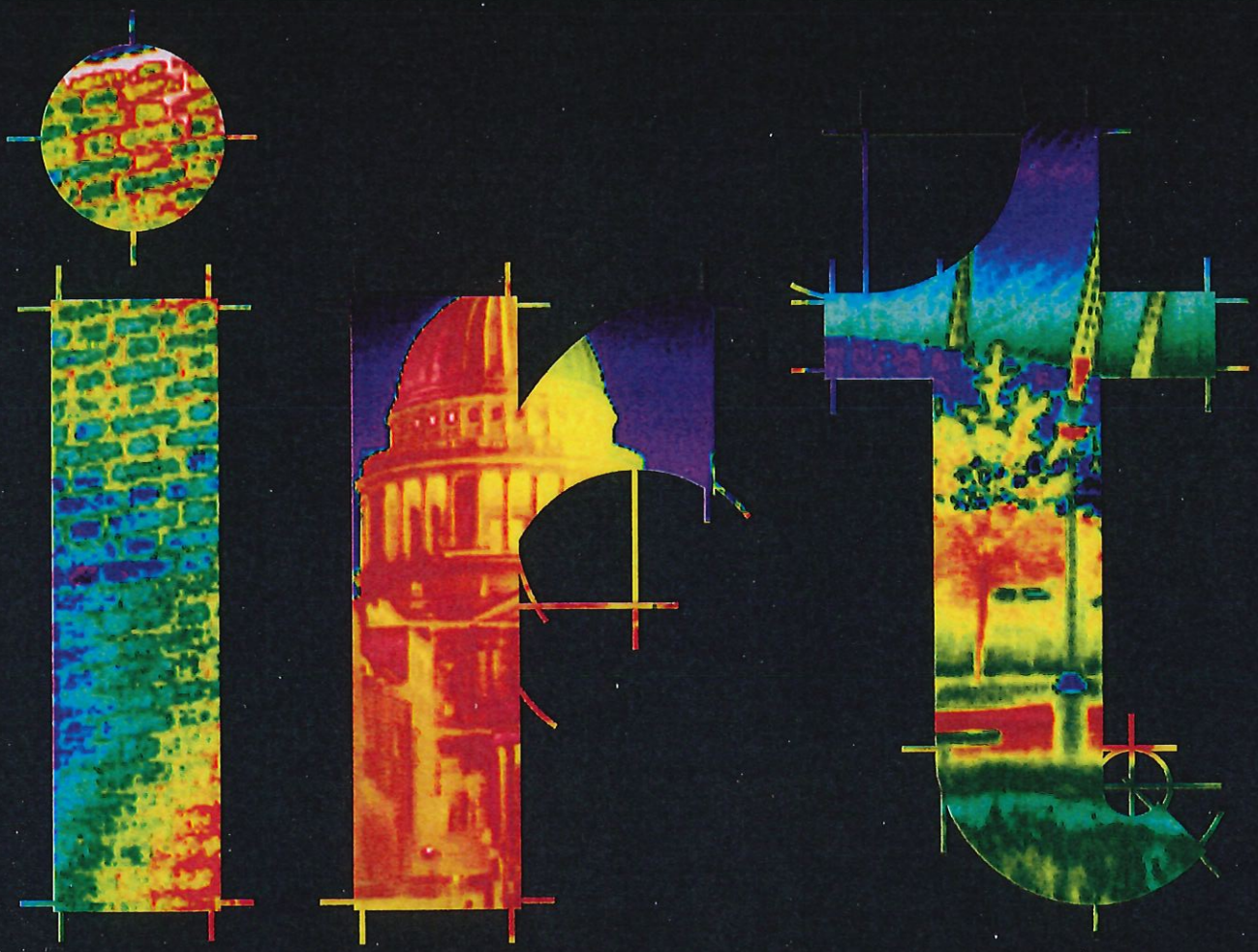

clarity of vision

irt surveys

surveys

Thermographic Survey

Sempatap Insulation On 8 Domestic Properties

For

Wolverhampton City Council

surveys

Thermographic Survey Report

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Ref: AA58/KG/1308

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Contents.

