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Thermographic Survey Report

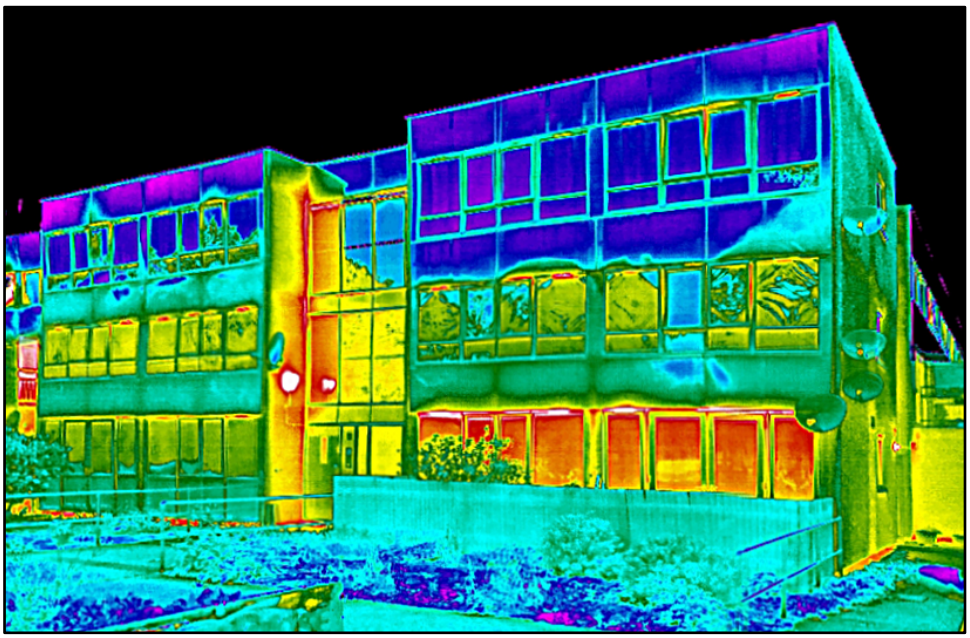
To Investigate

The 'Continuity of Insulation'

At

Eastfield Estate
Mitcham
Greater London
CR4 1BX

Prepared For:	MLM	Survey Date:	05/11/14
Thermographers:	R.Faulkner G.Winser	Project No:	15081



Chas Accredited

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APPROVED LEVEL 2 THERMOGRAPHER

APPROVED TRAINING ORGANISATION

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Summary

This survey was undertaken to provide enough thermographic information about the property to enable an observer to make a reasonable determination concerning the 'Continuity of Insulation' and 'Thermal Bridging'. The criteria used have been a combination of objective testing and subjective comparisons of the building surfaces.
Environmental conditions for 5th November we good to undertake an external survey, but given the circumstances no individual property occupier was approached and therefore internal conditions have had to be assumed.
Overall, the individual block types appeared to offer similar thermal performance. Thermal bridging is most evident on end walls where not obscured by cladding panels. Internal corners often show the greatest heat loss in part due to the geometry. However there are several instances which may benefit from closer examination. Communal entrances also showed heat loss and therefore further checks into construction, single glazing, air gaps and door types may offer easy short term opportunities for improvement.
There may be a valid explanation, but our main concern was with the amount of heat loss seen on the garage doors. Some questions to ask include: Has the first floor slab been insulated below? Are there any primary unlagged heat sources in the garage? Was the garage constructed within or outside the thermal envelope?
Depending on how this report fits with existing enquires, the next stage would be to identify strategic sample units and re-inspect both internally and externally to ascertain how the internal environment appears across the floors walls and ceiling. This will also provide good evidence for thermal comfort levels and help decide whether possible complaints are lifestyle issues or building fabric limitations.

Mr R Faulkner
PCN IRT Level 3 CEM

About Thermography

Thermography is a term used to describe a type of photography that uses infrared radiated wavelengths to make pictures as opposed to visible light as in normal photographs. It can be also referred to as 'thermal imaging' or 'infrared'. When undertaking building surveys, iRed use one of the most sophisticated thermal imaging cameras available to the commercial market with detector sizes up to 640 x 480. In digital camera terms this may initially be dismissed as a very low resolution, but it must be remembered that the data captured is equivalent to a thermometer in each cell; a maximum of 307,200 thermometer readings in every image. Several hundred individual images are often captured during the course of a survey which are later stitched into a number of panoramic thermograms.

Scope

This survey and report combines images to provide a general thermographic overview of the external walls, from the outside of the property. Whilst care has been taken to record temperatures as accurately as possible, the absolute values obtained should be treated with a degree of caution. Variable environmental conditions together with changes in camera angle; distance, material change and emissivity can all adversely affect the result. However, by combining images with equal parameters the 'relative' change of temperature across a selected material will be accurate and therefore useful analysis can be made.

From discussions prior to the survey, the following points have been incorporated into the methodology of data collection and presentation of findings.

- The survey to be a combination of general scanning and capturing of selected images that may fairly represent the situation. (Qualitative Survey).
- Anomalies noted to be identified either within the narrative or on the image.
- The survey to be conducted in accordance with the criteria set out in:
  - BRE 176 ' A practical guide to infra-red thermography for building surveys'.
  - BRE Information Paper IP 1/06 'Assessing the effects of thermal bridging at junctions and around openings' BRE 176 ' A practical guide to infra-red thermography for building surveys'.
  - BS EN 13187: 1999 'Thermal Performance of Buildings – Qualitative detection of thermal irregularities in building envelopes – Infrared method',
- Provide sufficient image data to allow a competent third party to replicate the process and findings presented in the report.
- Record and include any relevant environmental and meteorological data.

Methodology

Environmental data from outside and within the building were recorded for the times of image capture. To negate the effect of 'solar gain', external images were taken at night at least two hours after sunset. A series of representative images were later stitched into a number of panoramic thermograms.
From empirical evidence, iRed have developed a set of rules to ensure an observer can be assured that each thermogram fairly represents the actual situation.

- Every thermogram must be accompanied by a temperature scale with sufficient numerical values to enable an observer to equate a colour or shade with a temperature.
- There are several widely available palettes in common thermographic use, but given the relatively narrow temperature range within which a building is exposed, the 'Rainbow' pallet provides the most distinctive clarity and is usually the preferred.
- The temperature scale adopted within a report will determine how much impact each of the images portray. Without forethought a completely false impression could be created and therefore iRed use a system that determines the eventual scale.
    - For external surveys, the outside air temperature should be the coldest item observed. The upper end is determined with reference to the estimated internal temperature. Anything that appears warmer must be artificial such as a light or the boiler exhaust vent. Quite often, the top end will vary between 15°-25° above the bottom but rarely exceeding the internal air temperature. The tighter the scale the more discernible the temperature change across a surface can be observed.
    - Internally, the start point is to bracket the internal air temperature with 5°C above and 5°C below to give a 10° span. The span is then adjusted to account for the actual range encountered but rarely exceeding a 15° span. However no internal measurements were captured for this report.
- Finally, the report should aim to provide consistency in thermogram production settings to enable a direct visual comparison to be made between elevations and other points of interest.

