

# Become an Energy Champion



Sixth Assessment Report  
**SYNTHESIS REPORT**

**ipcc**  
INTERGOVERNMENTAL PANEL ON climate change



# URGENT CLIMATE ACTION CAN SECURE A LIVEABLE FUTURE FOR ALL

**#IPCC**

**#ClimateReport**



# Energy Champions are Community

## Volunteers

### Caveats in the Survey Report

The survey and report are carried out by volunteers with some training but no professional expertise. Please obtain professional advice and surveys for any major alterations to the building's fabric.

Loddon Community Energy has to make clear what the limitations of this report are: It is not a structural or condition survey of the property and has not been carried out by professionally qualified surveyors and so must not be used in such a way. It is simply a free outline of the property's thermal limitations for the sole purpose of trying to help the existing occupier make the property more energy efficient and thereby saving energy and carbon emissions.

The survey is undertaken by volunteers with little or no training in the complex science of building physics and so we seriously recommend that before an owner/occupier undertakes any major works implied by this report they should take professional advice in case of unforeseen consequences.

# Health and Safety

## Insurance

- Public Liability
- Employers Liability
- Professional Indemnity

**Lone Working** – keep yourself safe

**Safeguarding** – keep others safe

*Don't work at height*



# Working in other people's homes

- Make sure someone knows the address you are going to, and when you are due to return
- Give some thought before you arrive to what exit strategies you could use if you felt uncomfortable or threatened.
- Be prepared to show ID, explain your reason for visiting and wait to be invited in before you enter.
- Conduct your own 'Dynamic Risk Assessment' on the door-step before you enter. If you feel at all uncomfortable, make an excuse and leave. Trust your instincts.
- Do not enter the premises unless the person you expect to meet is there. If they are not, say you will return later or re-arrange the appointment for another day.
- Give the person you are visiting some indication of how much of their time you expect to take and try to stick to it.
- As you enter, make a note of how the door opens and closes so that you can leave quickly, if necessary.
- Take note of your surroundings and possible exits.
- If you are uncomfortable about any animals in the room with you, ask to have them removed.





# Why retrofit?

- Carbon emissions of home energy - 20% + of all UK emissions
- Electricity grid due to be decarbonised by 2035
- Benefits of reducing energy use
  - Lower carbon emissions
  - Lower energy costs
  - More comfort
  - Better health
- How to retrofit
  - Reduce heat loss
  - Generate renewable energy
  - Low carbon heating system



**#STOPBURNINGSTUFF**



**SOLAR  
PANELS**



**HEAT  
PUMPS**

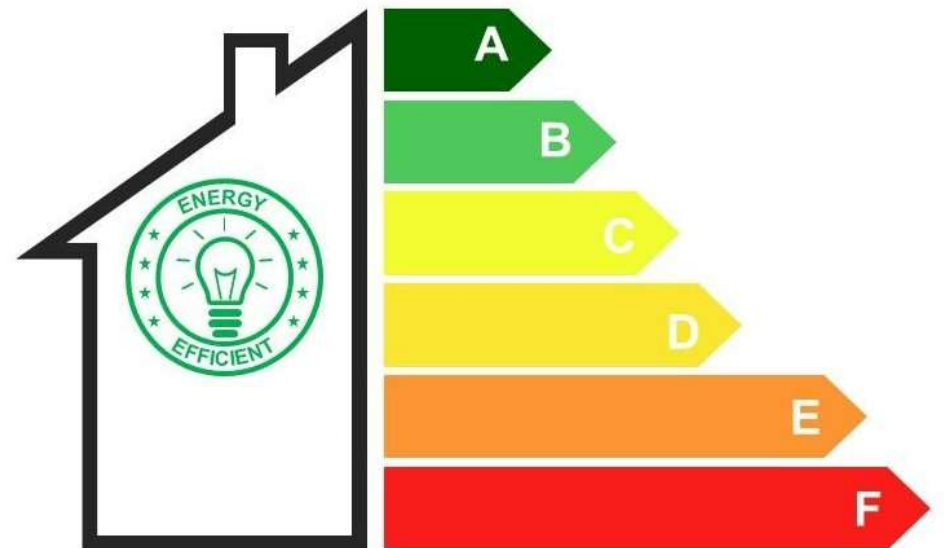


**INSULATION**

**REDUCE YOUR HOME'S  
ENERGY USE AND  
CARBON FOOTPRINT**

# Five steps to energy efficiency

- Maintain/repair any leaks and stop draughts
- Insulate the fabric of a building
- Consider the efficiency of your appliances and lighting
- Add renewable energy systems
- Install a low-carbon heating system to replace gas or oil



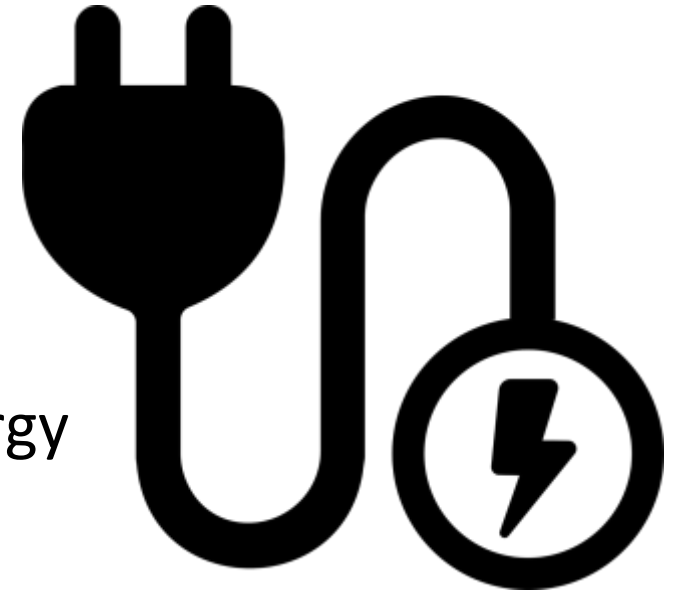


# How heat escapes from a building

- Convection - heat moves via air
- Conduction - heat moves through objects
- Radiation - heat moves as energy waves
- Draughts - uncontrolled ventilation - replace with controlled ventilation
- Principles of retrofit
  - Fabric first
  - Even, all-round insulation
  - Make building airtight