1. Introduction.

1.1 IRT Surveys were commissioned by Mr. Tom Winckley of Wolverhampton City Council to conduct a thermographic survey of 8 Domestic Properties, Wolverhampton.

1.2 The before survey was carried out on the 30th of January 2008 at 11:00p.m and the after survey was carried out on the 13th of May 2008 at 11:00pm.

1.3 The purpose of the survey was to thermally quantify the benefits of Sempatap Insulation on 8 domestic properties in Wolverhampton.

2. Details of equipment.

2.1 The following equipment was used on site,

- Flir Systems Thermacam P25 – longwave, uncooled, digital, 320x240 high-resolution thermal imaging system. Tripod mounted, with full colour LCD display and real time imaging.

- Digital still camera.

3. Weather Conditions.

3.1 At the time of the surveys the weather conditions were clear, with a northerly wind, 1mph.

4. Explanation of Images.

The following report contains several colour infrared images which can be difficult to understand.

The equipment we use sees heat instead of light and automatically allocates various colours to different temperatures. For example red is hot and blue is cold. The hottest colour being white and the coldest being black.

There are several factors that can lead to miss-interpretation of a thermal image. Different materials reflect energy in different ways, such as glass or highly polished metals. Where there are materials like glass, the information recorded must be ignored, as it is not an accurate temperature. A well insulated roof or building in good condition should show consistent temperatures and colours across its surface.

5. Terms of Reference.

This investigation involved the use of non-destructive methods and therefore the majority of the findings presented within this report are the result of the measurement and interpretation of electromagnetic signals. This report represents the best professional opinion of the authors. Every effort has been made to ensure that the results are accurate and reliable. However, as with other indirect methods there is a possibility of localised inconsistencies and inaccuracies within the results. There are many contributing factors which will cause and influence the appearance of anomalies. In the following report, the author will use their expertise to identify what in their opinion is the most likely cause of the inconsistency. Factors such as heat sources, surface staining and reflections will have been considered during analysis and although they may not be listed there is always a possibility that these factors have influenced the results.

This final report supersedes any previous reports by IRT surveys, whether written or oral and completes the work commissioned by Mr. Tom Winckley of Wolverhampton City Council.