Environmental & Technical Data

Condition for External Images	Advice	Actual
Necessary surfaces free of direct solar radiation for at least one hour :	Yes	Yes
Temperature difference across the building fabric ≥ 10°C :	Yes	Yes
Internal air to ambient air temperature difference ≥ 5°C for last 24 hrs. :	Yes	Unknown
Amb air temperature within +/- 3°C for duration of survey and preceding hour:	Yes	Yes
Amb air temp, within +/- 10°C for preceding 24 hrs. (12 hrs. for ltwght fabric) :	Yes	Yes
Free from precipitation just prior to or during survey? :	Yes	Yes
Are the building surfaces to be inspected dry? :	Yes	Yes
Is the wind speed below 5 m/s (Measurement taken at 2m height)? :	Yes	Yes

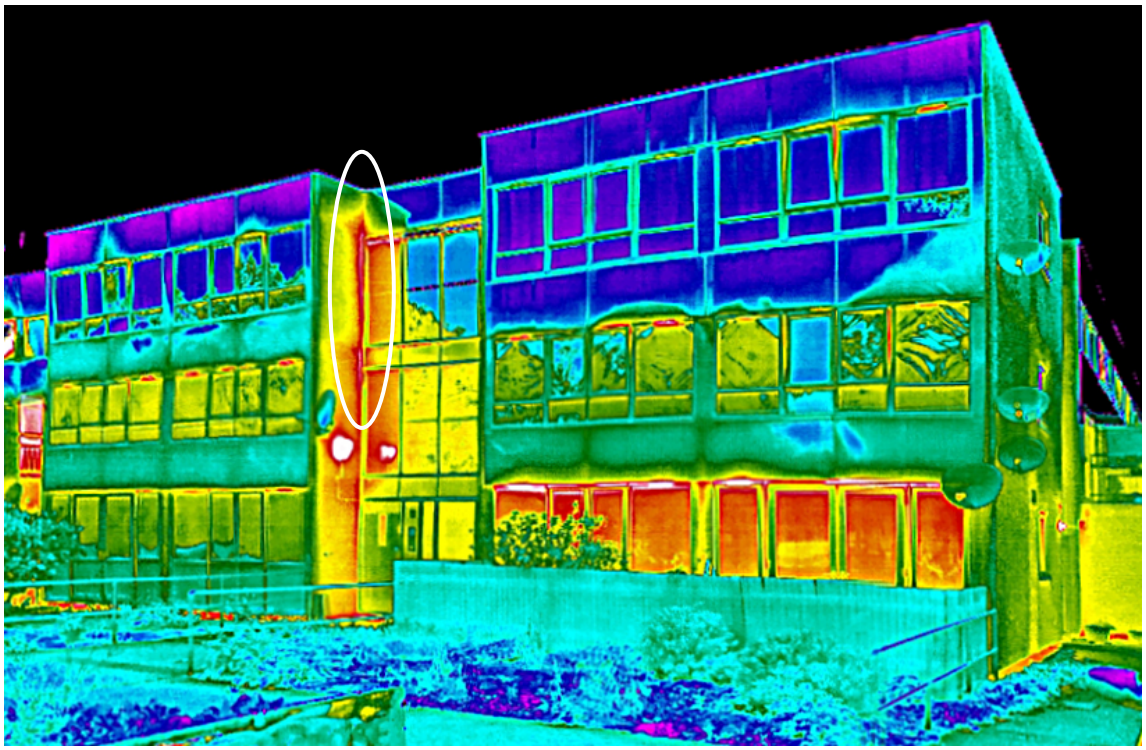
Wunderground

The weather and forecast were monitored with 'Weather Underground', which collates data from weather stations in the local area.

Item	Pre – Survey Conditions	Start	End
Time:	Previous 6 to 12 Hours.	20:30	22:30
Ambient Air Temperature:	High of 9°C during Day	7°C	4°C
Internal Air Temperature:	Unknown but assumed circa 20°C	Unknown	Unknown
Wind Direction:	Mainly NW	LV	LV
Wind Speed:	Maximum 5.7 m/s during day	<1m/s	Calm
Precipitation:	Nil	Nil	Nil
Building Surfaces:	Dry	Dry	Dry
Cloud Cover:	Scattered Clouds	0%	0%
Sunset:		16:28	

Camera		Weather Station	
FLIR B400		Kestral 4500	
Serial No.	160002134		Accuracy
Calibration Cert. No.	13230	Temp:	±1°C
Calibration Date:	01/07/2014	Wind Sp:	±0.1 m/s
Lens Type:	25°	Wind Dir:	±5°
Image capture:	05/11/14	RH%:	±3%
Display Image type:	Rectilinear stitch	Baro:	±1.5 mbar
Emissivity:	0.92		

57 – 62 Clay Avenue – South Elevation



Comments:

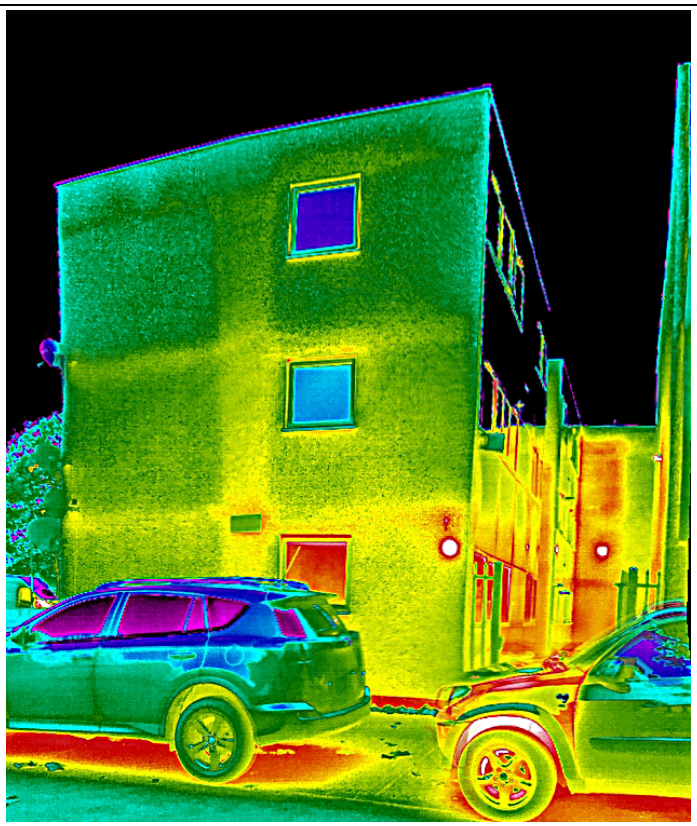
When first observing a thermogram, it is important to look at the scene in general and not be drawn into finding so called 'hotspots'. Within the visual spectrum it is common to make reasonable assumptions or to draw conclusions, but this has been honed by years of experience. Instead, force yourself to observe different and otherwise inconsequential details such as the colour of the ground and fence which are after all natural and unheated objects. In this instance they appear about 6°C or within a degree of the measured air temperature. This gives a reference point to start judging the effectiveness of the building elevations.

The striking change in the above image is the 2nd floor that generally appears to be 4°C and below. Logically this cannot be real and is in fact the result of reflection from the night sky. However this will not stop anomalies from being detected such as the heat loss from around some 2nd floor windows. The main anomaly is circled white and similar examples will be discussed later.

Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Relative Humidity:	N/A
Distance To Target:	10 m
Wind Speed:	<1m/s

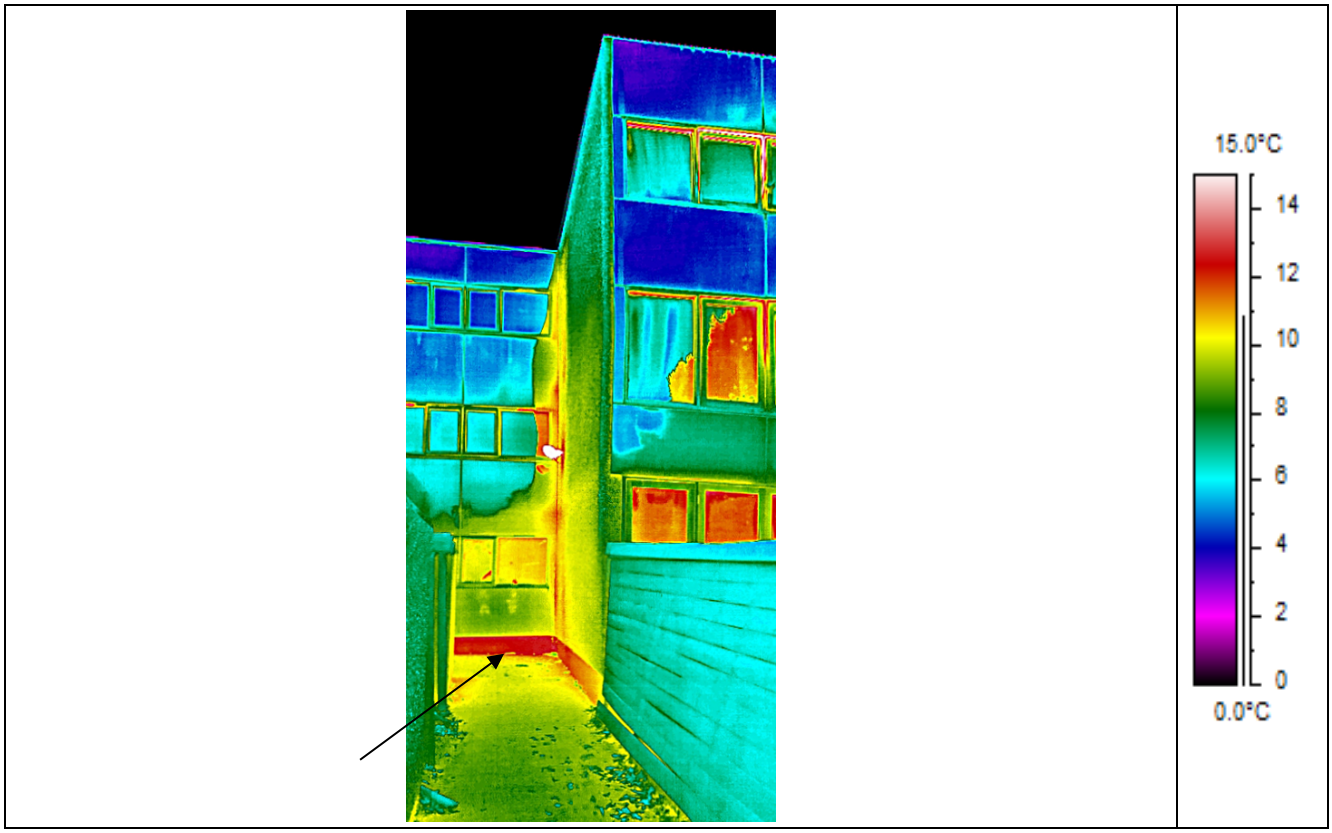
Digital Image:

57 – 62 Clay Avenue – North East Corner



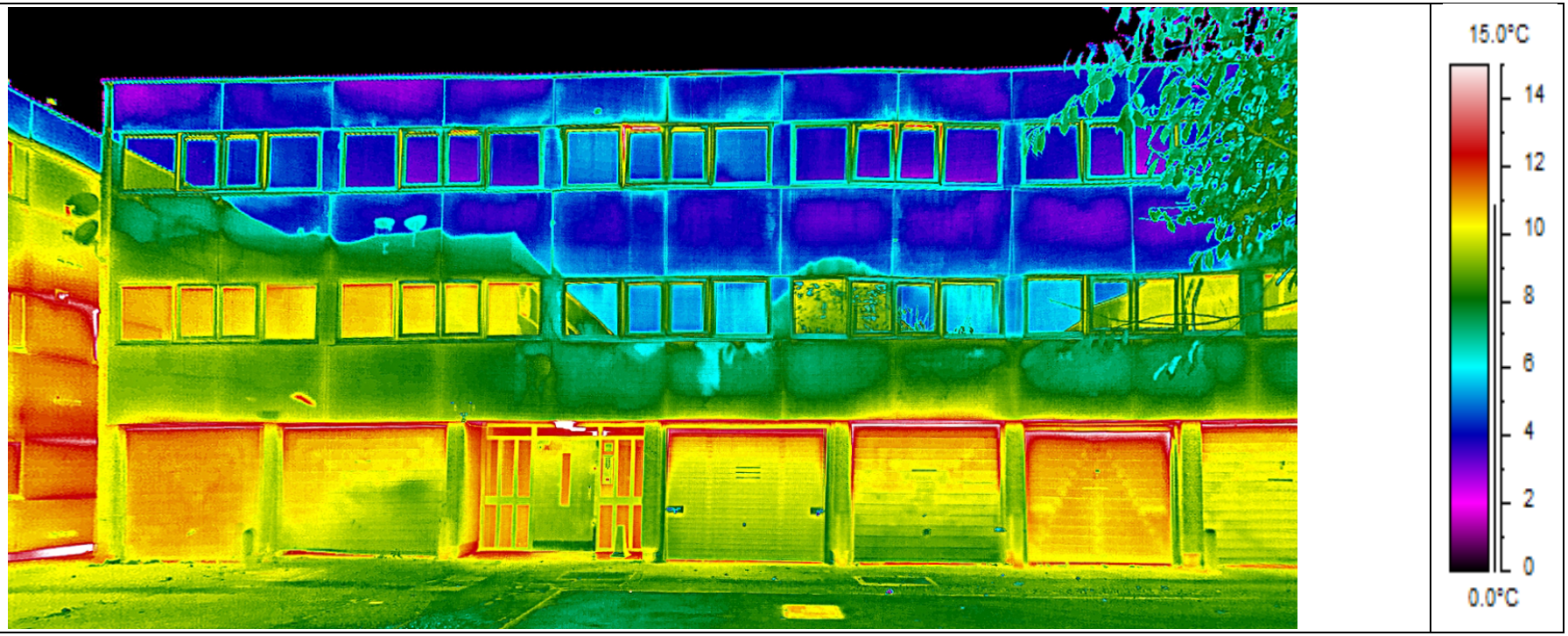
Comments:		
The general impression of cooling from ground to 2nd floor will be influenced from the sky and possibly buildings behind the camera. Also, without knowing the exact internal conditions only a guess can be made. However, the vertical and horizontal yellowish lines at each floor level suggest there is some thermal bridging from each floor slab.		
Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	10 m	
Wind Speed:	<1m/s	

57 – 62 Clay Avenue – North East Join



Comments:		
The black arrow highlights a potential weak area. Firstly, it could be below the DPC in which case it is naturally damper than the elevation. Thus, it may have retained more heat from a raised capacitance. Alternatively, there could be a thermal bridge through the floor slab which may lead to a significant heat loss. Further investigation on the internal walls may help confirm the matter.		
Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	10 m	
Wind Speed:	<1m/s	