# Units of Energy



- 1 unit of electricity = 1 kWh
- 1 kWh = 1,000 watts of power running for 1 hour = energy
- Appliance energy use - [What Uses Watt:](#)
  - Kettle – 3 kW = 3,000 W
  - TV – 50 W
  - Washing machine – up to 1.5 kW = 1,500 W
- Average energy use for a 3-bed semi with gas central heating:
  - Gas – 12,000 kWh
  - Electricity – 3,000 kWh

# M Hello, here's your energy statement

Covering: 8 Mar 2023 - 8 Jun 2023

Statement Date: 9 Jun 2023

Customer number: A6742000

Your previous balance on 9 Mar 2023	<b>£416.77</b>
Total energy costs (excluding VAT)	£385.06
VAT at 5%	£19.25
Total energy costs (including VAT)	£404.31
You've paid us	£452.36 Credit
Your new balance on 9 Jun 2023	<b>£368.72</b>

## Your monthly payment

We will regularly review your payment amount of £173.12 to make sure you're on track to cover your expected energy use.

We've applied the Energy Price Guarantee to your tariff. To view your rates visit [britishgas.co.uk/epg](https://britishgas.co.uk/epg)

### Your Electricity tariff:

Standard Variable Tariff

**Paid by:** Monthly Direct Debit

**Exit fee:** None

**Estimated annual usage:** 1,740.23 kWh

**Estimated annual cost:** £764.31

### Your Gas tariff:

Standard Variable Tariff

**Paid by:** Monthly Direct Debit

**Exit fee:** None

**Estimated annual usage:** 9,577.5 kWh

**Estimated annual cost:** £1,103.33

You're already on our cheapest tariff. However it's a good idea to check online for the best deals

## Have you got a question about your statement?

You can live chat to us by logging into your account or visiting [britishgas.co.uk/contact](https://britishgas.co.uk/contact)

We're available Monday to Friday, 9am to 5pm. Alternatively, if you're unable to chat to us online, you can call us on 0330 808 3880

## Your account in detail

Your previous balance on 9 Mar 2023

**£416.77**

### Electricity

Electricity meter number: 21L4591170

8 Mar 23 - 1 Apr 23 95.8 kWh at 32.646p per kWh £31.27  
02385.7 - ACTUAL  
02481.5 - ACTUAL

9 Mar 23 - 31 Mar 23 Standing charge £9.73  
23 days at 42.298p per day

Electricity meter number: 21L4591170

8 May 23 - 8 Jun 23 Anytime readings £42.14  
132.0 kWh at 31.921p per kWh  
02644 - ACTUAL  
02776 - ACTUAL

8 Apr 23 - 8 May 23 Anytime readings £41.91  
131.3 kWh at 31.921p per kWh  
02512.7 - ACTUAL  
02644 - ACTUAL

1 Apr 23 - 8 Apr 23 Anytime readings £9.96  
31.2 kWh at 31.921p per kWh  
02481.5 - ACTUAL  
02512.7 - ACTUAL

1 Apr 23 - 8 Jun 23 Standing charge £32.60  
69 days at 47.235p per day

**Total Electricity costs (excluding VAT) £167.61**

### Gas

Gas meter number: E6S19562492161

8 Mar 23 - 1 Apr 23 929.7 kWh at 9.958p per kWh £92.58  
01140.4 - ACTUAL  
01224.1 - ACTUAL  
83.7 gas units at 39.1 calorific value

9 Mar 23 - 31 Mar 23 Standing charge £6.24  
23 days at 27.128p per day

Gas meter number: E6S19562492161

8 May 23 - 8 Jun 23 195.0 kWh at 9.915p per kWh £19.33  
01296.9 - ACTUAL  
01314.5 - ACTUAL  
17.6 gas units at 39 calorific value

8 Apr 23 - 8 May 23 596.4 kWh at 9.915p per kWh £59.14  
01243.2 - ACTUAL  
01296.9 - ACTUAL  
53.7 gas units at 39.1 calorific value

1 Apr 23 - 8 Apr 23 212.1 kWh at 9.915p per kWh £21.03  
01224.1 - ACTUAL  
01243.2 - ACTUAL  
19.1 gas units at 39.1 calorific value