6. Explanation of the Report.

1. ID Box
A red 'id' box to help locate anomaly

2. Location ID
The location of the image

3. Location plan

4. Visual image
A visual image that matches the thermal image

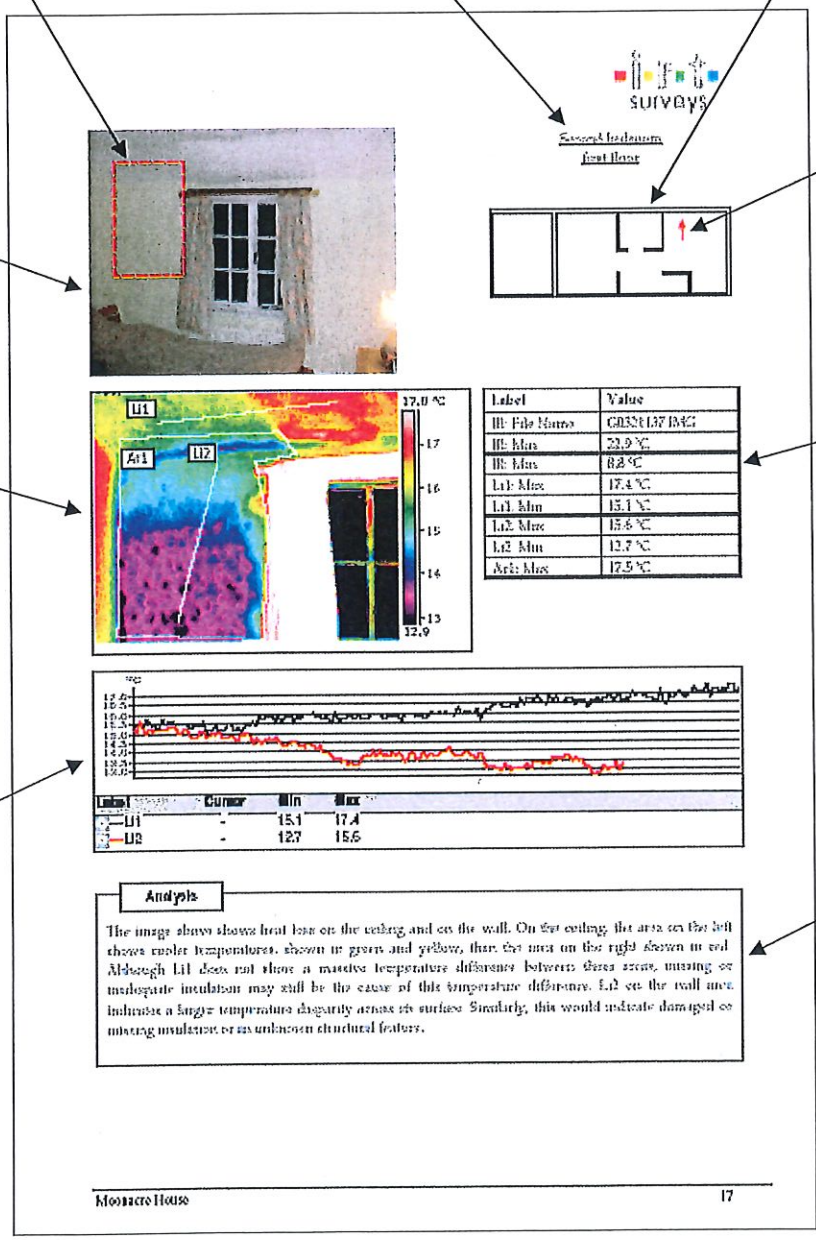
5. Thermal image

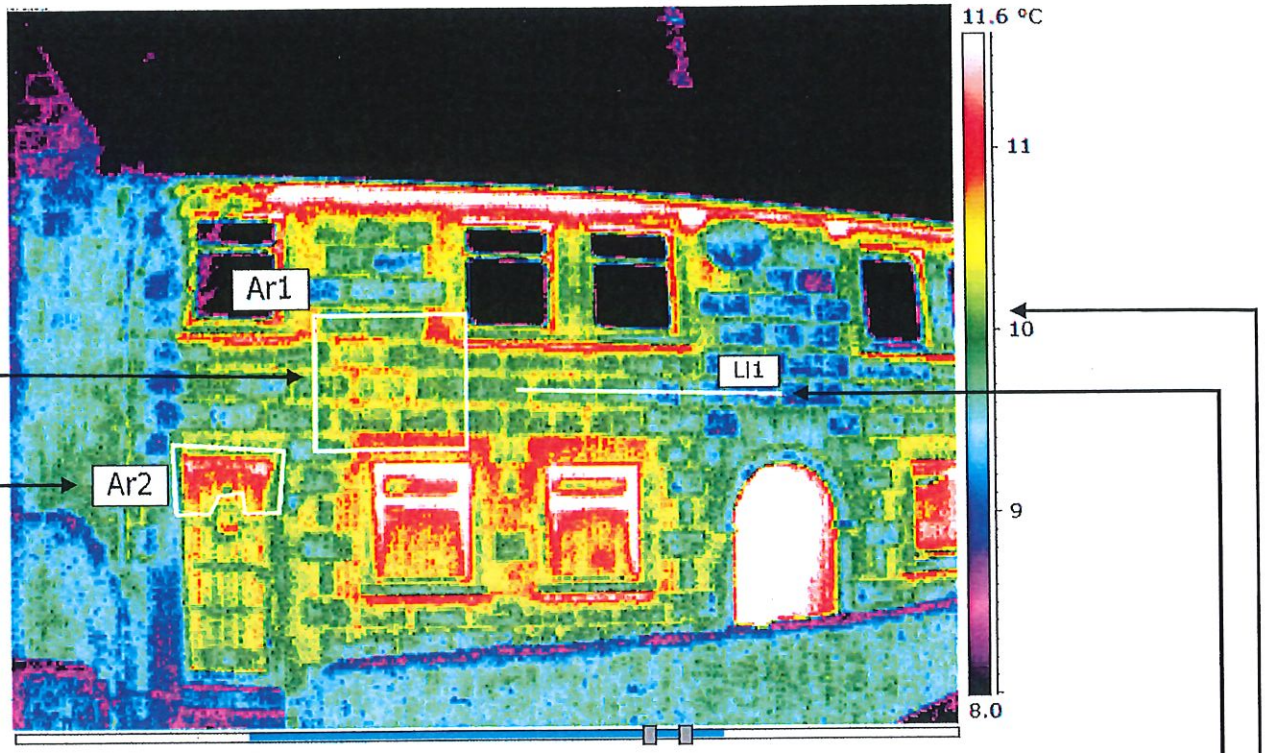
6. Data graph
Graph plotting the temperatures found along the line(s) drawn on the thermal image

