SUSTAINABLE TRADITIONAL BUILDINGS ALLIANCE
The work of the STBA

Monday 15 January 2018

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NDM HEATH LTD
Sustainable Energy Services

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Research – for UK Government

Policy – Consultations & working groups, e.g. *Each Home Counts*, PAS 2035

Guidance – Retrofit tools & guides

Training – STBA, CITB, local authorities and others

Advice – to local authorities, property portfolio owners

Expertise – Pool of leading Technical Experts

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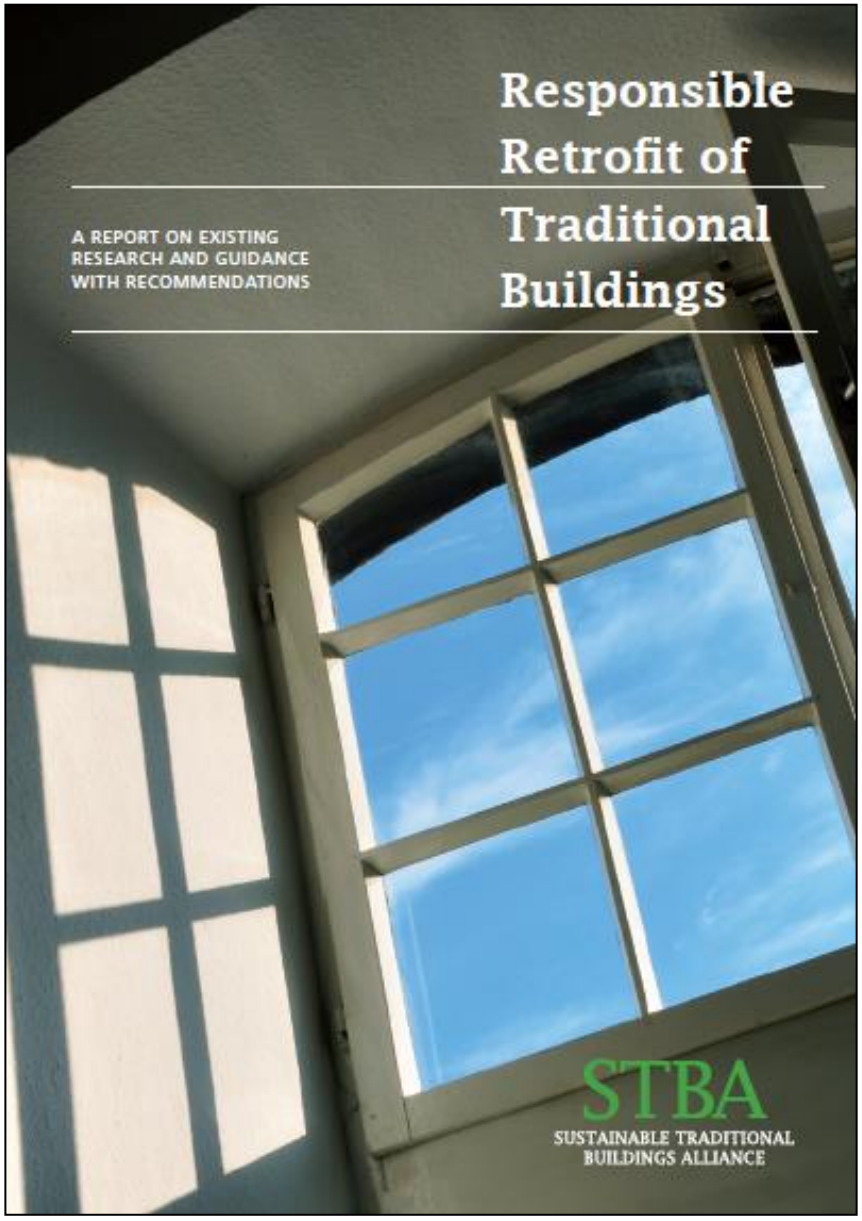

http://stbauk.org/stba-guidance-research-papers

Planning responsible retrofit of traditional buildings

Responsible Retrofit Series

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What is whole house retrofit ?

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3. Levels of whole house approach 3
4. The challenge 4
5. Vision, values and transformation 4