13- 32 Potter Close – South Elevation – Left Side



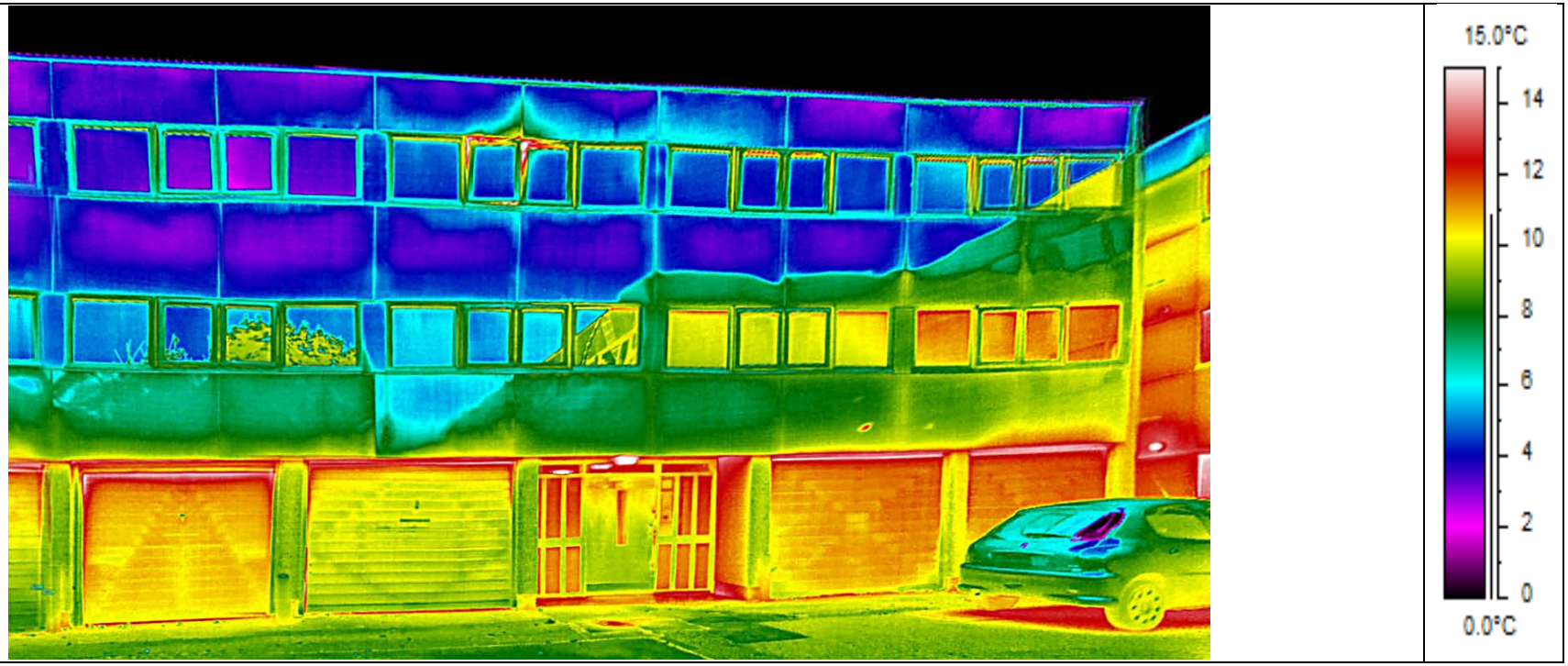
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	<1m/s

Digital Image:

Comments:

It is almost possible to define the reflected skyline in this image. Despite this, some marginally weaker areas to the elevation can be detected along with slightly open windows or windows with a poor seal.
However, the main point of concern are the garages. It is presumed they are unheated spaces and outside the thermal envelope and therefore should not generate any heat. This should be investigated further.

13 – 32 Potter Close – South Elevation – Right Side



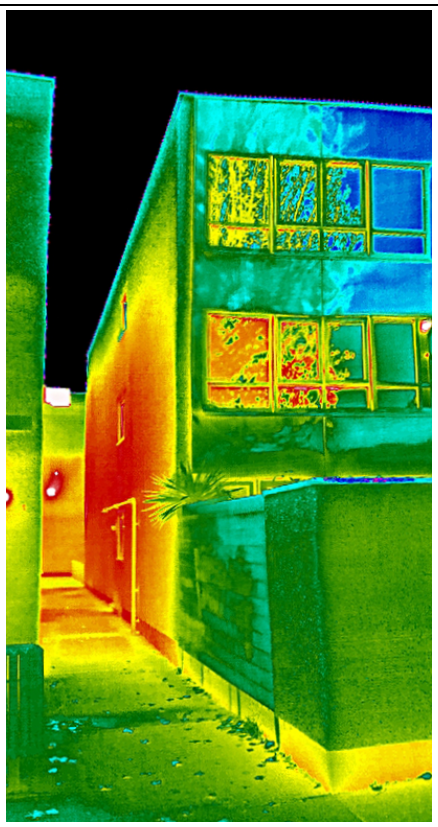
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	<1m/s

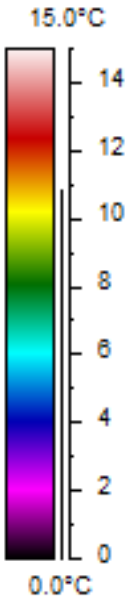
Digital Image:

Comments:

Window on top floor is open and can be ignored.
In addition to the garages discussed before, the main entrance appears to be thermally weak. The door and glazing should be checked for thermal integrity together with all seals.

13 – 32 Potter Close – North East Corner





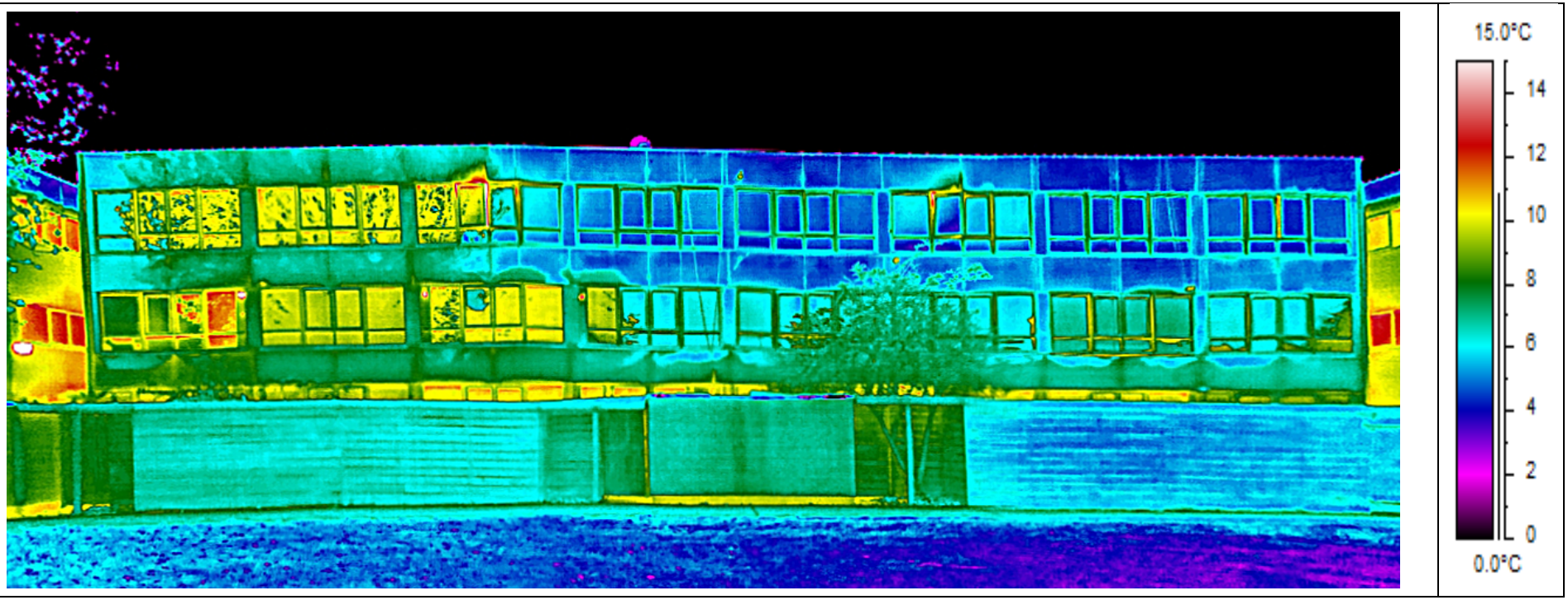
Comments:
It is suspected that the side elevation is generally protected by the close proximity of the adjacent building thus leading to a build-up of heat. Again, an internal survey of this particular outside wall could be compared with other walls in the room to confirm if there is significant heat loss from the elevation.

Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Relative Humidity:	N/A
Distance To Target:	10 m
Wind Speed:	<1m/s

Digital Image:

Front image of block

13 – 32 Potter Close – North Elevation



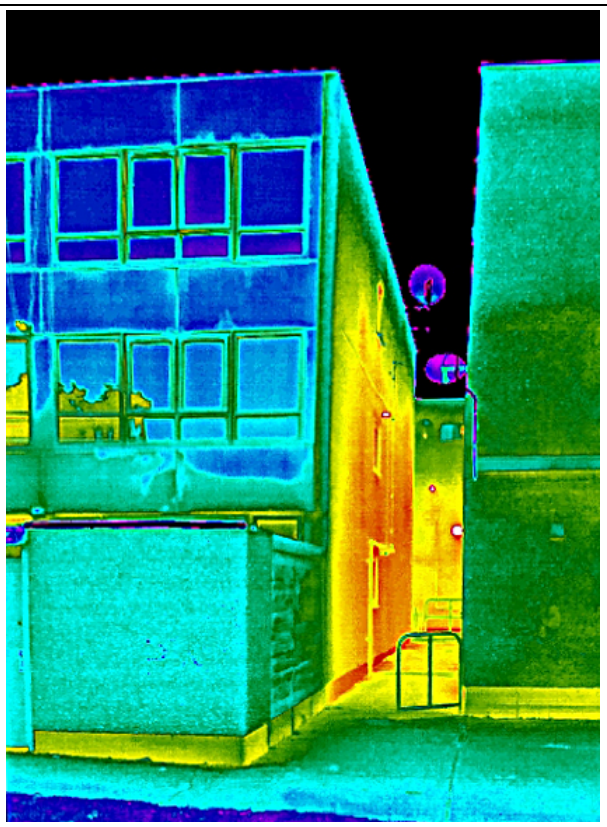
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	1m/s

Digital Image:

Comments:

Windows on top floor open.
The colour variegation to the 1st and 2nd floors are mainly due to reflection and can be ignored.

13 – 32 Potter Close – North West Corner

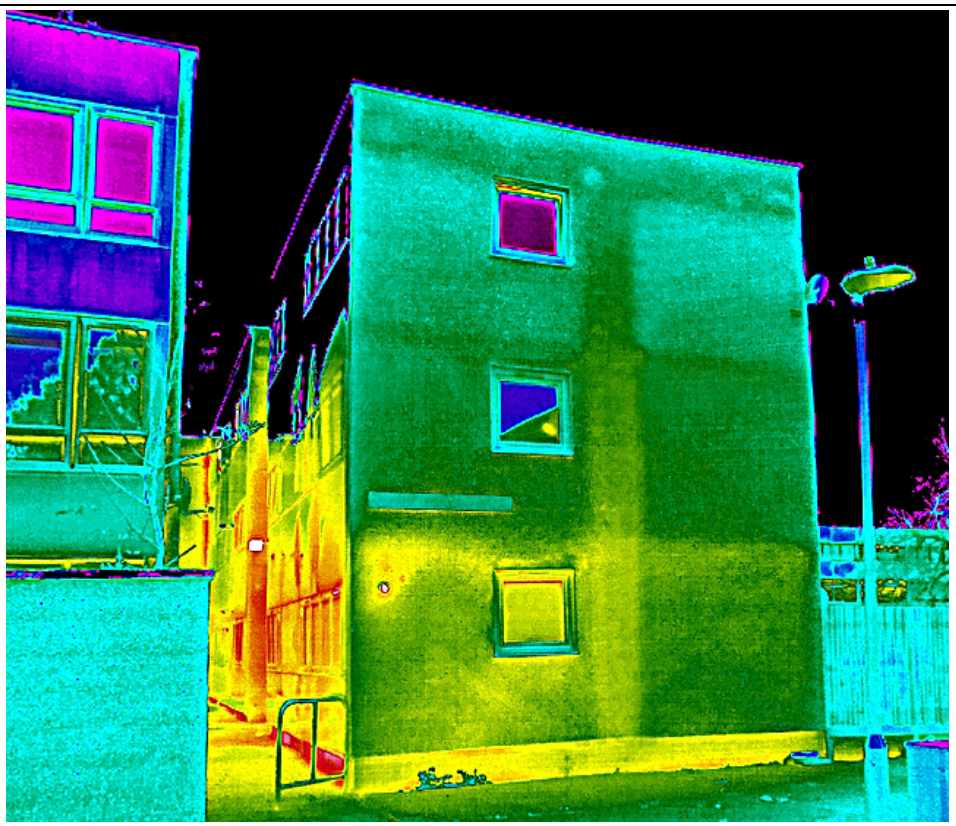


Comments:
No further comment

Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Relative Humidity:	N/A
Distance To Target:	10 m
Wind Speed:	<1m/s

Digital Image:

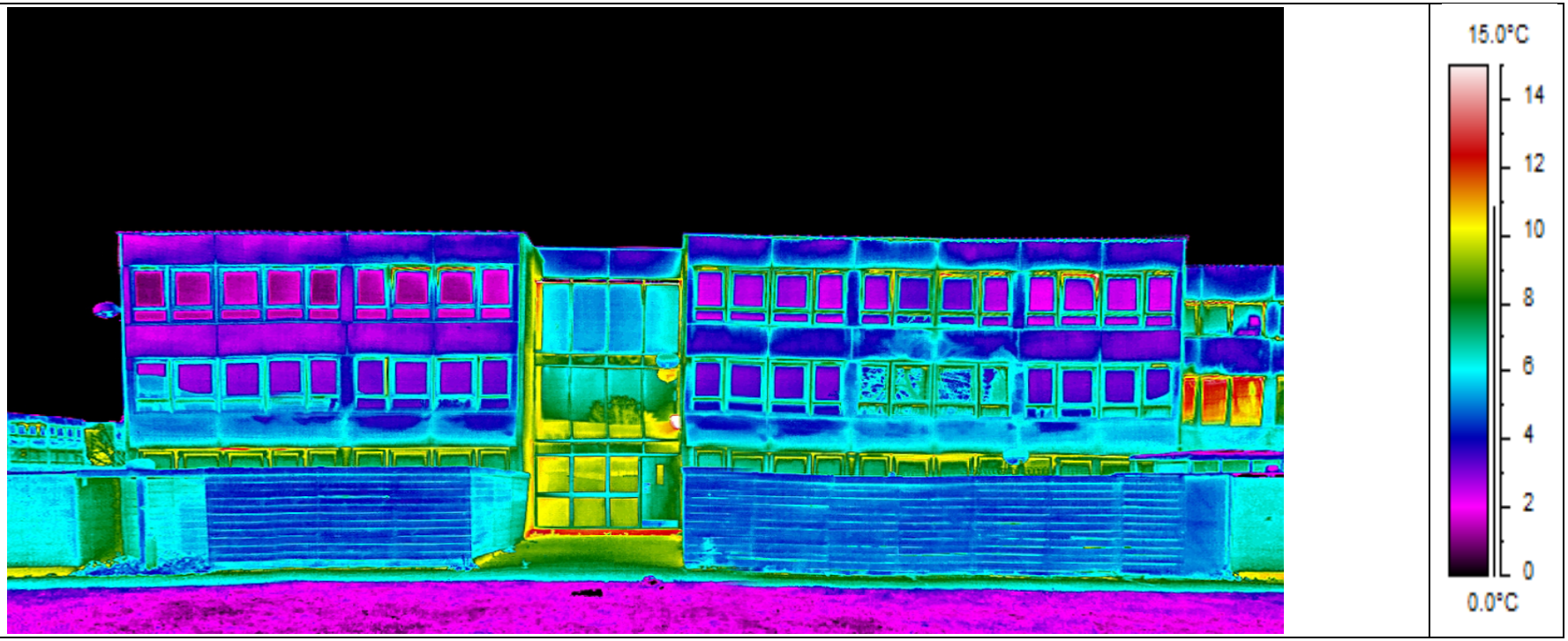
7-12 Thrupp Close – North West Corner



Comments:
Some evidence of thermal bridging on the end wall.

Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	10 m	
Wind Speed:	<1m/s	

7-12 Thrupp Close – South Elevation



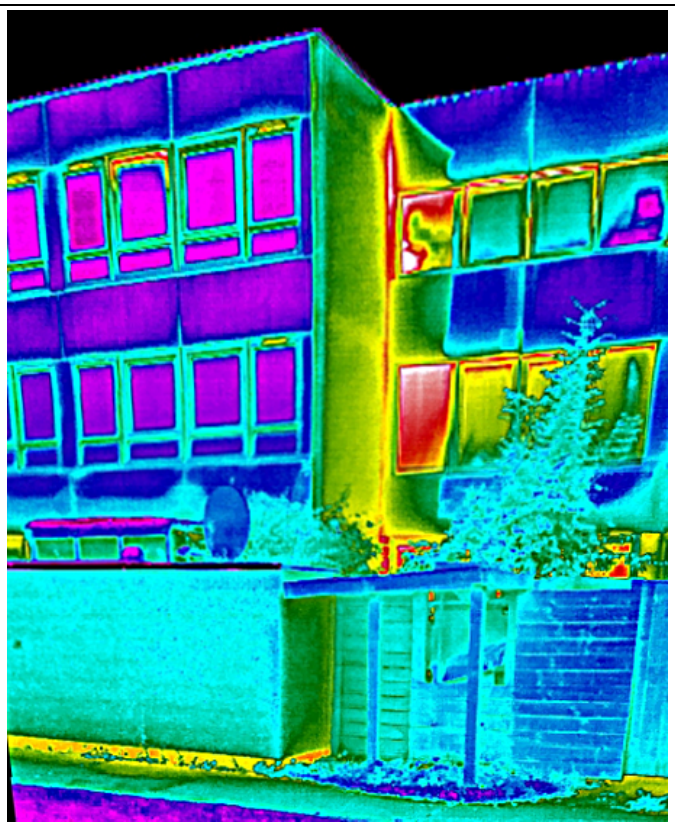
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	1m/s

Digital Image:

Comments:

No further comment.

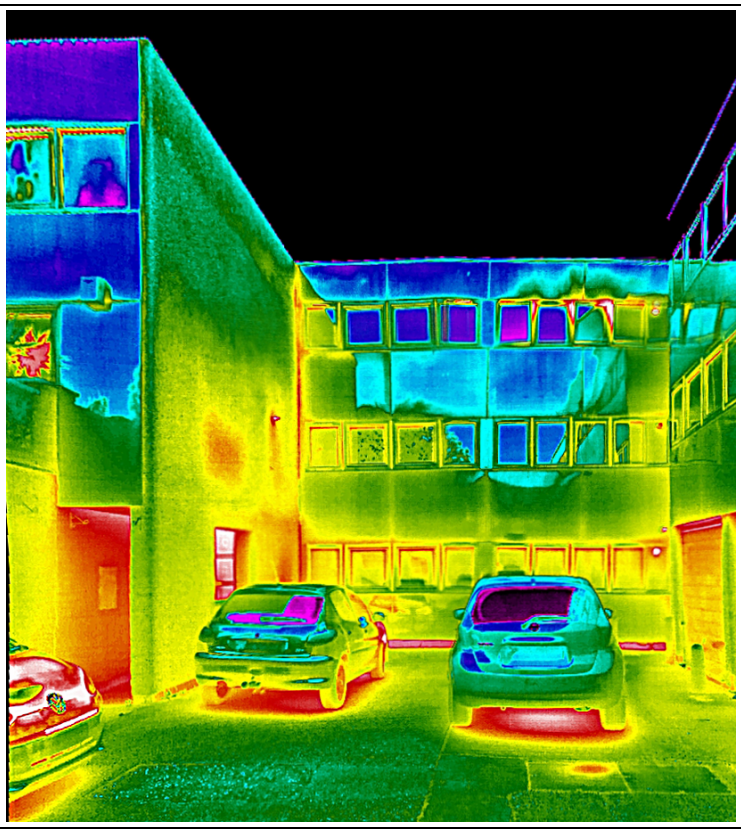
7-12 Thrupp Close – South East Join



Comments:
There is a significant anomaly at the internal corner on the 2nd floor. From the temperature it could be either air leakage or more probably missing / poor insulation. It is more than just the detail design, because the problem appears centred in just one area.

Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	10 m	
Wind Speed:	<1m/s	

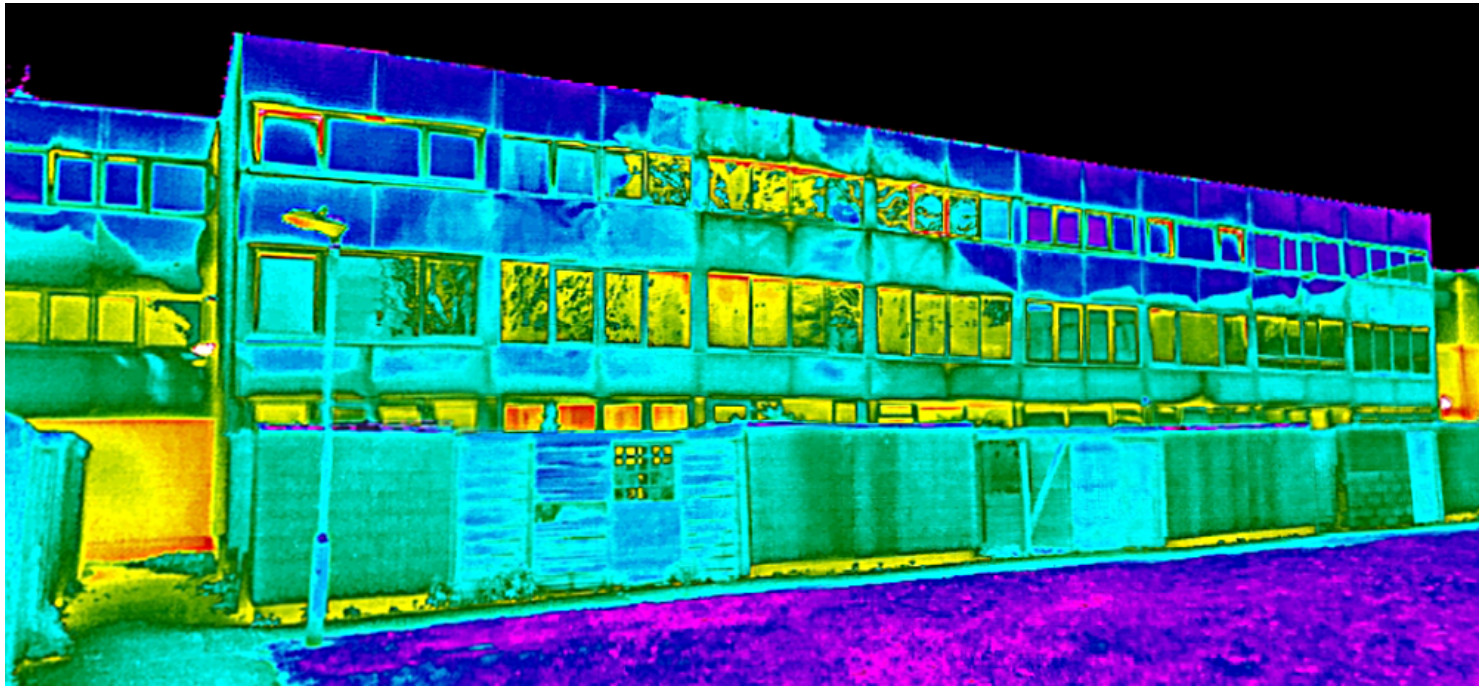
7-12 Thrupp Close – North East Join



Comments:
Open Windows

Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	10 m	
Wind Speed:	<1m/s	

1-8 Pains Close – North Elevation



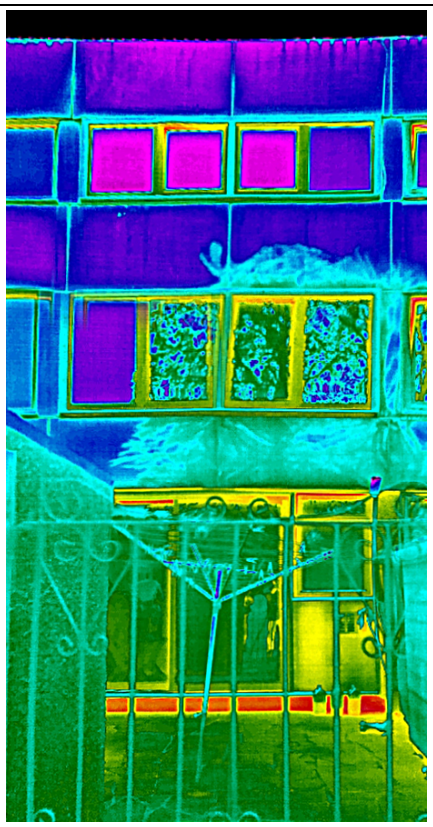
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	1m/s

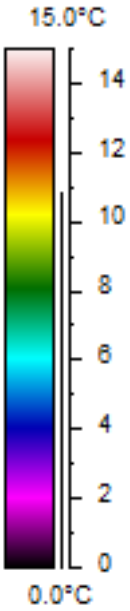
Digital Image:

Comments:

Some open or windows with poor seals.

1-8 Pains Close – North Elevation – No. 4 Close Up

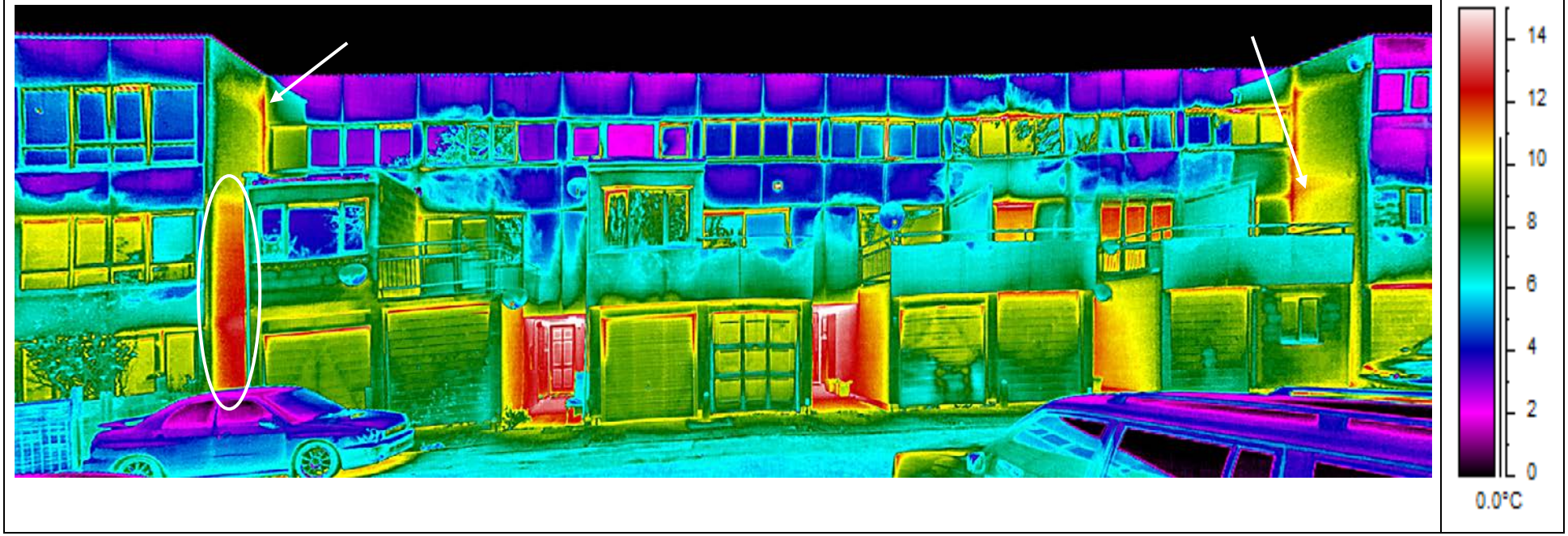




Comments:
This image is fairly representative of how the ground floor elevation appears on this block.

Object Parameters:		Digital Image:
Air Temperature:	7°C	
Reflected Air Temperature:	-60°C	
Emissivity:	0.92	
Relative Humidity:	N/A	
Distance To Target:	4 m	
Wind Speed:	<1m/s	

1-8 Pains Close – South Elevation



Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10m
Wind Speed:	<1m/s

Digital Image:

Comments:

Both of these visible doorways appear to show significant heat loss over the expected level for a protected area. The white arrows indicate further similar examples of thermal bridging.
The red area highlighted by the white circle should be investigated further as the main heat loss appears to have definite constraints at the 2nd floor level.

51-60 Pains Close – West Elevation - South End

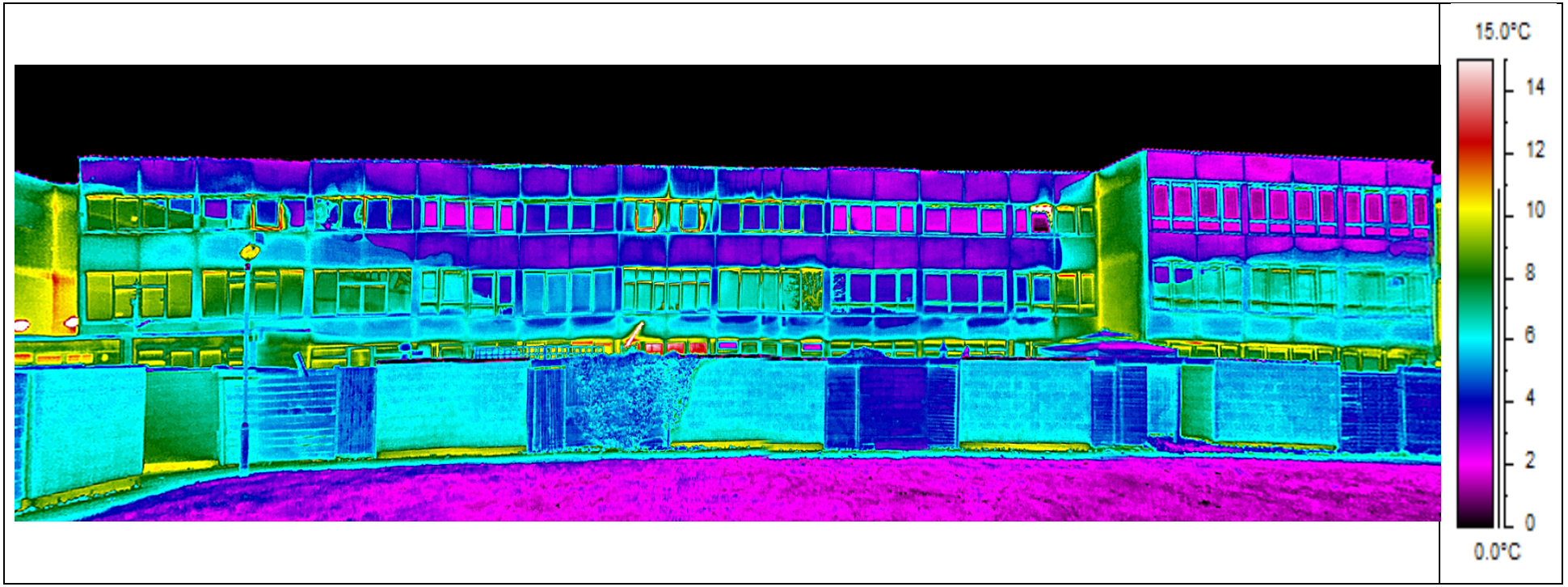
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10 m
Wind Speed:	<1m/s

Digital Image:

Comments:

The two Panels on top floor looked different visually and may have been replaced at some point.
Otherwise, the garage conversions and 1st floor addition contained within the white circle show thermal bridging along the window lintels, along the ground and 1st floor slabs, together with a general weakness defined by clearly visible mortar lines around the blockwork.