7. Location ID
Red arrow showing the direction of the image

8. Data table
Table of information about the thermal image

9. Analysis
Comments about the image and highlighted areas





Ar1 – Rectangular area box used to highlight an unusual temperature feature. Details of this area will be shown in the analysis box. Additional data from this area may be shown in the data table.

Ar2 - This can be any shape. It is shown here as a polygon to highlight the shape and area of an unusual temperature feature. As with Ar1, details of this area will be shown in the analysis box. Additional data from this area may be shown in the data table.

Li1 - Temperature profile line. Temperatures recorded along this line are displayed in the graph and also in the data table. This gives you an accurate visual indication of the temperature variations across this region and allows you to compare one area with another.

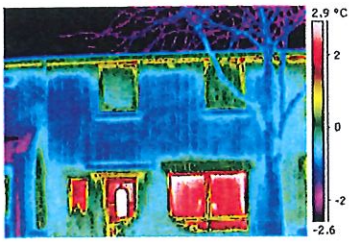
The temperature scale on the right of every thermal image provides an easy to understand key showing which colours represent which temperatures on the image. i.e. for this image red colours represent temperatures of approx. 11°C and blue colours represent temperatures of approx. 9.0°C.
The numbers at the top and bottom of the image show which temperature range we are looking at. In this image we are looking at temperatures between 8.0°C and 11.6°C

Please be aware that different images may have different temperature scales. As such, a red colour on 1 image may represent 10°C whilst it may only represent 9°C on another.

Examples and Explanations

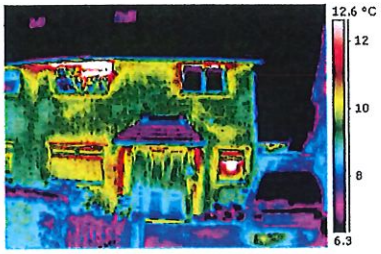
Cavity Wall Insulation

Good



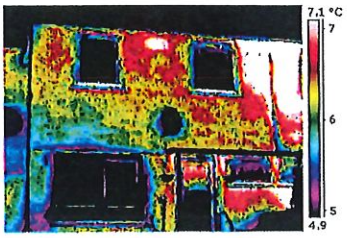
Good cavity wall insulation reveals consistent colours across its elevation.

Inconsistent



Inconsistent cavity wall insulation reveals a slight colour variance.

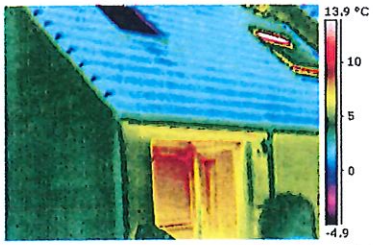
Poor



The example of poor insulation shows patchy and inconsistent colours.

