

2 Hertfordshire in Context

2.1 Policy Context

The challenge of climate change and the need to reduce greenhouse gases and stabilise CO₂ levels in the atmosphere has intensified. There is now a comprehensive range of legislation and policy at various scales which supports the development and implementation of decentralised renewable and low carbon energy policy and targets

At the international level, the Kyoto Protocol is currently being updated. The 'Bali Roadmap', an output from the Climate Change Conference in Bali (December 2007) set out a two year process to finalise a new legally binding international treaty at the United Nations Climate Change Conference in Copenhagen in December 2009 (COP15). COP15 did not produce this legally binding treaty. Politicians from the 192 participating countries recognised - through the Copenhagen Accord - the scientific view that the temperature increase should be held below a 2°C rise, and promised financial aid to developing countries to help them adapt to climate change. Further political effort is required to establish a new programme to reach an international, and legally binding, agreement on climate change.

The opportunity offered by Copenhagen (COP15) for politicians to set international targets to encourage quick and decisive action in this area was missed. On the global stage the politics lags behind the scientific imperative for early intervention to address this issue. However, the lack of an international agreement will not prevent concerted domestic action from countries showing leadership in tackling climate change.

The UK is already committed to meeting European CO₂ and energy targets, agreed between the European Commission and the Member States. The European Union has agreed to reduce CO₂ emissions by 20% on 1990 levels by 2020, with an intention to increase this target to 30% if international agreement is reached which commits other developed countries and the more advanced developing nations to comparable reductions. In addition the UK **Climate Change Act (2008)** sets a legally binding target for reducing UK CO₂ emissions by at least 80% by 2050. It also established the **Committee on Climate Change** which is responsible for setting binding carbon budgets for 5 year periods. In the 2009 Budget, the first three carbon budgets were announced, with the aim of achieving a 34% reduction in emissions by 2020. The Act is supported by the **UK Low Carbon Transition Plan (2009)**, which sets out the Government's approach to meeting their carbon reduction commitments. The plan includes commitments to reducing greenhouse gas emissions from the existing housing stock by 29% on 2008 levels by 2020 and by 13% for places of work.

The EU has also agreed to increase the proportion of its energy supplied from renewable sources to 20% by 2020, including electricity, heating energy and transport energy. As its contribution, the UK has committed to supply 15% of all the energy it uses from renewable sources by 2020. To achieve this, it is anticipated that renewable sources will need to contribute approximately 30% of our electricity supply, 12% of heating energy and 10% of transport energy, as set out in the UK's **Renewable Energy Strategy (2009)**. The draft **Heat and Energy Saving Strategy (2009)** aims to ensure that emissions from all existing buildings

are approaching zero by 2050.

The recently published **Household Energy Management Strategy (HEMS)** entitled '**Warm Homes, Green Homes**' (March 2010) sets out the strategic role that local authorities have to play and provides a new focus on district heating in suitable communities by removing barriers to the development of heat networks, encouragement of combined heat and power and better use of surplus heat through carbon pricing mechanisms.

The role of local authorities is further endorsed by a recent Audit Commission report into the role of local councils in reducing domestic CO₂ emissions⁵, which emphasises that *"councils can use their influence, legal powers and resources to:*

- Lead – encouraging local communities and public and private sector organisations to take action on domestic energy by developing a clear strategic vision, facilitating partnership working, providing information, advice and support and championing energy issues;
- Oblige – using powers within the planning system to promote the development of more sustainable homes and increase the supply of low-carbon and renewable energy; enforcing Building Regulations; and using the HHSRS⁶ to improve private sector homes; and
- Subsidise – funding measures in council homes and using financial incentives – such as council tax rebates, and direct funding, for example – home improvement grants or loans to promote take-up of measures to improve energy efficiency and supply low-carbon and renewable energy."

Planning has an important part to play in making this a reality, particularly in providing the evidence and resource assessments, policies and targets that underpin wider local authority CO₂ reduction strategies.

In terms of District Heating (DH), HEMS states:

"District heating using CHP has the potential to deliver significant carbon savings and lower bills, but requires significant local coordination and specific support, for example through the planning system, to promote market confidence and growth"

Through HEMS, Government will support the roll-out of DH through a framework of policy and financial support, including:

- Clarifying the role of local authorities in driving deployment of DH and consulting on specific provision through a revised PPS on climate change;
- Strengthening expectations on suitable local authorities to develop local partnerships that drive deployment of low carbon and renewable options such as heat networks in their areas. The development of new Local Carbon Frameworks will support this change;
- Integrating policies for Zero Carbon Homes to support investment in larger offsite solutions such as DH, which typically offer better value carbon savings (decisions on how to meet these aims will be taken by summer).