Responsible Retrofit Series

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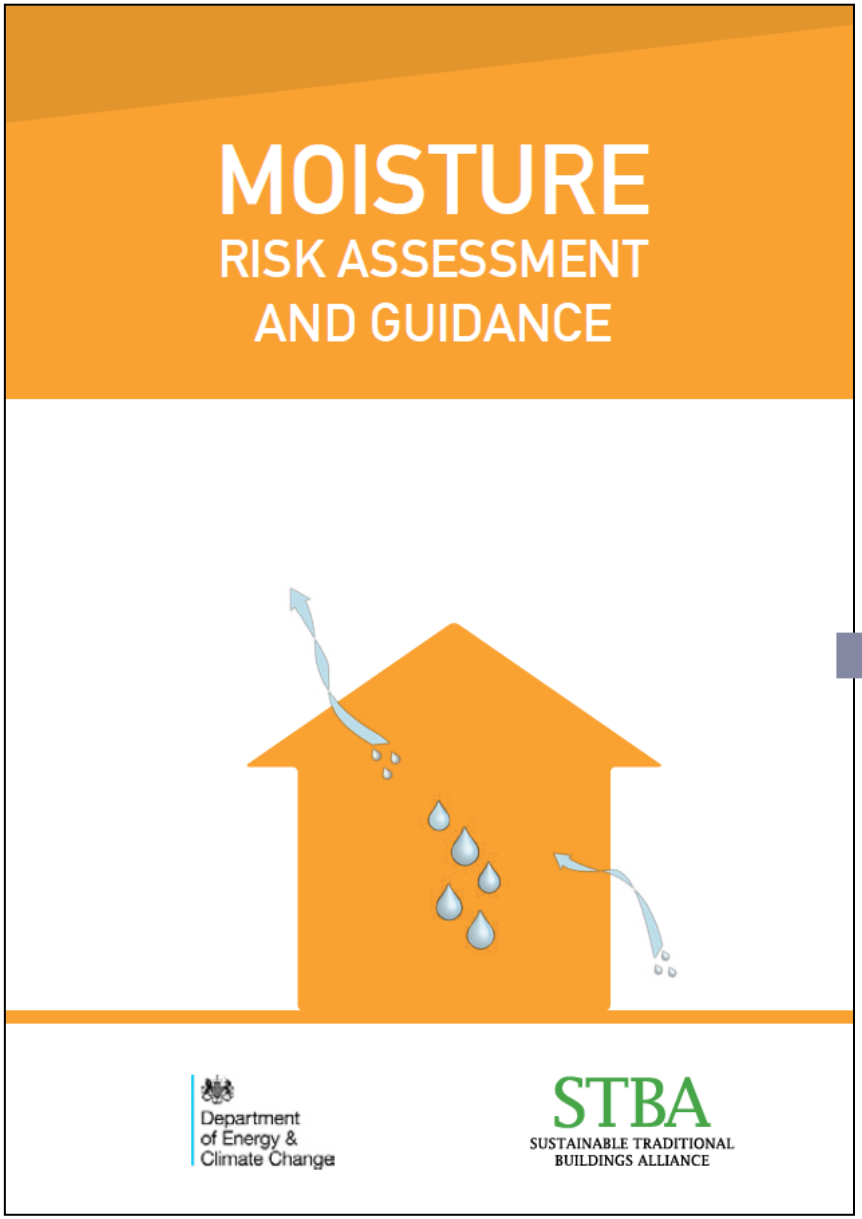

