of moisture with a suitable local barrier, such as building paper

As the health and durability of suspended timber structures often depend on the ventilation to the void below, it is important to ensure that this is effective and unobstructed. Air bricks and other vents are often easily obstructed by raised external ground levels, and these should be carefully reduced to restore full cross flow. The addition of new airbricks or vents may be required if a more serious blockage, such as a house extension, has obstructed the ventilation paths. It has been noted that the existing air bricks do not provide the required ventilation that would be expected and that is required for suspended timber floors. This problem has been exacerbated by the solid floor of the solid concrete floor of the modern 1970's side extension.

Suspended ground floors were occasionally constructed without ventilation paths below. If the timbers and support walls are relatively dry then this will indicate that conditions are stable and careful thought must be given to what effect adding insulation will have. In some cases stable conditions have been helped by ventilation through board gaps to the room above. Under these circumstances the addition of insulation may significantly obstruct this ventilation, and the addition of new ventilation paths below the floor may therefore be necessary.

Given the depth of the existing ventilation void, such installation of insulation proposed will not restrict the ventilation required.

To minimise future disruption and consequent damage, it is good practice when relaying the floorboards to provide access covers into the under-floor void for inspection, maintenance and upgrading. These access covers should be screw fixed or latched for ease of access, and in insulated floors should also be insulated and draught-sealed to prevent a thermal bridge and draughts.

As the existing boards are face fixed, and are square edged, the boards can easily be removed for maintenance.

Many floor voids are used for the routing of services, water and heating pipes and electrical cables, which lie in notches in the floor joists or are clipped to the joists. These may have to be relocated in order to provide suitable space for added insulation. It is not advisable to run services in floor voids unless there is access to the void to inspect them.

The following issues need to be considered:

- Water pipes at ground level below floor insulation can easily be damaged by frost. Lag any cold water supply pipes passing through a ventilated sub-floor whatever the distance from the external wall. The recommended insulation thickness, using an insulant with a thermal conductivity of 0.035 W/mK, is 25mm thickness for 15 mm diameter pipes and 19mm thickness for 22 to 28 mm pipes

- Lag any central heating pipes within the floor structure to prevent wastage of heat.

- Electricity cables give off heat when in use and may overheat where they are covered by thermal insulation, increasing the risk of short circuit and fire. This risk is further increased by the presence of combustible loose fill and/or plastic insulation. To reduce the possibility of the electricity cables overheating, before installing insulation to any suspended floor consider re-wiring to move the. If cables must be run within insulation they can be replaced with higher capacity cables which will generate less heat from the same current

- When cables pass through thermal insulation, they should be routed at right angles so that the cables are in contact with the smallest possible amount of thermal insulation to minimise the heating effect of the thermal insulation on the cable Whenever cables or pipes pass through the air-tightness barrier (see below) the hole created should be sealed carefully around the cable or pipe

Relaying the old boards

Best practice in historic buildings is to conserve the old floor boards and patch repair them locally as necessary. Floorboards should only be replaced where repair is impossible. Replacement timber should match the existing timber both in species and in manner of conversion, which will allow the quality and grain also to match.

Considerable care may need to be taken when relaying old floorboards. Boards should generally be re-fixed in their original positions with nails, taking great care not to puncture underlying cables or pipe-work. However, in certain situations such as over a decorative plaster ceiling, a valuable ceiling painting, or a lath and plaster ceiling where the plaster key is suspect and might be disturbed by the vibration from nailing above, it is advisable to use screws instead. Brass screws are often preferred, and can be lightly greased before fitting to aid later removal for maintenance. Where a board is likely to be frequently lifted and re-laid, use brass cups to protect the board from damage caused by the screw head.

Installing Insulation and Draughtproofing.

The thermal performance of suspended floors can be very significantly upgraded by insulating and/or by draught-proofing. Installation of insulation reduces the heat loss through the floor and eliminates draughts from the unheated and ventilated void below.

The choice of insulation and/or draught-proofing measures will be determined by whether the floorboards can be lifted without damage, whether access is available to the void beneath the floor, and whether other works are being undertaken at the same time. The insulation of suspended floors in a building can usually be installed on a room by room basis whenever the opportunity arises.

Draughts in buildings are particularly wasteful of energy because they not only allow heated air to escape, but also make the occupants of the building feel cold. Occupants of draughty buildings often turn up thermostats to compensate for this discomfort, which wastes even more energy, and the problem can grow into a vicious circle.

The insulation should be cut carefully to fully fit the space between the joists to form a tight fit. Any gaps between the joists and the insulation should be kept to a minimum as breaks in the insulation layer will allow air movement, heat loss, and will encourage local condensation.