1 Apr 23 - 8 Jun 23 Standing charge £19.13  
69 days at 27.72p per day

# Before you arrive

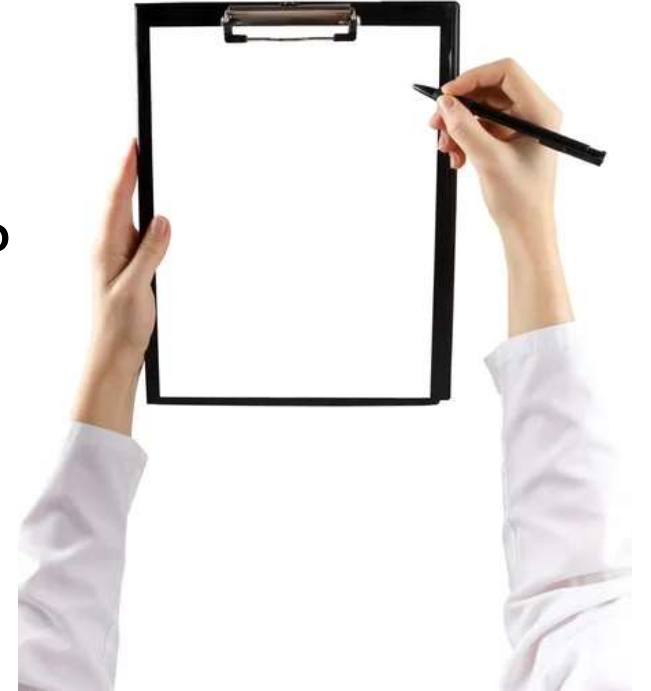


- Email to explain process
- Book a suitable date and time
- Check if resident owns or rents property (social housing?)
- Ask resident to find one year of energy bills
- Check EPC and council tax band
  
- Don't:
  - Make residents feel guilty for not doing enough
  - Pressurise residents to make changes
- Do:
  - Be sensitive to personal circumstances eg income, family, disability



# When you arrive at the property

- Ask the resident:
  - How long have they lived there?
  - What is their experience of living in the property?
  - Is it hard to heat or keep warm?
  - Any damp or condensation?
  - Any energy efficiency improvements eg CWI?
- Complete survey checklist
- Room by room check - watch out for damp, draughts etc



# During the survey

- Complete form with resident
- Start in loft or at top of house - look at insulation
- Look out for signs of damp or condensation, lighting, condition of windows
- Stop by hot water tank if any, view controls on this, on radiators and discuss programming
- Downstairs to view boiler, size of radiators, draught proofing, condition of front and door
- Check external condition of walls and roof
- Discuss recommendations & debate options, eg renewable energy



# Easy Wins

- Turn thermostat down to appropriate levels
- Reflector Foil behind radiators on external walls
- Lower boiler flow temp to 60C
  - only condensing combi boilers
  - not if very poorly insulated house
  - reduces energy use by around 8% - increases efficiency of boiler by making sure it runs in condensing mode to recover waste heat
  - [moneysavingboilerchallenge.com](http://moneysavingboilerchallenge.com)
- Draughtproofing – windows, doors, letterbox, service entry points, floorboards, skirting boards
- Insulate hot water cylinder and at least first metre of pipework



# Damp and Moisture

- Moisture inside the home produced by:
  - Breathing
  - Cooking
  - Bathing
  - Drying laundry
- Reduce this by:
  - Lids on cooking pots
  - Avoid drying laundry indoors
- Relative humidity - cold air holds less water vapour
- Condensation - air is saturated and cannot hold moisture at that temp.
- Mould - grows on cold surfaces when RH over 75%





# Controlled Ventilation

- Humidity controlled extraction
- Target wet rooms - bathroom and kitchen
- Trickle vents in windows
- Don't try to diagnose severe damp or mould



# Lighting

- LED - light emitting diode
- Up to 40% more efficient than compact fluorescent bulbs (CFL)
- No toxic elements
- Easy to install
- CFL life - 10,000 hrs, LED life - 25,000 hrs
- LED is 12% cheaper than CFL - for lifetime purchase and energy cost