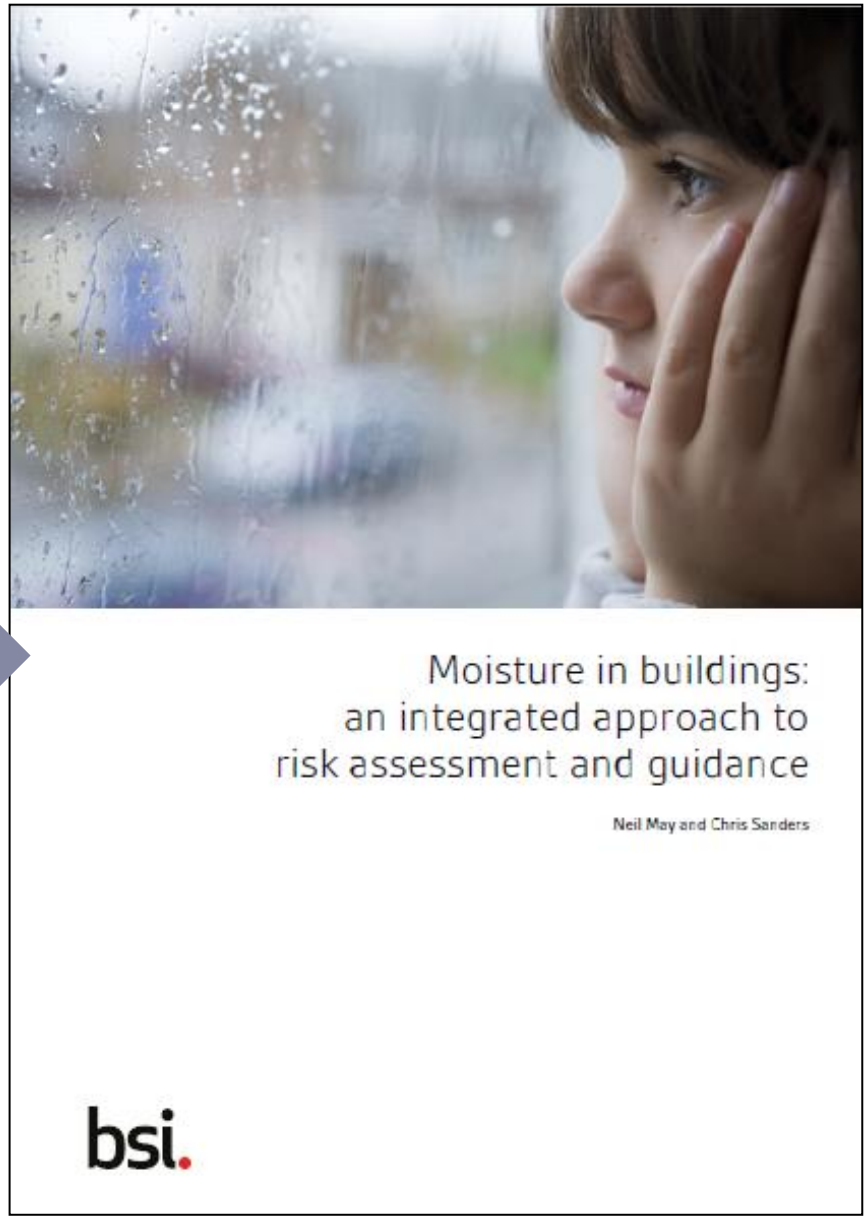

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WELCOME TO THE RESPONSIBLE RETROFIT KNOWLEDGE CENTRE

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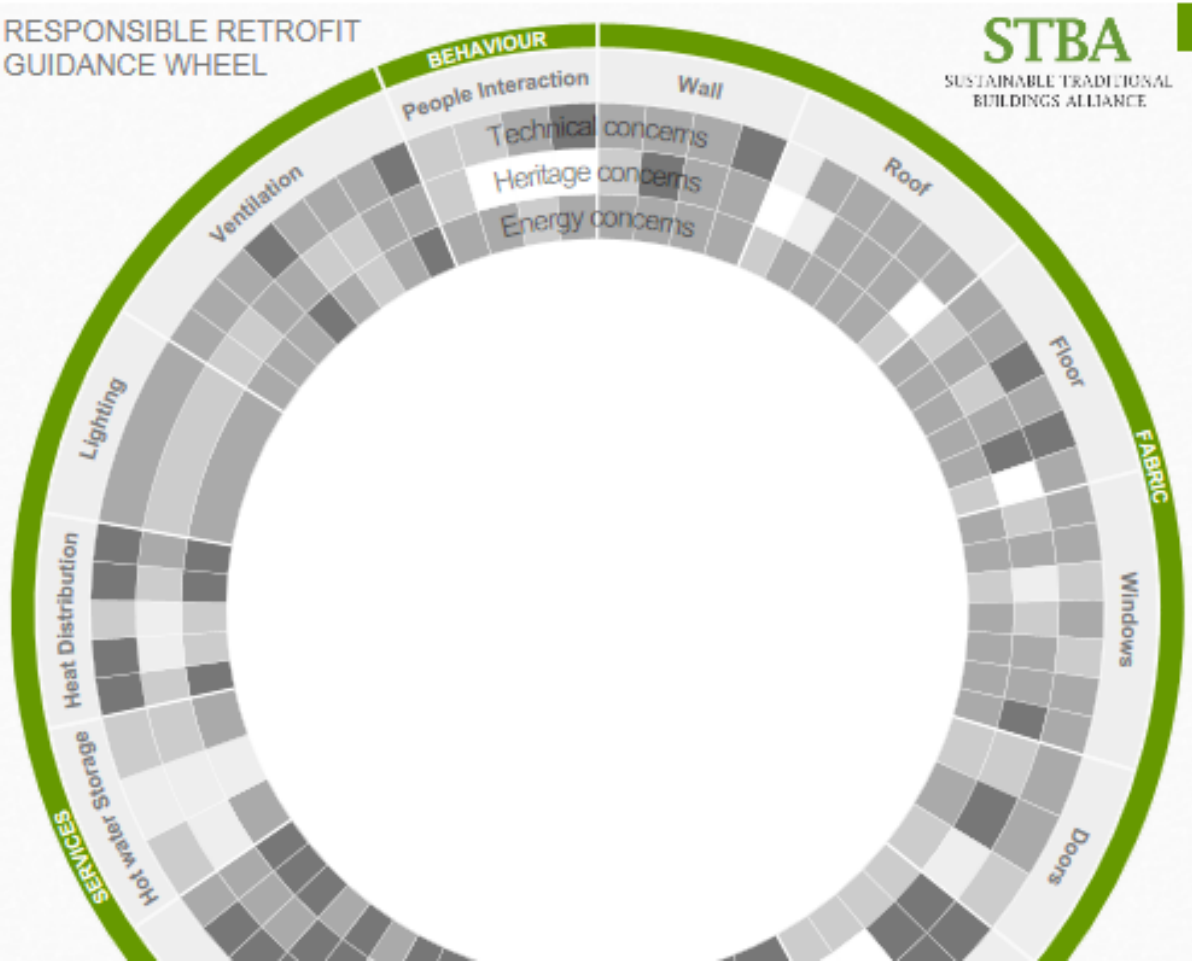
RESPONSIBLE RETROFIT GUIDANCE WHEEL



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GETTING STARTED | ABOUT | GLOSSARY | REPOR

▸ Colour key

▾ Building context

Please select the context of your building here:

Heritage
What is the heritage value of the building?
Conservation area (Building in conservation ar

Condition/State of repair
What is the condition/state of repain of the building?
Fair (Acceptable condition, likely to need some

Exposure
What is the exposure of the building to wind driven rain? (see B.Regs AD C diagram 12 shows map for UK zones). Apply correction factors if known and as described in BS 8104:1992
Moderate (Wind driven rain (in l/m2 per spell) 3

Energy User Type
How does the energy user compares with others in terms to energy use as assessed in the Green Deal Occupancy assessment?
Medium (Typical) Energy Use (Within 20% eith

User interest and involvement In Operation
What is the user's level of motivation and knowledge when operating the building?

http://www.responsible-retrofit.org/wheel/

Blackpool Council

CODE OF CONDUCT FOR SOLID WALL INSULATION PROJECTS

A Contractors' Code of Conduct for Solid

Prepared for Blackpool Coun

NDM HEATH LTD
Sustainable Energy Services

Blackpool Council

DECISION MAKING PROTOCOL FOR SOLID WALL INSULATION PROJECTS

A Guide to Decision Making for Solid Wall Insulation Retrofit Projects on Traditional Buildings

Prepared for Blackpool Council by NDM Heath Ltd and the STBA, July 2014

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A Bristolian's guide to Solid Wall Insulation

A guide to the responsible retrofit of traditional homes in Bristol

BRISTOL 2015 EUROPEAN GREEN CAPITAL

https://warmupbristol.co.uk/content/solid-wall-insulation

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Bristol City Council: https://warmupbristol.co.uk/content/planning-guidance-your-home

6.3.2 Internal wall insulation

Many of the basic principles of IWI are similar to those for EWI, however they occur within an internal context so the way they are dealt with will be different.