Most suitable types of insulation can be installed by pushing semi-rigid, compressible batts up between the joists, allowing their natural resilience to hold them in place. Care needs to be taken not to compress the insulation too tightly, as the air between the fibres is important to provide the actual insulating properties. Where there are damp walls immediately adjacent, the insulation should be separated from them with building paper. The installation of a continuous membrane with low vapour resistance below the joists will also help to prevent the insulation batts from slipping.

The insulation shall be installed from above the floor, and shall be supported between the floor joists and an air and vapour control layer is laid over the insulation below the floorboards. This should be fully supported and therefore used in conjunction with rigid insulation. The insulation can be supported by netting, a breather membrane or proprietary fixings depending on the type of insulation material being used. If there is any sign of dampness in the sub-floor area then it would be advisable to consider a vapour permeable insulation material.

Installing the insulation from above situation is most frequently found in historic and traditional buildings, particularly where the boards can be lifted without unacceptable levels of damage. If boards are to be lifted for any other reason it would normally be appropriate to take the opportunity to install insulation at the same time. Suitable materials are semi-rigid batts, boards or loose fill cellulose.

Although it is possible to simply install insulation batts between the joists from above by friction fit, the most reliable installations will include some form of restraint to prevent the insulation slipping down over time. In its simplest form this may be achieved by stapling light plastic mesh or netting below or at the bottom of the joists, or even hanging it over the joist tops. If a more expensive breather membrane is used instead this can enhance the performance of the insulation by limiting air movement at its lower face. If sufficient access is available, it may still be possible to install wood or hemp-fibre boards below the joists whilst working from above, but this situation is likely to be rare.

Insulation materials:-

When selecting the most appropriate insulation material for each building it is important to ensure that the material will continue to perform at a suitable level for many years. If the insulation is likely to suffer physical degradation a more robust material may be appropriate. Similarly, insulation which tolerates vapour movement will be required if high moisture levels are anticipated.

Most types of foamed plastic insulation, such as closed cell polyisocyanurate (PIR), polyurethane or polystyrene are inappropriate for general use in historic and traditional buildings as their inability to absorb and release moisture may increase the risk of condensation. They are often also difficult to form and fit accurately to irregular historic construction. They are therefore not usually appropriate for the insulation of suspended timber floors.

Perhaps the most common materials used for insulating floors in existing buildings are fibreglass and mineral wool, primarily because they are cheap, easy to handle and convenient to install. However, they are not necessarily the best materials for the job, even though they are to a degree air and moisture permeable. As the fibres of the insulation cannot absorb moisture, any condensation forming within the insulation zone will reduce insulation performance, increase the heat loss, and may also promote and sustain mould and rot in adjacent vulnerable fabric. Eventually, with persistent moisture, these materials themselves can start to break down. They also need to be carefully handled by those installing them, and protective clothing and dust masks need to be worn.

The most appropriate materials for older buildings currently available are those based on natural fibres, such as sheep's wool, hempfibre, cellulose fibres (derived from recycled newsprint) and wood-fibre board. 'Natural' insulation materials have the ability to 'breathe', allowing both air and moisture vapour to pass through slowly, thus minimising and diffusing the danger of condensation. Unlike artificial fibres, the material itself can also absorb moisture and release it again when the air is drier. This buffering effect can help to reduce the risk of condensation when there are rapid fluctuations in temperature or humidity. However, it should be noted that if exposed to persistently high levels of humidity sufficient moisture may be absorbed to cause decay or damage. An additional benefit of natural insulation materials is their good acoustic performance. They are also non-hazardous and unlikely to be irritants.

The Approved Document that accompanies Part L of the Building Regulations for existing dwellings, ADL1B (2010), calls for insulation of floors to have a U-value of 0.22 W/m²K.

The cost-effectiveness of floor insulation is complicated by the impact of the size and shape of the floor (perimeter/area ratio). Where the existing floor U-value is greater than 0.70W/ m²K, as will normally be the case over an externally ventilated floor void, the addition of insulation is likely to almost always be both feasible and very cost-effective.

The extent and type of insulation that can be provided between the joists will be dictated by the joist depth, which can vary considerably in older buildings from as little as 75 mm to those that are 225 mm deep, or more. Obviously, the greater the depth of the joists the more opportunity there is to provide insulation.

In many cases it may even be possible to achieve the full target U-value of 0.22W/ m²K, set out in the 2010 Building Regulations, simply by installing insulation between the joists. Individual calculations will need to be carried out for each situation (often provided free of charge by material suppliers) but it is quite possible to meet the required standard for new buildings with as little as 150mm of sheep's wool insulation, assuming air infiltration rates are well controlled by allied methods. Greater depths of insulation can usefully be installed, but very large quantities may not be cost effective.

Where insulation levels approach new building standards, conventional U-value calculations are likely to register the existing floor joists as cold bridges, and to suggest that additional insulation, such as wood-fibre boards, should be installed either above or below. This may be beneficial, but in situations where their installation would be physically difficult, or require unacceptable alterations to historic fabric, they may well be better omitted. In practical terms, as long as good ventilation through the under-floor void is maintained, condensation on the bottom edges of the joists is unlikely to be a problem.