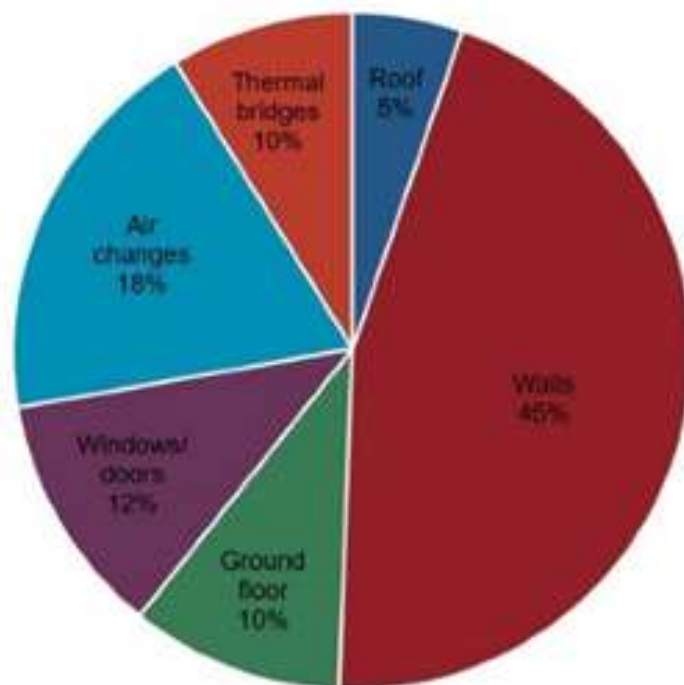


# Thermal Bridging

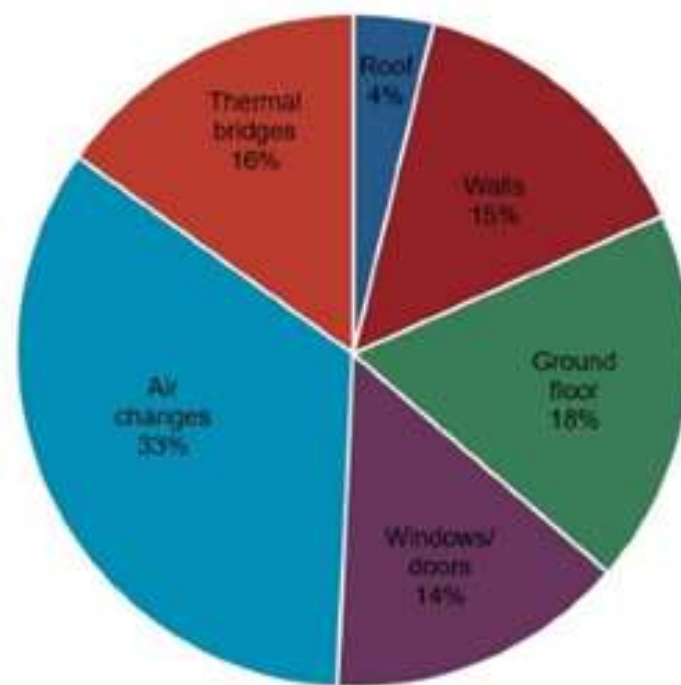
- An area that has a greater rate of heat loss than its surroundings
- Corners, junctions and edges – minimise with even and continuous insulation
- Minimise by paying attention to detail
- Lower surface temperature - condensation and/or mould growth
- Thermal bridge examples:
  - Window reveals
  - Nails in wood
  - Rafters
  - Timber studs



These charts show the percentage breakdown of heat losses from a typical dwelling before and after a retrofit. Note how the heat losses due to thermal bridging and poor air tightness now make up half of the total heat losses. Therefore, these must also be addressed in order to obtain the full potential benefits of the insulation - and avoid the risk of condensation.



Typical semi-100mm loft insulation, old double glazed windows, uninsulated solid walls and floor



After wall insulation (U=0.3), loft top-up and new windows (U=1.6) -no attention to air tightness or thermal bridges



# Insulation

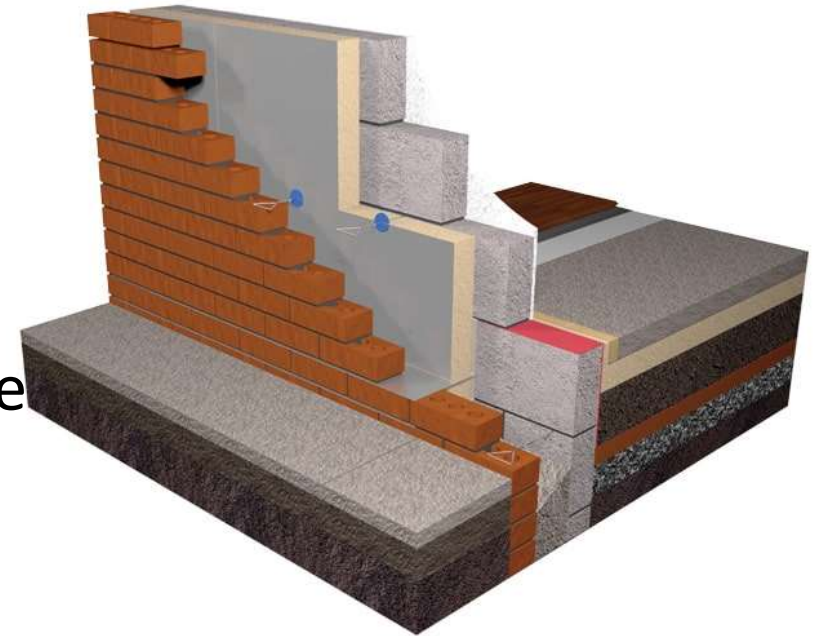
- Reduce the thermal conductivity of the building fabric
- Increase the thermal resistance
- Warmer in winter, cooler in summer
- Traditionally constructed buildings – maintain vapour permeability
- Walls - cavity wall or solid wall
- Loft - mineral wool roll
- Roof - room-in-roof
- Floor - solid or suspended floor



<b>Insulation Material</b>	<b>Thickness To Reach U = 0.30</b>	<b>Thickness To Reach U = 0.20</b>
<b>Aerogel™</b>	<b>37mm</b>	<b>60mm</b>
<b>Phenolic Foam</b>	<b>60mm</b>	<b>100mm</b>
<b>Polyisocyanurate (PIR)</b>	<b>65mm</b>	<b>105mm</b>
<b>Extruded Polystyrene (XPS)</b>	<b>75mm</b>	<b>115mm</b>
<b>Recycled Newspaper (Cellulose)</b>	<b>100mm</b>	<b>160mm</b>
<b>Wool from Recycled Glass</b>	<b>100mm</b>	<b>160mm</b>
<b>Expanded Polystyrene (EPS)</b>	<b>105mm</b>	<b>170mm</b>
<b>Mineral Wool</b>	<b>105mm</b>	<b>170mm</b>
<b>Hemp Fibre Board</b>	<b>105mm</b>	<b>175mm</b>
<b>Wood Fibre Board</b>	<b>110mm</b>	<b>175mm</b>
<b>Sheep Wool</b>	<b>110mm</b>	<b>175mm</b>
<b>Foam 'Insulated Wallpaper'</b>	<b>135mm</b>	<b>210mm</b>
<b>(Figures based on published figures for thermal conductivity)</b>		

# Cavity Wall Insulation

- Cavity walls after 1930 (mainly)
- Introduced to reduce rain penetration
- Older buildings - 50mm cavity, newer 100mm+
- Check brick alignment
- Empty cavities need checking for debris - borescope
- Not suitable if exposed to wind-driven rain
- Cheapest type of wall insulation
- Insulation can be
  - Blown mineral wool - must stay dry, can settle
  - Expanded polystyrene beads - in light resin
  - Injected polyurethane foam - water resistant, bonds wall layers
- Specified by building regs since 1985 - after 2000, optimum performance



## Solid brick walls and cavity walls

After 1930 houses started being built with cavity walls. This means that the outside walls of a house are built with two layers and a space or cavity between them. From 1985 all new houses built in this way have insulation fitted into the cavity but houses built in the intervening period have unfilled cavities. It is now easy and inexpensive to have the cavity filled and this will reduce considerably heat loss through the walls.