As with EWI, many risks are increased or decreased depending on a house's location and orientation. **For houses in Bristol, research (prepared for this guide) suggests that IWI should be an acceptable and relatively safe measure, and can be a very useful retrofit option, provided that the principles and details in this guide are followed.**

The importance of following a whole-house approach and using a joined-up process has already been covered in detail. However, for **IWI this must be re-emphasised – IWI is a retrofit measure that must also include:**

a) the outside of the wall (checking condition and treating where necessary, to ensure the wall doesn't get too wet or damp);

b) all junctions (where the external wall meets windows, doors, floors, internal walls, service pipes & cables, etc.); and

c) the ventilation system of the house (current status and any additional need post-retrofit).

The reason this is so important is that the risk of moisture-related problems is generally increased with IWI: adding insulation to the inside of solid walls means less internal heat will reach the walls, so they will often be colder than before, and this reduces the ability of the wall to dry out if it gets wet (through driving rain, for example). If moisture is trapped or condensation forms within the wall, this reduces the effectiveness of the insulation and can affect the health of both the building and its occupants. Floor joists and any timbers embedded in the wall are particularly vulnerable, as they are susceptible to mould and rot with long-term exposure to excessive moisture.

The following issues need to be considered as part of the application, design, application and in-use processes.

Assessment issues

Heritage and community value

Although the assessment of the heritage and community value of a house is sometimes covered by designated status in planning, often beautiful buildings are not listed or part of conservation areas. It is essential that before undertaking IWI you think about the beauty and character of the inside of the rooms being insulated, and see if there is anything of significance which will be damaged or adversely affected. If you need to, talk to people with expertise in heritage.

Building Form

The more geometrically complex a building form, the more difficult it will be to insulate with a whole-house approach. However, IWI can often be applied to complex buildings more easily than EWI as walls tend to be flatter and less ornate inside houses than outside, particularly on front façades. Bay windows are easier to insulate internally, although they remain complex and still require great care and attention to detail.

Exposure and orientation

It is important to understand not only how a building is performing when visited, but also what the likely challenges are in the middle of winter, for example, or during an autumn storm. This requires an understanding of your local weather and differences depending on orientation (i.e. South-facing façades often receive more sun and rain than North-facing façades). Traditional buildings sometimes demonstrate this understanding and have different finishes or protections on different sides according to exposure and orientation. In Bristol, some outlying areas are much more exposed to driven rain (particularly on the South-West side) than houses in the centre, so a lot of care must be taken with ensuring the pointing or render, the rainwater goods and the seals around openings are all in good condition, whereas this is less critical in sheltered locations.

Materials and Construction Method

Knowing what your building is made of, how it was constructed and how it has been altered over time will help inform what's possible and what risks may be involved. For example, some wall materials are much more porous than others; some walls have a lot of timber embedded in them (such as lintels and ties, as well as joists and wall plates), and some have less. Although this guidance is designed to minimise risk, it is still important to be aware of higher-risk areas are and take particular care where they are present.

Assessment issues continued

Condition

Building condition is one of the most important considerations in deciding whether or not to proceed with IWI (or any retrofit measure). If a building is in poor condition it is much more likely that there will be problems with a retrofit. On the other hand, a retrofit project can sometimes be a good opportunity to address both superficial and underlying problems. The key point is that if there are structural or moisture problems in your existing building, they must be fully investigated and taken into account in any work that is planned. If there is excessive moisture in your walls, then it is always best to address the cause of this moisture and to let the building dry out before undertaking any IWI work.

Use

Use is also an important context. First, understand how the building was used in the past, what it was designed for and how that differs from today's use. Secondly be aware that moisture risks and potential energy savings are very different in a house which has a large young family living in it, compared with that of a single occupant who is often out of the building. This context makes a lot of difference to the benefits of IWI, and to the disruption of application. Projects should take account of the use of the building throughout the design and installation.

Design issues

External Wall

- Ensure that the outside wall is in good condition (and if it is not, ensure that it is repaired properly with lime-based mortars and plasters – not cement, as this is impermeable), all rainwater goods and drains are working, under-floor vents are clear of debris and external ground levels are below the internal ground floor level
- All sources of acute damp should be explored and addressed before installing IWI. The wall should always be dry on the inside (and most of the way through to the outside) before any IWI installation

Moisture quality of insulation system

Always use 'moisture-open' insulation systems for IWI, to ensure that walls can dry to the inside as well as the outside of the building – this will help minimise the risk of moisture-related problems outlined previously. Using moisture-closed insulation systems reduces the wall's capacity to dry, which is particularly important if the wall is wet in any way due to driving rain, residual damp, or condensation. In this case, 'moisture open' means both vapour permeable and capillary active. If insulation systems are not capillary active then further advice should be sought – if in doubt, check and consult expert advice.

Insulation thickness

- Do not target a finished (i.e. post-insulation) wall U-value of lower than 0.6 W/m²K – this typically means a maximum insulation thickness of around 60mm. This is because the more insulation you put on the wall the greater the heat resistance and the colder the wall, thereby reducing drying potential and increasing condensation risks. In addition, heat loss modelling has demonstrated that, due to unavoidable thermal bridging with IWI, applying larger amounts of insulation will generally have reduced effectiveness (i.e. there is an optimum insulation depth, beyond which the cost-benefit ratio reduces significantly)

Airtightness

- As part of the IWI design, ensure that airtightness is also addressed – in particular, ensure that air cannot leak into joist ends, wall plates and other timbers which are embedded in the wall
- Use an IWI system that is affixed directly to the wall with no air gaps, and use a moisture-open bonding coat to affix the insulation to the wall – this should significantly reduce the risk of mould growth behind the insulation, and reduces the risk of thermal bypass
- A levelling coat of lime plaster (applied to the wall prior to insulation) can greatly assist with airtightness, while continuing to allow moisture movement