Loft insulation

Good

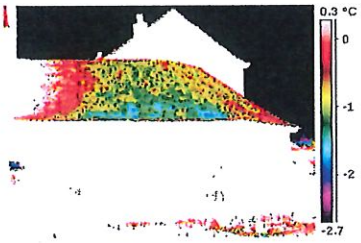


The example of a well insulated loft reveals a consistent colour across the entire surface of the roof.

Inconsistent

An example of an inconsistent loft reveals small isolated regions of increased temperature.

Poor



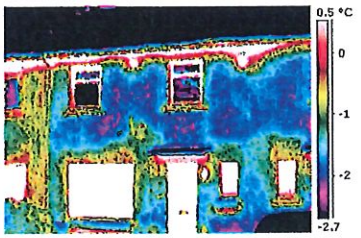
The example of a badly insulated loft on the right is very patchy, and shows lots of colours.

Windows

Good

No heat loss can be seen around the windows in the good example. The example of poor window detailing shows heat escaping from around the windows.

Heat Loss Around Windows

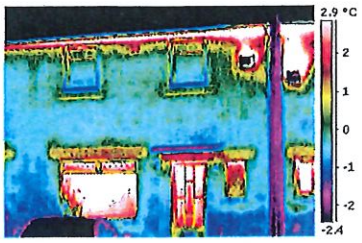


Thermal Bridging

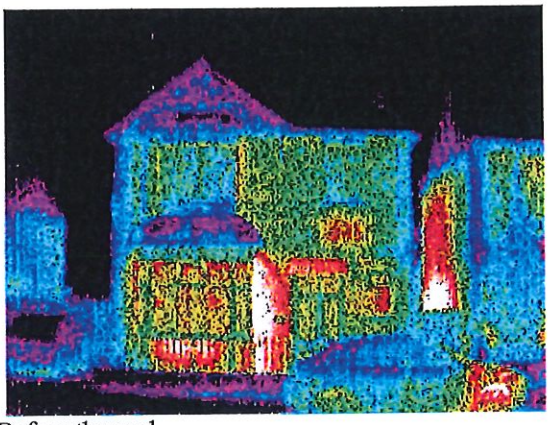
Good

In the example of thermal bridging, heat loss can be seen from the lintels above the lower windows. There is no thermal bridging in the good example.

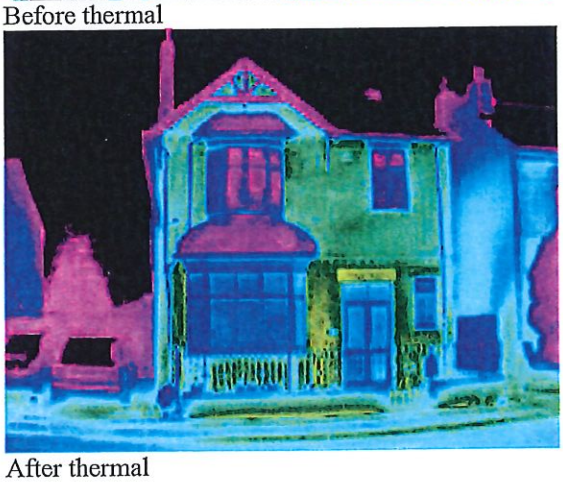
Thermal Bridging



Visual image



Before thermal



After thermal

538 Wolverhampton Road
Wolverhampton
WV2 3DP

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£5.46	51.03	13.27	3.58

Remedial Measures Taken:

- Sempatap Insulation

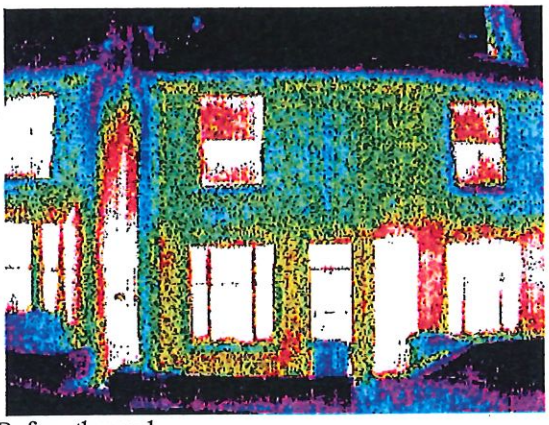
Analysis

Thermographic analysis of the before shot, showed inconsistent temperatures in red and yellow colours. A large hot spot can be seen to the right of the bay window suggesting poor detailing at the junction; however, wind sheltering may also contribute. Increased temperatures are also seen below the upper right hand window indicative of missing/ damaged insulation; however the size and shape of the anomaly suggests that it is due to an internal heat source. Analysis after insulation reveals consistent temperatures across the entire elevation which indicates a well insulated property in good condition.