There are two easy ways to check if you have cavity walls. Either look at the 'bond' or pattern of the brickwork or check the thickness of the wall.

A **cavity wall** will look like the picture on the right with all the bricks laid end to end with only the long face of the brick or 'stretcher' showing.



A **solid brick wall** will look like the wall to the left with both the long face of the brick and the short face or 'header' showing in a regular pattern.

The **thickness** of a wall can be measured at a door or window. A solid wall will be 23cm (9") thick plus internal plastering and external rendering (if any) and a cavity wall 30cm (11.5") plus plastering and rendering (if any).



# Solid Wall Insulation

- For walls with no cavity
- Traditional construction - allow safe passage of moisture
- Modern construction - vapour sealed envelope with moisture extract
- External wall insulation:
  - Less disruptive
  - May need planning permission
- Internal wall insulation:
  - Lose room space & internal features
  - Wall colder - possible frost damage



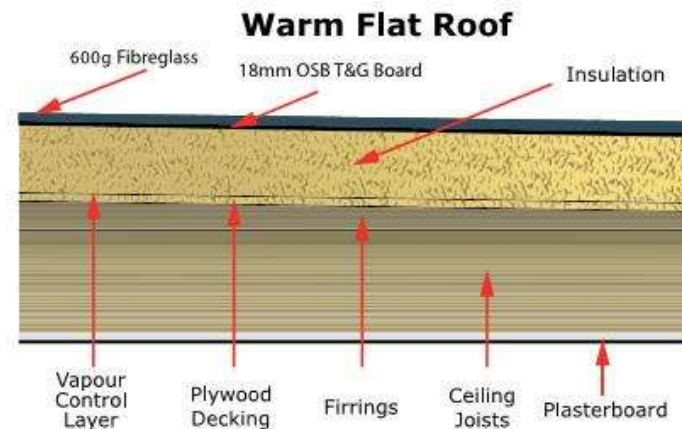
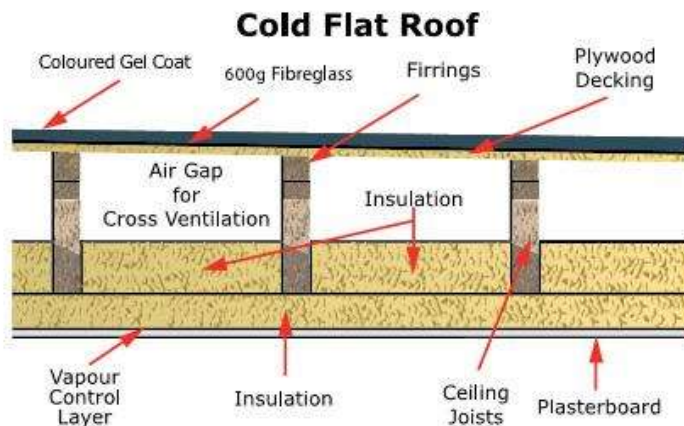
# Loft Insulation

- Cheap and easy to install
- Building regs specify 270mm, recommended 300mm (about 1 foot)
- Must not be squashed - use loft feet and boarding
- Ventilation gap at edges - eaves ventilation tray
- Insulate and draughtproof loft hatch
- Cross-layered over ceiling joists
- Room in roof:
  - Warm loft
  - Solid internal insulation on ceiling
  - Avoid spray foam insulation



# Flat Roofs

- Warm Roof:
  - Insulation above main structure
  - Less risk of condensation on underside of roof deck
- Cold Roof:
  - Insulation is within or below roof structure
  - Needs good throughflow of ventilation, otherwise risk of condensation and timber rot
- Best done when renewal of the waterproof covering is needed



# Floor Insulation

- Most disruptive
- Lower priority - schedule with other works
- Solid Floor:
  - May raise floor height
  - Affects fitted furniture, doors, skirting boards etc
- Suspended Floor:
  - Risk of damp/rot in joist ends
  - Sub-floor void needs good crossflow ventilation



# Windows

- Expensive - replace when windows are near end of life
- Triple glazing, argon filled - 50% more thermally efficient
- Optimum cavity - 16mm
- More heat lost through frame than glazing
- More panes = more thermal bridges
- Listed buildings - usually secondary glazing
- 50% as effective as double glazing
- Heavy curtains and/or thermal blinds





# Airtightness

- Uncontrolled ventilation
- Warm air escapes, cold air gets in
- Chimney - chimney balloon/sheep
- Doors & windows - draughtproof
- Loft hatch
- Service entry points



# Thermal Imaging

- Visual representation of heat loss
- Carry out standard survey first
- Unless initial survey request includes specific Thermal Imaging investigation
- Climatic conditions are key:
  - Use windy.com to check forecast conditions
  - At least one hour after sunset, low humidity, clear sky
  - Low wind speed – below 10 mph
- Minimum 10°C difference between internal and external temps
- Heating must be on for at least 8 hours before the survey



# Solar Panels - Photovoltaic (PV)

- Produce electricity in daylight hours
- Standard system - 3.6kW, about 10 panels
- Suitable roof:
  - Shading
  - Pitch
  - Orientation
  - Roof strength
- Panels - 25 years, inverter & battery - 10 years
- Permitted development - conditions in conservation areas
- Storage & usage:
  - Battery
  - EV charger
  - Solar diverter