Insulation coherence

- The whole façade should be insulated wherever possible – this extends to adding insulation at floor-wall junctions and considering treating joist ends (see drawings below)
- Always insulate windows and door reveals with at least 10mm of high-performance insulation or 20mm of average-resistance insulation (your designer should be able to advise on specific materials)
- Where the IWI meets partition or party walls, insulation should be applied to these walls as well for at least 100mm to minimise the impact of these unavoidable thermal bridges, unless otherwise specified by experts
- 'Thermally-broken' fixings should be used (as per EWI)
- Services (e.g. pipes and wiring) should be run in conduits in the existing wall, or removed and reinstated onto the surface of the new insulation system where possible

Design issues continued

Ventilation

In increasing airtightness of the building it is essential to also ensure that the building has an effective ventilation system. For IWI an active ventilation system should be specified. This is covered in detail in Section 6.3.

Replication / reinstatement of features

Where there are features on the internal walls being insulated, such as cornice details, historic skirting, these should where possible be preserved and re-fixed over the IWI system or in some cases can be reproduced new. In certain situations, this becomes an opportunity to re-instate features which have been lost, and this can considerably enhance the appearance and value of a property. The appropriateness of such replication is dependent on the individual home, and it may be advisable to consult with the Planning team to help guide your decision on this.

Application issues

Quality of installation

This is essential in any SWI project, and is key to a successful and happy retrofit project. Firstly this means that the contractors should strictly follow the design and specification – if they find a problem with this, then they must consult with both you and the designer before proceeding further.

Of course installers should also be suitably trained and experienced. If there are inexperienced workers on site, then at least they should be supervised by a trained and experienced colleague or manager. Ideally there should be someone on site with a sound understanding of the principles and details in this guide, who is able to liaise with you and the designer if needed.

Capacity and Caution

Projects often fail because of unexpected or unplanned factors. If there is not sufficient capacity (i.e. time or money) to deal with these, then a job is more likely to be poorly done, with corners being cut or some areas just left out altogether. So ensure that there is a contingency fund if at all possible, and make sure your timescales have some flexibility.

In-use and Maintenance issues

In Use

Once IWI has been installed, it is essential that owners and occupants know what can and can't be done to their walls, for example if they want to add lights, services, shelves and so on.

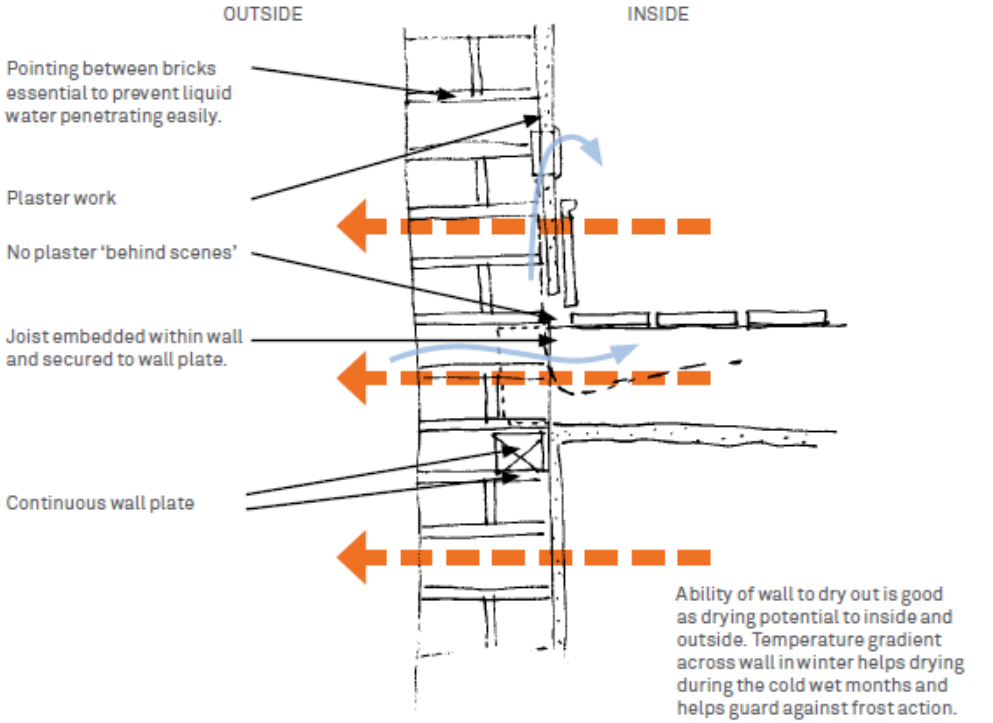
On a more general note, it is very important that the end users of the house are a) involved throughout and b) well informed about the changes they are likely to notice and any different behaviours they should adopt (e.g. being more aware of ventilation). If a dedicated ventilation system is installed as part of the project, it must have simple, user-friendly, reliable controls and its operation and maintenance should be explained clearly to the occupant, so they can use it properly and identify any faults quickly.