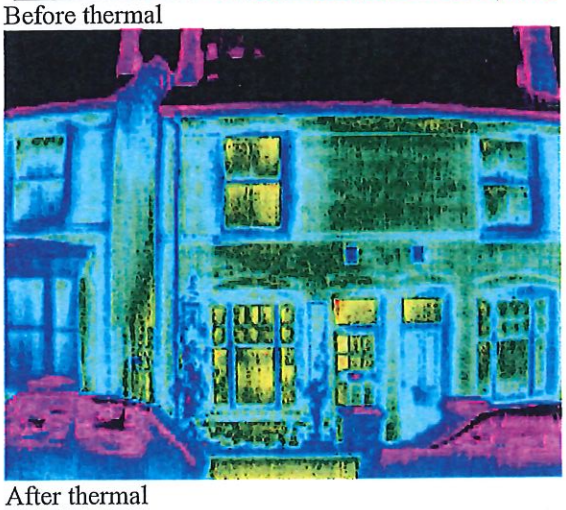
surveys

Visual image

24 Fellows Street
Wolverhampton
WV2 4NU



Before thermal



After thermal

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£4.94	46.17	12.00	3.24

Remedial Measures Taken:

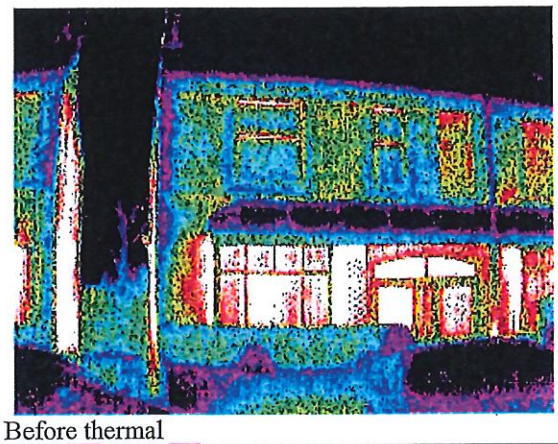
- Sempatap Insulation

Analysis

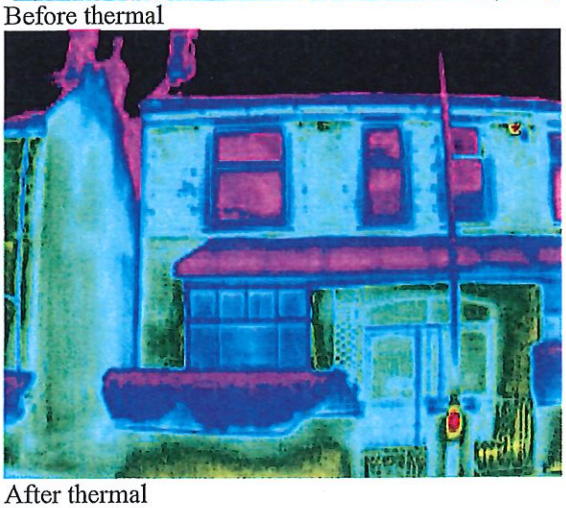
In the before image, inconsistent temperatures can be seen in red and yellow colours indicating heat loss due to poor detailing or missing/ damaged insulation. Warmer temperatures are seen on the bottom level of this property suggesting heating is on compared to the above level; however it could simply be there is no insulation at all. Analysis of the property after insulation reveals significantly reduced heat loss across the elevation suggesting a much more energy efficient property.