# Solar Panels - Thermal

- Produce heat - to make hot water
- Sun heats transfer fluid
- Pumped to a heat exchanger in hot water tank
- Fewer roof panels
- Higher maintenance - fluid



# Heat Pumps

- Extract heat from air or ground
- Use electricity (reverse refrigeration) to increase heat
- Air source heat pump - 270% efficient (gas boiler 90%)
- Nearly three times more heat produced than electric energy used
- Water heated to about 50°C (boiler 85°C)
- May need bigger radiators or underfloor heating
- Sensible to insulate first
- Ground source - more efficient (400%) but double cost
- Air-to-air - cheap, but can be noisy and needs internal ducting to be effective





# Heat Pumps

- Permitted development – first installation, not within 1m of property boundary
- Heat loss calculation - installer charges refundable £400
- External unit - ground mounted on anti-vibration pads
- Low noise - mainly used in winter
- Install cost higher than boiler - approx. £13,000 for 3-bed (less £5,000 grant)
- Running cost similar to boiler
- Electricity costs - currently 4x more than gas, per unit
- Huge carbon savings
- [Electrification of Heat project](#) 2021 - 750 UK homes:
  - “All housing types are suitable for heat pumps”
- [Nesta study](#) 2022 - 2,500 UK homes:
  - “Satisfaction levels between heat pump and gas boiler users are very similar”



# Whole House Retrofit Plan

- Whole house approach
- Improvement measures interact with each other
- Identifies priorities
- Phasing and combinations
- Costs and benefits
- Retrofit Coordinator - PAS2035
- Fee - £600+

Win.ACC NATIONAL ENERGY FOUNDATION South Downs

Whole House Retrofit Plan

### 12 Phasing your improvements (continued)

The measures recommended below aim to significantly reduce your energy use, annual energy costs and CO<sub>2</sub> emissions. This demonstrates a good range of the possibilities available. We can of course limit recommendations to your more immediate needs to fit within your current budget.

Phase 1 Measures	Estimated Costs	Energy Rating	Fuel Bill	tCO <sub>2</sub>	kWh/m <sup>2</sup>
<b>Where you are now</b>	<b>Per Measure</b>	<b>72 C</b>	<b>£580</b>	<b>2.32</b>	<b>78.01</b>
Low energy lighting	£300	73 C	£540	2.27	79.73
300mm loft insulation from 100mm	£350	74 C	£530	2.17	74.56
<b>After Phase 1 Measures</b>		<b>74 C</b>	<b>£530</b>	<b>2.17</b>	<b>74.56</b>
<b>Package Cost &amp; % Improvements</b>	<b>£650</b>		<b>9%</b>	<b>6%</b>	

Phase 2 Measures	Estimated Costs	Energy Rating	Fuel Bill	tCO <sub>2</sub>	kWh/m <sup>2</sup>
<b>After Phase 1</b>	<b>Per Measure</b>	<b>74 C</b>	<b>£530</b>	<b>2.17</b>	<b>74.56</b>
PCDF boiler reference from generic SAP boiler information	£0	75 C	£520	2.14	71.80
Draughtproof doors and windows	£70	75 C	£520	2.13	71.23
<b>After Phase 2 Measures</b>		<b>75 C</b>	<b>£520</b>	<b>2.13</b>	<b>71.23</b>
<b>Package Cost &amp; % Improvements</b>	<b>£70</b>		<b>2%</b>	<b>2%</b>	
<b>Cumulative Cost &amp; % Improvements</b>	<b>£720</b>		<b>10%</b>	<b>8%</b>	