51 – 60 Pains Close – East Elevation



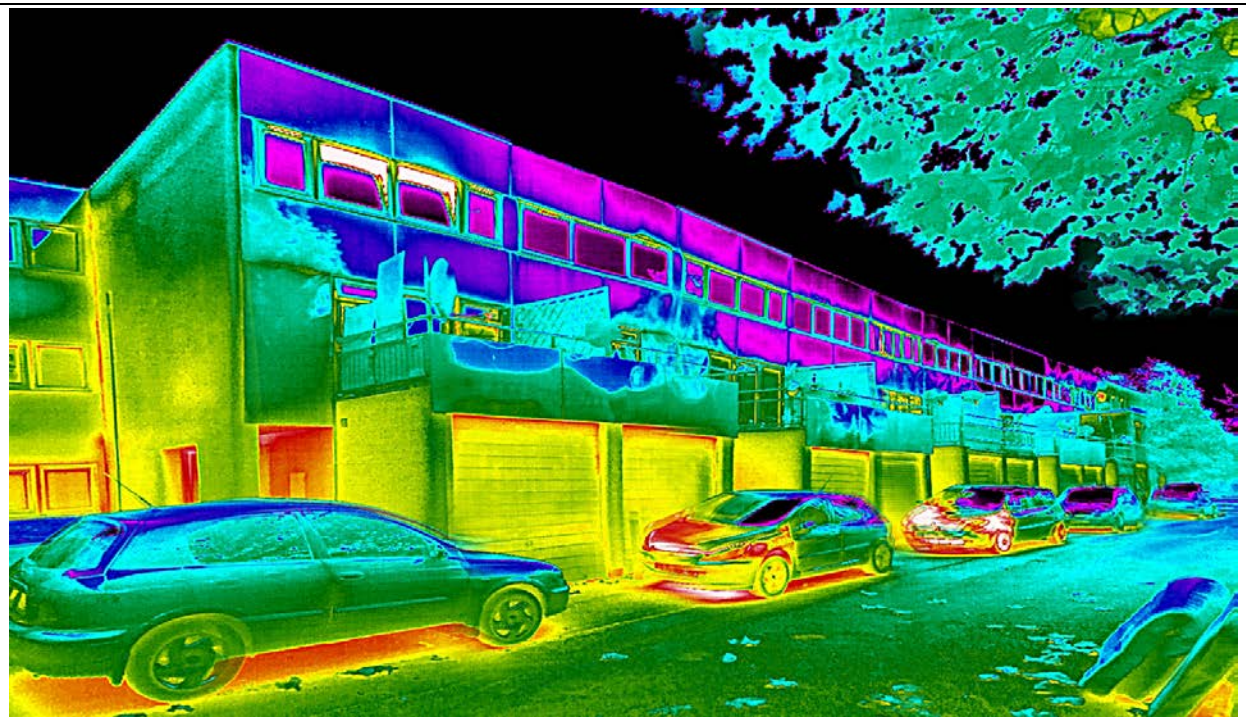
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	10
Wind Speed:	<1m/s

Digital Image:

Comments:

No further comment.

51-60 Pains Close – West Elevation – North End



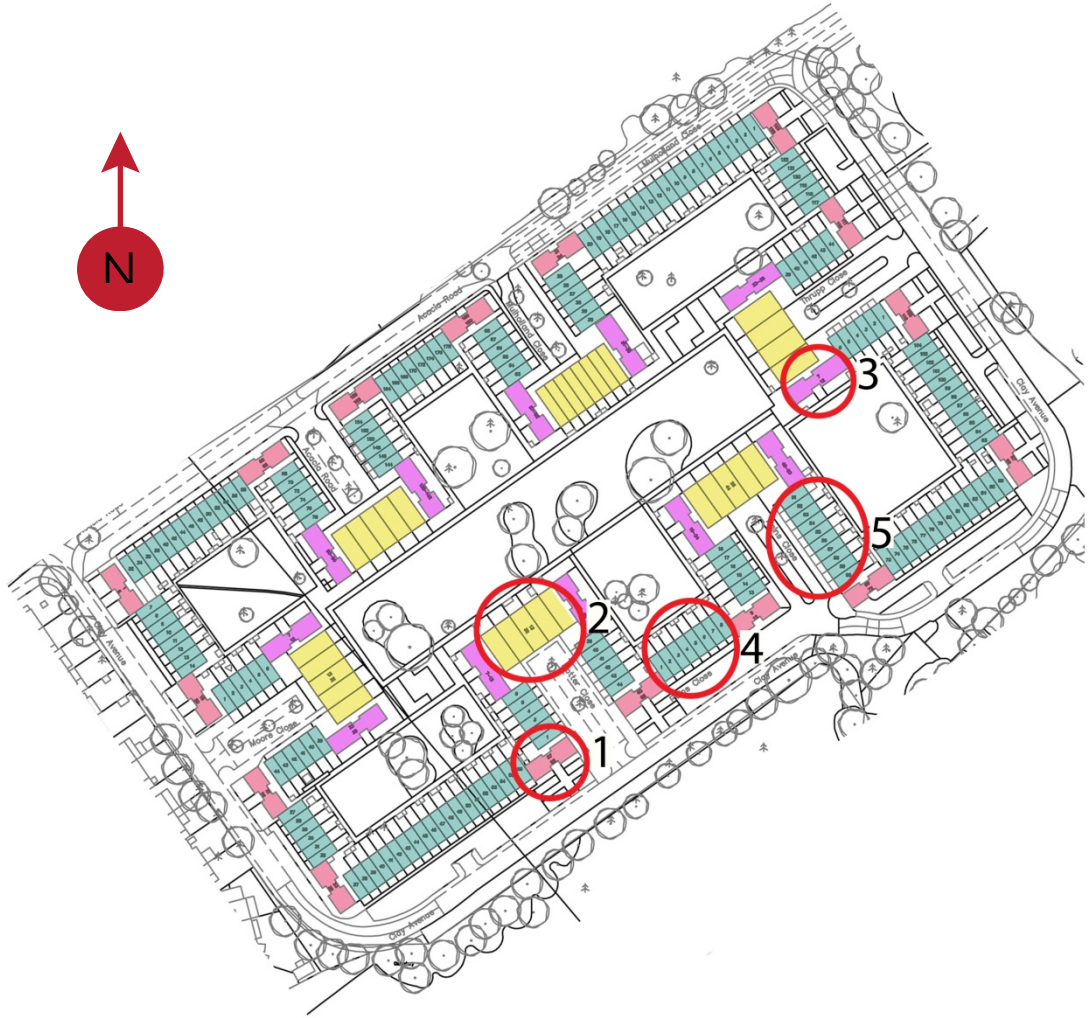
Object Parameters:	
Air Temperature:	7°C
Reflected Air Temperature:	-60°C
Emissivity:	0.92
Distance To Target:	4 m
Wind Speed:	<1m/s

Digital Image:

Comments:

Open windows on top floor.
No further comment.

Appendix – Estate Plan



1. 57-62 Clay Avenue
2. 13-32 Potter Close
3. 7-12 Thrupp Close
4. 1-8 Pains Close
5. 51-60 Pains Close