Maintenance

IWI is not a 'fit and forget' measure:

- Wherever possible, you should make simple visual checks on vulnerable areas (areas where you know there is a thermal bridge, for example) every few months. While it is generally hard to see behind the insulation, if you can lift a floorboard to check the condition of the floor joists and ends for any dampness or mould that would be a good starting point. Expert advice should be sought for any more invasive or extensive monitoring
- As stated above, the condition of the external wall, rainwater goods, drains, under-floor vents and so on should have regular checks and maintenance where needed

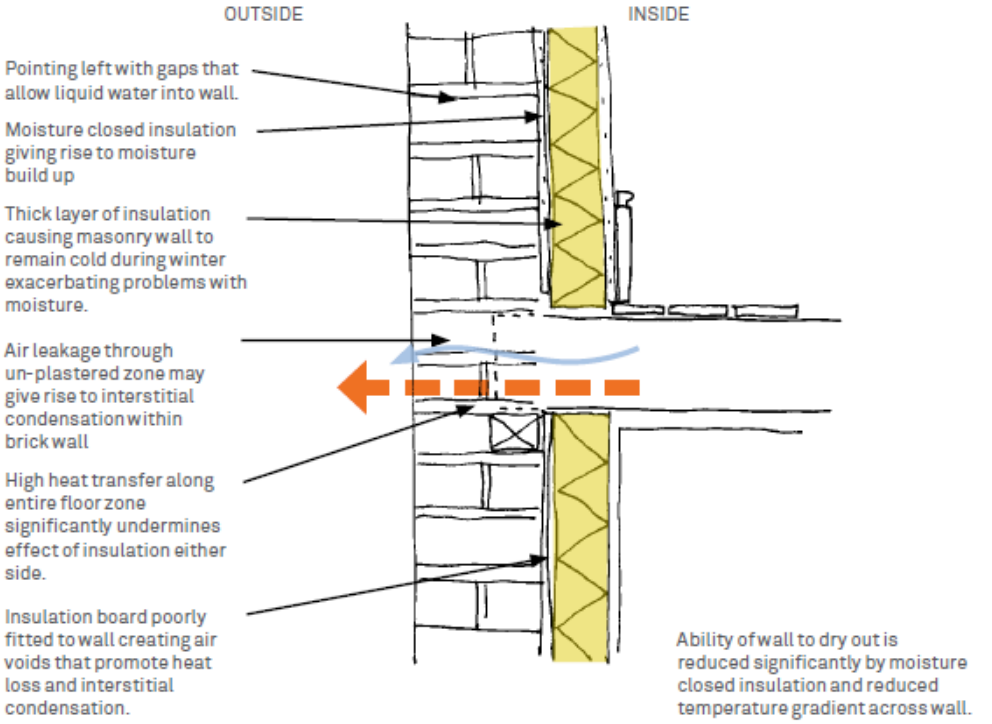
EXISTING TYPICAL ARRANGEMENT



WATCH POINTS

- Check for timber decay within joist end and wallplate before installing insulation
- Check condition of pointing
- Check make up of plaster (lime, sand/cement or gypsum)
- Check for services that may need moving
- Check for mechanically fixed lining that may need moving

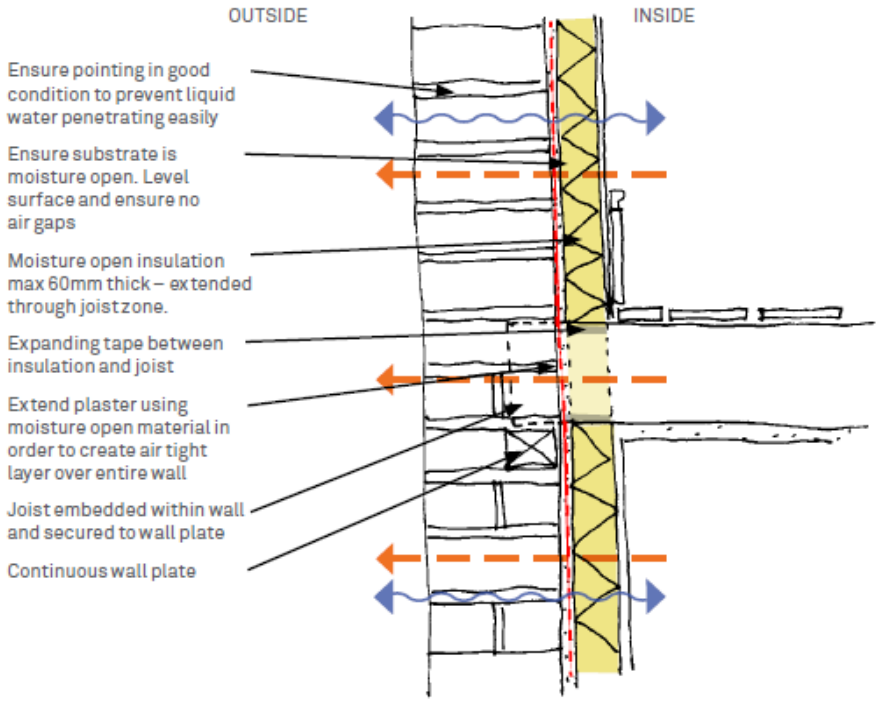
POOR PRACTICE APPLICATION OF IWI



WATCH POINTS

- Ensure external face of wall prevents driving rain
- Ensure moisture within wall can migrate towards inside and outside