In this particular case the thickness of the insulation material shall not exceed 100mm, as that is the depth of the existing timber joists.

Ground Floor Suspended Timber Floors

In this particular case the joists span from main wall (outside wall) to main wall and supported at the mid point by a low level 'sleeper wall' where the ends of the joists at half lapped over a thin timber wall plate. The intermediate sleeper wall do no have any ventilation openings in the brickwork below, relying on the small gap between the underside of the floor boarding and the top of the wall plate. It is important to remember that as part of the installation of the insulation that will be installed between the existing joists, this small opening may well be restricted further.

The ground below a suspended timber ground floor can often be damp so the timber is protected by being physically separated from the sources of this moisture. In later Victorian and 20th century buildings the ground may have been covered over with a concrete slab or screed. This was usually to control the ingress of pests and vermin and is rarely any impediment to ground moisture. The timber is further protected from the moisture below by the ventilation of the sub-floor void, normally via airbricks set in the perimeter walls. Cross-ventilation of the space is necessary to prevent any air stagnation. This ventilation keeps the relative humidity here low and the timber structure in sound condition, but it is also a significant source of heat loss from rooms above, particularly if the boarding is butt-jointed with open gaps.

From initial inspection, and from evidence of deteriorating skirting boards, it is clear that the existing underfloor ventilation is not sufficient to maintain the and keep the relative humidity low enough. It is therefore proposed to install additional air brick ventilation to increase this vital air flow.

The underfloor ventilation requirement should be at least 7500mm2 per metre run of wall. This requitement should be provided not only via air bricks in the outer walls, but also through the sleeper walls themselves.

In order to provide this level of ventilation, air bricks should be positioned at least every 1.80m or so. In the sleeper walls one brick shall be removed from the wall at about 1.80m centres. These openings should be positioned at least 150mm above the sub-base ground level. It is imperative that this ventilation is continuous to external air bricks on the opposing external walls.

Whilst the floor boards are lifted, it would be sensible to insert a DPC under the existing timber wall plate (100 x 25 timber) on the sleeper walls. This DPC can be inserted by slightly lifting the ends of the joists, (the wall plate is attached to the ends of the joists) and sliding the flexible DPC in. A bituminous based DPC should be used.

The walling below the floor will also be checked for any signs of rising damp. There is a very high probability that the ground level on the outside may not be as low as it should be, and the inappropriate discharge of water from the bottom of the rain water pipes is of great concern. We will discuss remedial works to the ground levels and rain water pipes later in this document.

The works proposed in the historic part of the house are summarised as follows: -

- Uplift existing floor boards to ground floor rooms, carefully recording their exact positions clear debris from oversite and air brick paths.
- Remove suitably located bricks from sleeper walls to enable/maintain air flow, lift sleeper wall plates an introduce preventative DPC over brickwork. Bricks shall be removed to attain least 7500mm2 per metre run of wall. This equates to ½ a brick every 1m run of wall.
- Fit new airbrick(s) to match existing to improve airflow where the 1970s extension has blocked those to the Southeast elevation.
- Fit underfloor mineral wool insulation batts to full depth of floor joists and refit boards.
- Template and manufacture new s/w moulded skirting board and picture rail and reinstate where missing (remnants remain within cupboards) or previously replaced, to all rooms.
- Historic box sash windows to be overhauled, repaired and insulated in accordance with accepted conservation practice, retaining intact and serviceable historic fabric wherever possible (see separate report).
- Line reception room chimneys for modern wood-burning stoves.

<u>Windows generally</u>

The windows generally are in a reasonable condition, some of the joints on the bottom of the lower sashes may need some localised repair or the lower sashes replaced.

In general each and every set of sashes in each window will need removing, and sash cords replacing where required, and sashes overhauled, and redecorated. Some of the existing ironmongery have almost failed and needs replacing with like for like. Likewise some of the sash pullies have corroded and have seized, these will require there replacement.

Because of the draughty nature of these type of sash windows, draught proofing works shall be installed.

A detailed survey of each and every window shall be carried out, to identify the works required. The works shall be carried out in regard to Historic England's *'Traditional Windows, Their Care, Repair and Upgrading',* second edition February 2017.

A full report is supplied separate to this document.

Advisory (not forming part of this application)

Isolated repairs will be carried out to the slate roof covering as required, along with a number of de-laminated hip and ride tiles.

Isolated repairs will also be carried out to the existing plastic guttering and down pipes. Joints and rubber seals will be replaced.

The two chimneys are in a very bad state of repair, and as such a significant amount of re-pointing will have to be carried out. Likewise, much of the leadwork flashing around the chimneys will have to be re-formed or replaced as required.

Appendix A