516 Wolverhampton Road
Wolverhampton
WV2 4PJ

Visual image



Before thermal



After thermal

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£6.90	64.49	16.77	4.53

Remedial Measures Taken:

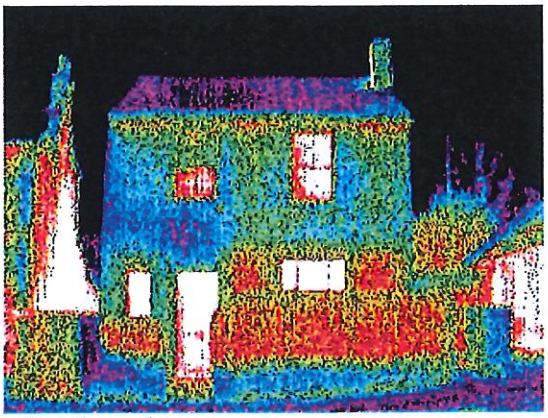
- Sempatap Insulation

Analysis

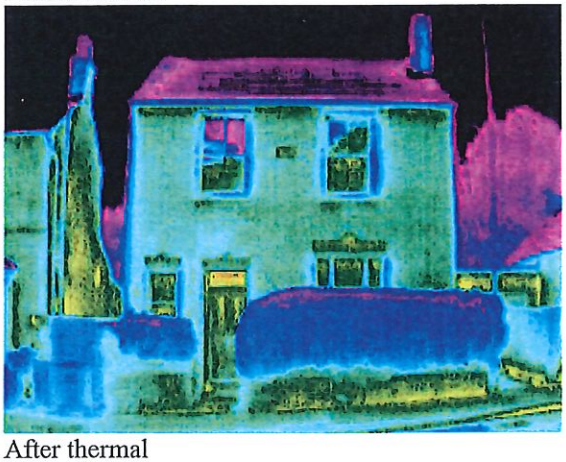
Thermographic analysis of the above thermal image taken before the building renovations reveals increased temperatures to the left of the bottom window indicative of missing/damaged insulation and/or poor detailing. Analysis after remedial measures were taken reveals slightly more consistent temperatures across the property; however, increased temperatures indicative of heat loss can still be seen around lower windows. Although this is minor we advise that it is investigated further.

66 Upper Villiers Street
Wolverhampton
WV2 4NX

Visual image



Before thermal



After thermal

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£8.00	74.77	19.44	5.25

Remedial Measures Taken:

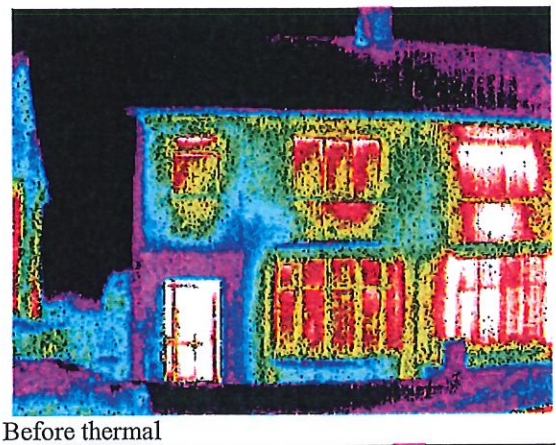
- Sempatap Insulation

Analysis

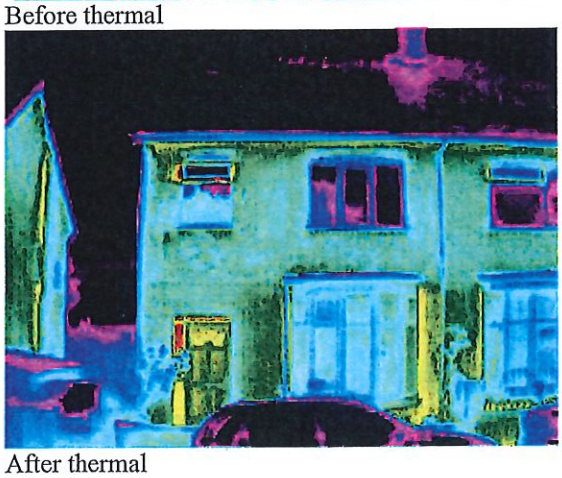
Thermographic analysis of the above thermal image taken before the building renovations reveals increased temperatures. Increased temperatures are seen in red and yellow colours around the windows and below the eaves on this property. Warmer temperatures were also recorded on the ground floor suggesting that it's completely un-insulated. After remedial measures were taken much more consistent temperatures could be seen across the elevation. It must be noted that particularly cooler temperatures were seen across the ground floor suggesting much better overall insulation.