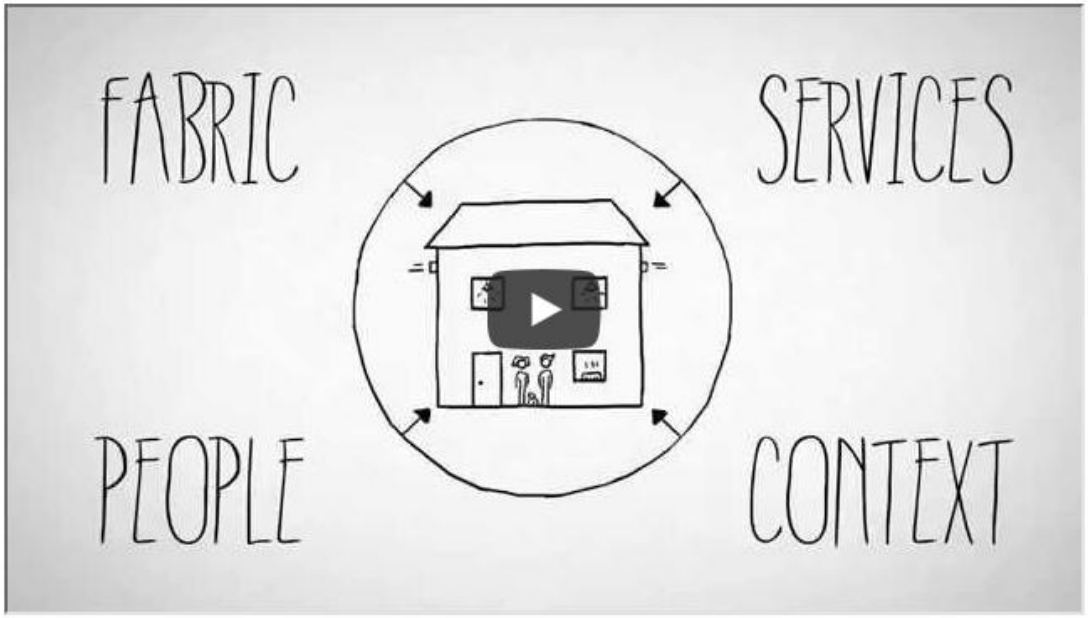
GOOD PRACTICE APPLICATION OF IWI



WATCH POINTS

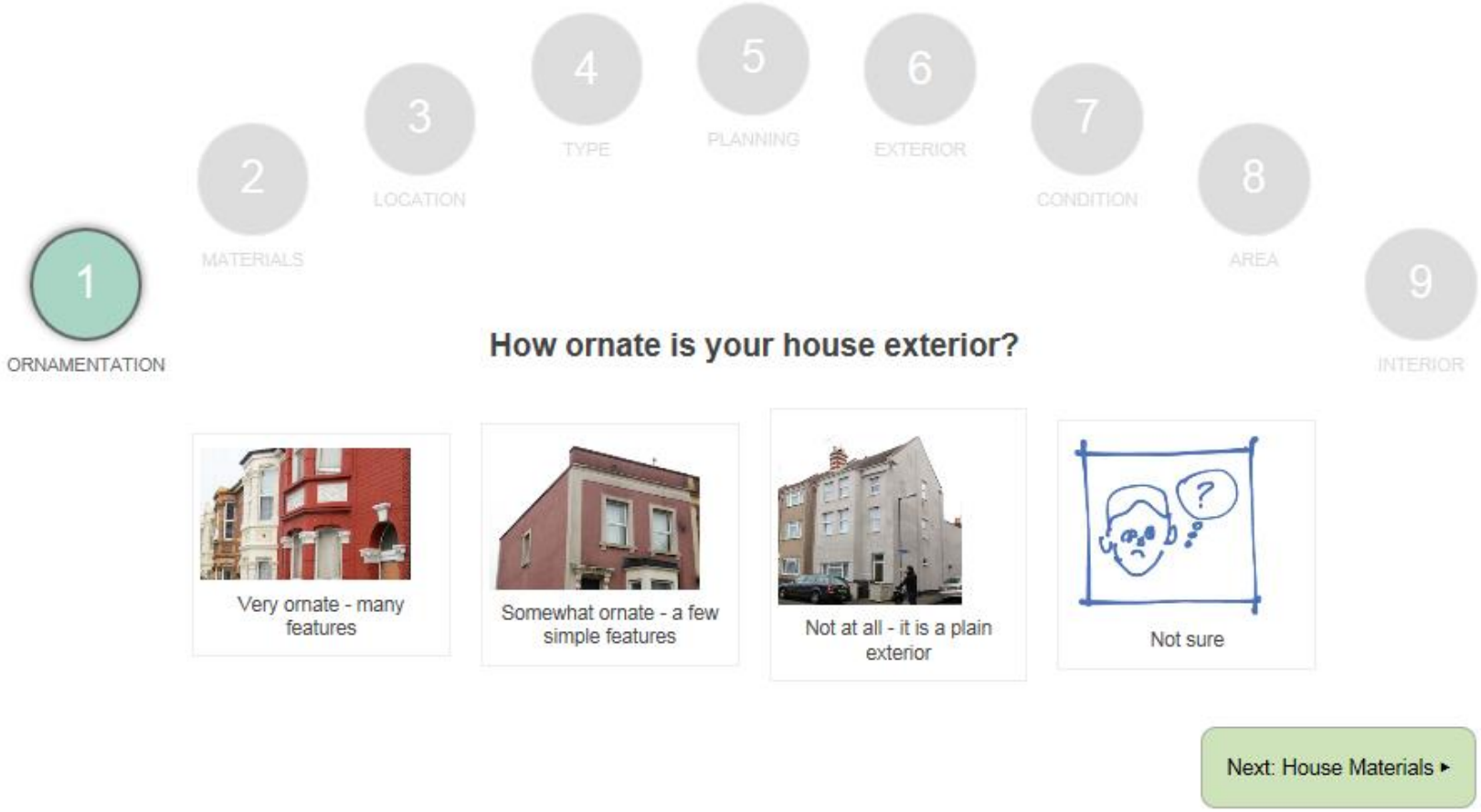
- Ensure external face of wall prevents driving rain
- Ensure moisture within wall can migrate towards inside and outside
- Ensure air leakage around joist zone is reduced