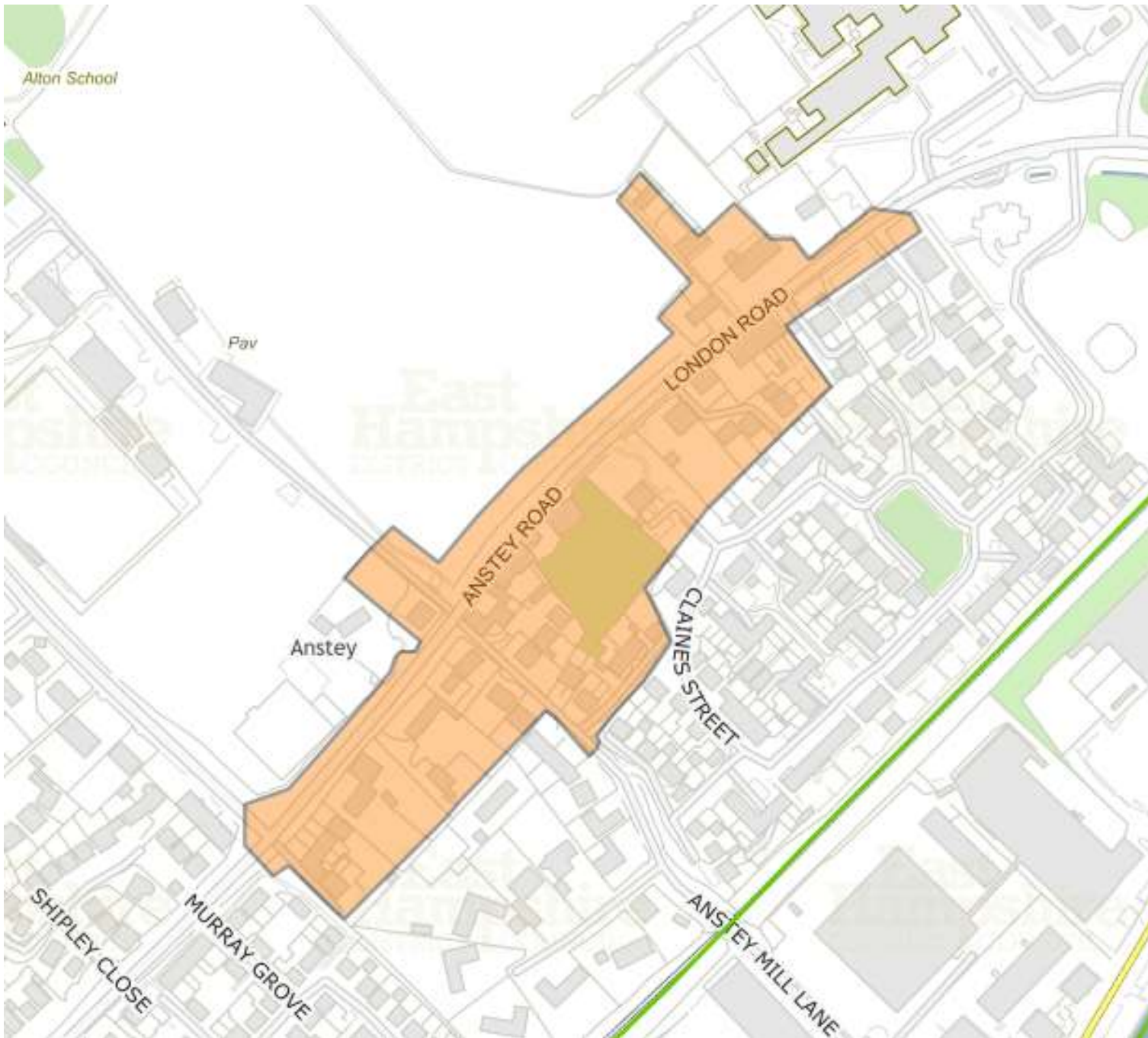
# Installers

- Recommending installers - risks, independent advice
- MCS accreditation - Microgeneration Certification Scheme
- Trustmark accreditation - all trades
- Find an accredited contractor:
  - [MCS](#)
  - [Trustmark](#)
- Consumer review sites:
  - Checkatrade
  - Trustpilot
- Solar installers - Renewable Energy Consumer Code (RECC) - for SEG



# Planning rules

- Conservation Areas:
  - Alton Anstey
  - Alton Town
  - The Butts
  - Villages
  - <http://maps.easthants.gov.uk/easthampshire.aspx>
  - <https://www.easthants.gov.uk/planning-services/heritage-and-trees/conservation-areas/conservation-area-guidance>
- Permitted development - solar and heat pumps at rear
- Listed Buildings – listed building consent
- [Search for a listed building](#) by postcode