55 Upper Villiers Street
Wolverhampton
WV2 4NU

Visual image



Before thermal



After thermal

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£7.03	65.70	17.08	4.61

Remedial Measures Taken:

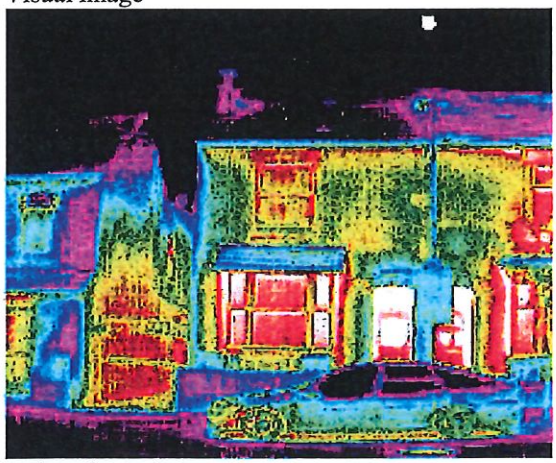
- Sempatap Insulation

Analysis

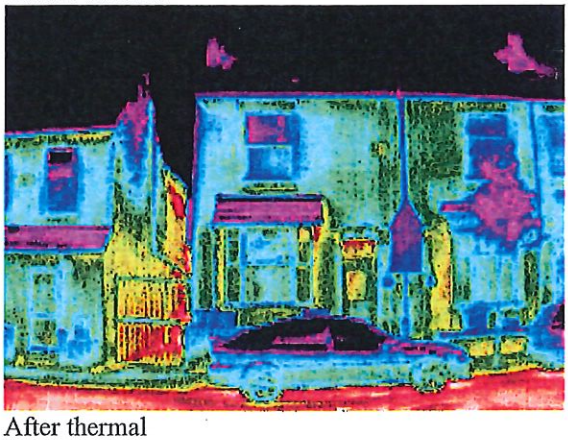
The thermal image entitled 'before' was taken previous to any renovation work. It can be seen by the warmer red and yellow colours that some minor increases of temperatures are present around the windows and below the eaves. The heat loss below the upper right window is the most inconsistent area. These areas of increased temperature are indicative of heat loss via missing/damaged insulation and/or via poor detailing at building junctions. Analysis of the property after remedial works were carried out revealed much less heat loss around the windows; however, inconsistency is still seen below the eaves and around the lower bay window. We suggest that this is investigated.

20 Wonderers Avenue
Wolverhampton
WV2 3HL

Visual image



Before thermal



After thermal

The energy calculations are shown in table below; these are based on additional energy use from the highlighted suspect regions and represent the minimum amount of saving that could be achieved from amending these anomalies. These calculations do not represent what could be achieved by insulating an entire wall

Additional costs p/a	kWh	CO2 (kg)	Carbon (kg)
£7.35	68.69	17.86	4.82

Remedial Measures Taken:

- Sempatap Insulation

Analysis

The thermal image entitled 'before' was taken previous to any renovation work. In the image an area of temperature inconsistency can be seen by the red and yellow colours to the top right of the lower window. Some minor increases in temperature can also be seen around the windows and below the eaves, this is indicative of heat loss via missing/damaged insulation and/or poor detailing. Analysis of the property after insulation has been applied reveals more consistent temperatures revealing a better level of insulation and thus less energy loss.