Bristol Solid Wall Insulation Guidance Tool



Begin Survey ▸

https://warmupbristol.co.uk/content/solid-wall-insulation



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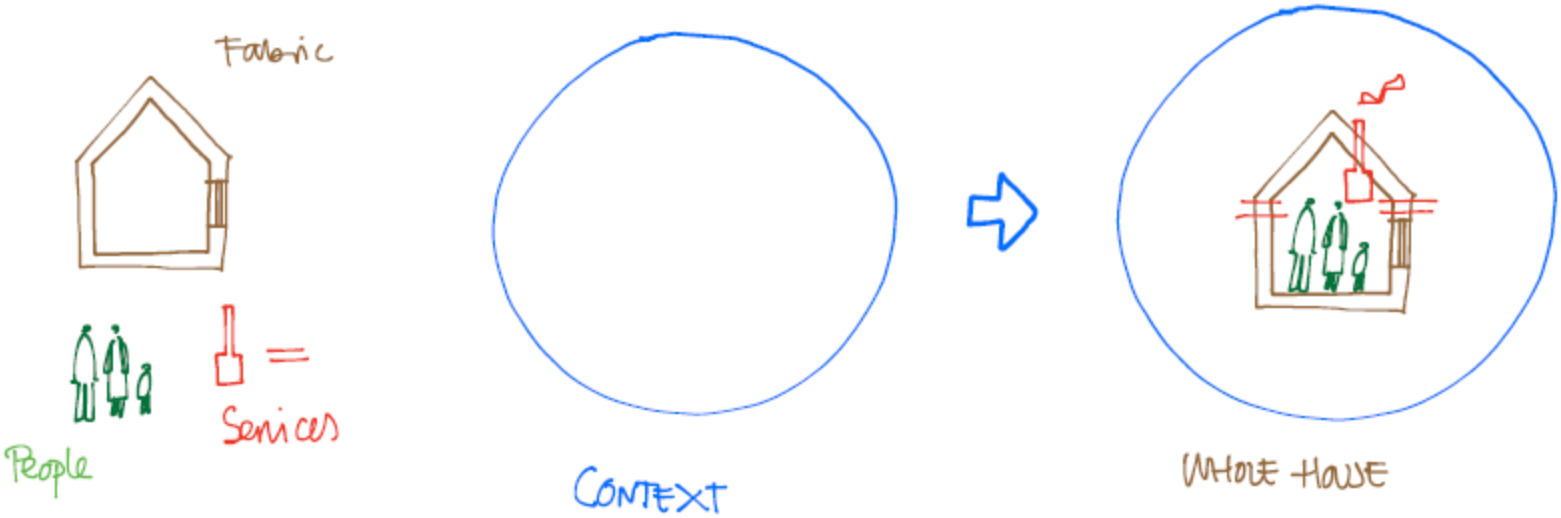
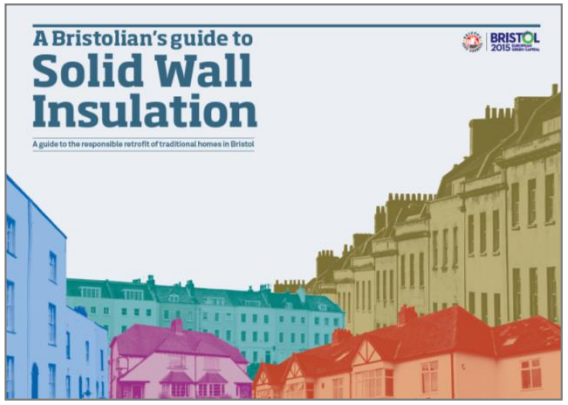


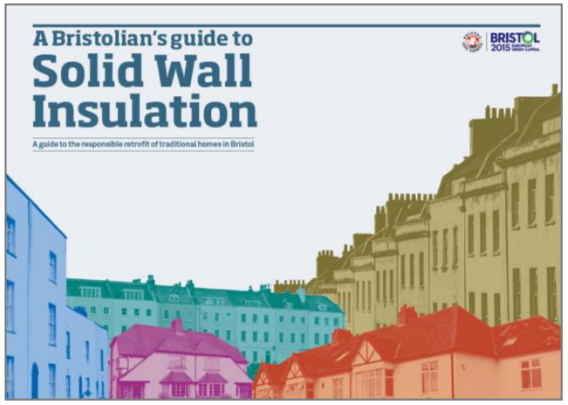
‘Regardless of your reasons for retrofitting, the key to success is ***understanding****. Understand your home, your lifestyle, your environment, your priorities, the upgrade measures available, the importance of careful planning and detailing, and the ‘whole-house approach’ and joined-up process’*



Bristol City Council / STBA: *A Bristolian’s Guide to SWI* (2015)

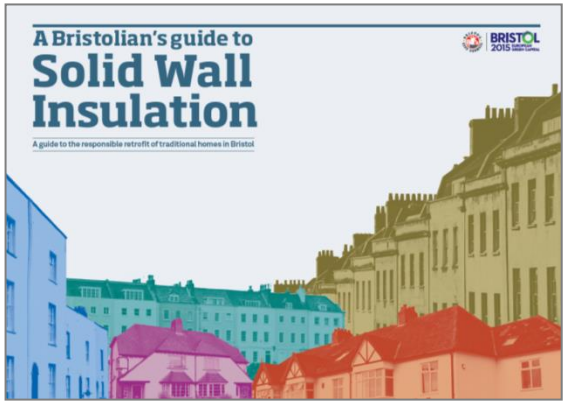
SWI

can be a very beneficial and positive measure that considerably enhances a property'



Bristol City Council / STBA: *A Bristolian's Guide to SWI* (2015)

'Where SWI is appropriate, well planned, well designed and well implemented in a joined-up process, with good communication between everyone involved in the project, it can be a very beneficial and positive measure that considerably enhances a property'



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