Alton School

Fav

East Hampshire Council

LONDON ROAD

ANSTEY ROAD

CLAINES STREET

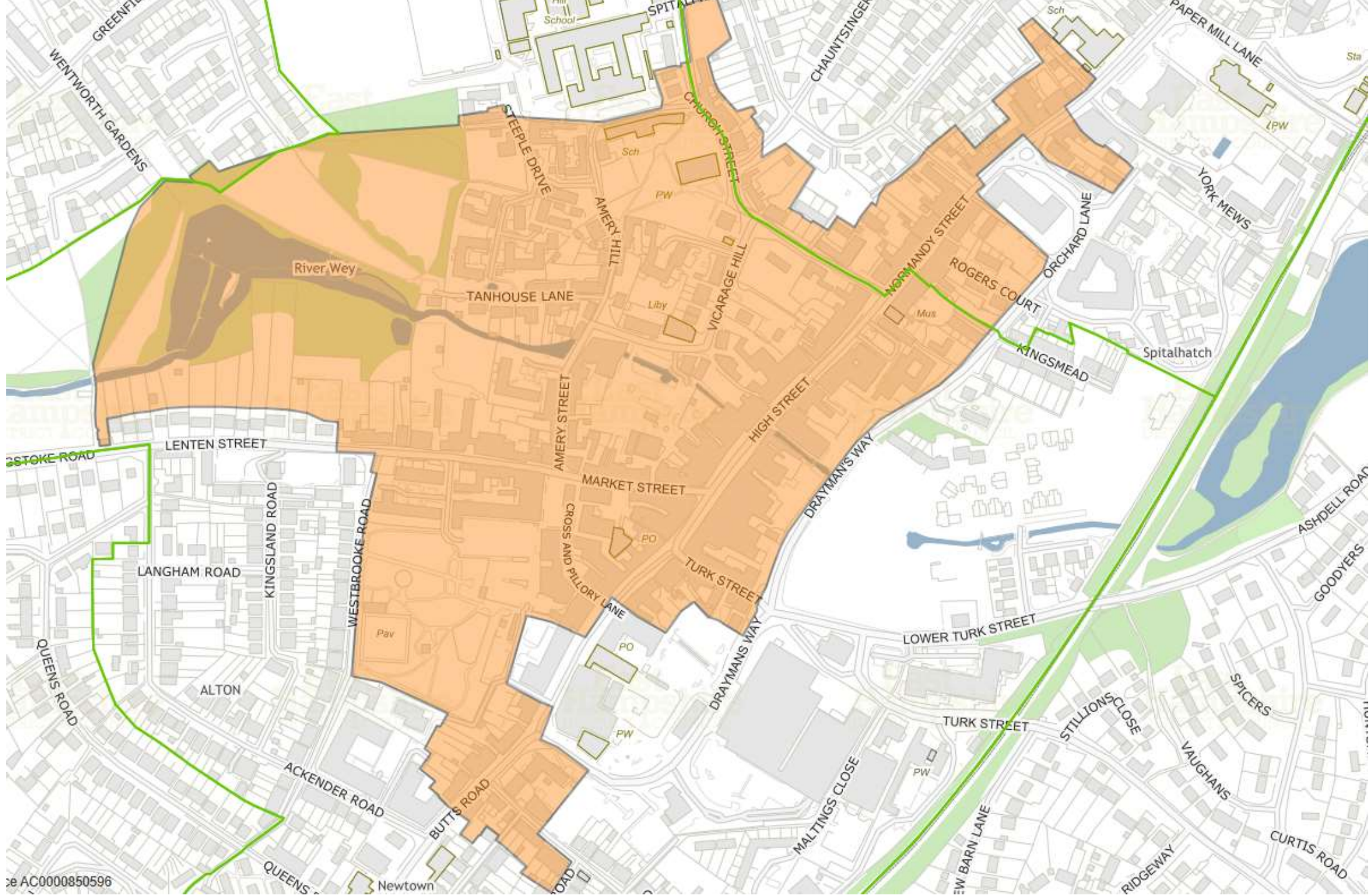
Anstey

SHIPLEY CLOSE

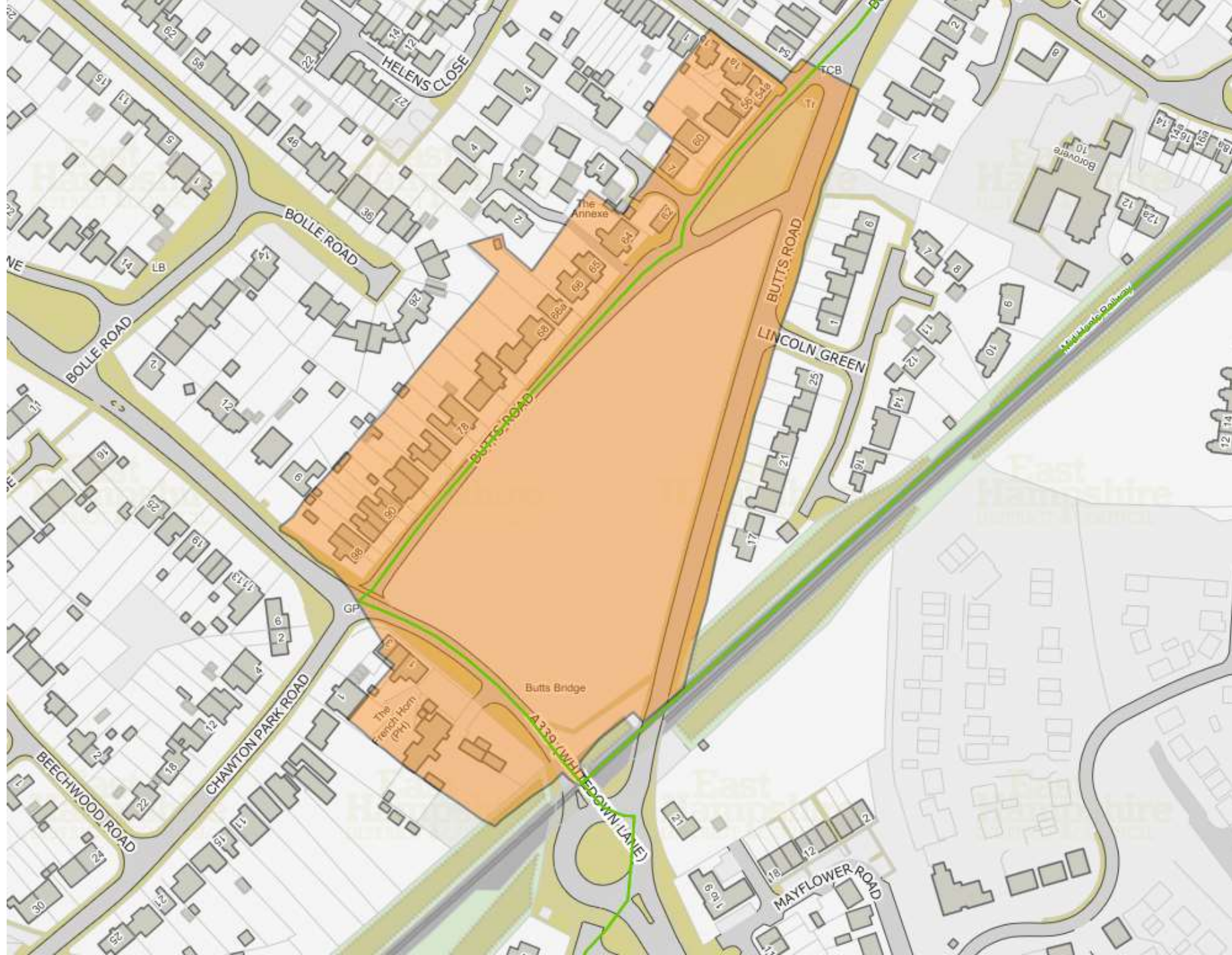
MURRAY GROVE

ANSTEY MILL LANE













# Grants

- Smart Export Guarantee - export solar electricity to the grid
- Boiler Upgrade Scheme - £5k for air source, £6k for ground source
- Great British Insulation Scheme:
  - Council tax bands A – D
  - EPC of D or below
  - Launching soon
- Low income:
  - Warmer Homes – LAD grant
  - ECO – Energy Company Obligation
- [Basingstoke & Deane Borough Council](#)
  - Homeowner loan – up to £10k, £95 fee, 4.49% interest – via Parity Trust
  - Homeowners on benefits, not eligible for loan – up to £3,000 grant
  - Landlord grant – up to £500





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- helping  
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warm

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