The **Planning and Compulsory Purchase Act (2004)** placed sustainable development at the heart of the planning system. The **Planning Act (2008)**

⁵ Audit Commission (October 2009) 'Lofty Ambitions: The Role of Councils in Reducing Domestic CO₂ Emissions: Local Government'

⁶ Housing Health and Safety Rating System.

established a single development consent regime and a new planning process for nationally significant infrastructure projects. The Act also introduced the enabling legislation for the Community Infrastructure Levy (CIL) which will empower local authorities to levy a charge on development to support infrastructure development.

The key national planning policy in relation to energy and climate change is set out in **PPS1 Supplement on Planning and Climate Change**; their implications are described in Chapter 1. **PPS22: Renewable Energy (2004)** established some key principles which regional planning bodies and local authorities should adhere to in planning for renewable energy, in particular the requirement to encourage rather than restrict renewable energy development. The Government is reviewing the PPS1 Supplement and PPS22 and has just published a **new combined PPS on Planning for a Low Carbon Future in a Changing Climate**. Having reviewed the consultation the broad policy goals of the PPS Supplement have not changed significantly.

The current Regional Spatial Strategy for the region is the **East of England Plan** which covers the period 2001 to 2021. The Plan identifies resource efficiency, sustainable energy generation and sustainable design as the key measures for delivering sustainable development and minimising CO₂ emissions. Policy ENG1 encourages new development to be located and designed to optimise its carbon performance and states that local authorities should encourage the supply of energy from decentralised, renewable and low carbon energy sources.

POLICY ENG1: Carbon Dioxide Emissions and Energy Performance

Working with regional partners, EERA should consider the performance of the spatial strategy on mitigating and adapting to climate change through its monitoring framework and develop clear yardsticks against which future trends can be measured, which should inform the review of the RSS and the preparation of Local Development Documents.

To meet regional and national targets for reducing climate change emissions, new development should be located and designed to optimise its carbon performance. Local authorities should:

- encourage the supply of energy from decentralised, renewable and low carbon energy sources and through Development Plan Documents set ambitious but viable proportions of the energy supply of new development to be secured from such sources and the development thresholds to which such targets would apply. In the interim, before targets are set in Development Plan Documents, new development of more than 10 dwellings or 1000m² of non-residential floorspace should secure at least 10% of their energy from decentralised and renewable or low-carbon sources, unless this is not feasible or viable; and
- promote innovation through incentivisation, master planning and development briefs which, particularly in key centres for development and change, seek to maximise opportunities for developments to achieve, and where possible exceed national targets for the consumption of energy. To help realise higher levels of ambition local authorities should encourage energy service companies (ESCOs) and similar energy saving initiatives.

The Plan also sets targets for renewable and low carbon energy generation in the region (Policy ENG2) and encourages Development Plan Documents to set ambitious but viable proportions of the energy supply of new development to be secured from such sources, as well as the development thresholds to which such targets would apply.

POLICY ENG2: Renewable Energy Targets

The development of new facilities for renewable power generation should be supported, with the aim that by 2010 10% of the region's energy and by 2020 17% of the region's energy should to come from renewable sources. These targets exclude energy from offshore wind, and are subject to meeting European and international obligations to protect wildlife, including migratory birds, and to revision and development through the review of this RSS.

The participating Hertfordshire LPAs are at various stages of developing their council's **Core Strategy**. A number of policies relating to energy and CO₂ emissions are emerging. A summary of each LPAs Core Strategy status and relevant emerging policies was carried out as part of the Stage One Hertfordshire Planning Performance and Climate Change scoping study, which has been used to inform the work carried out as part of this study.

2.2 Building Regulations and Zero Carbon

The current 2006 Building Regulations Part L require that CO₂ emissions calculated for a new development should be equal to or less than a Target Emission Rate. This is in the region of 20% lower than emissions from a building which complies with the 2002 Building Regulations, depending on the specific building type.



Following consultation, the Government announced in July 2007⁷ that all new homes will be designed to be zero carbon from 2016. The following interim changes to the Building Regulations for homes are likely to be introduced:

- 2010 - 25% improvement in regulated emissions (relative to 2006 levels). This corresponds with the mandatory energy and CO₂ standards for Level 3 of the Code for Sustainable Homes.
- 2013 - 44% improvement in regulated emissions (relative to 2006 levels), corresponding to Code Level 4 mandatory energy and CO₂ standards.

The changes in 2010 (expected to come into effect in October) and 2013 will only apply to emissions that are inside the dwelling and are regulated (heating, ventilation, cooling and lighting). From 2016, the requirements will apply to all emissions associated with energy use in the dwelling, including cooking and other appliances (referred to as unregulated).

⁷ Building A Greener Future: Policy Statement

In Budget 2008, the Government announced an ambition that new public sector buildings should be zero carbon from 2018, one year in advance of the commercial new non-domestic buildings sector. It defined the scope of this ambition as covering the central (but not local) government estate, hospitals, the defence estate, prisons, courts and schools (although the latter are subject to a separate 2016 zero carbon ambition under the Building Schools for the Future programme).

A further consultation in 2008⁸, followed by a Government statement in July 2009 confirmed the definition of zero carbon that will be applied to new homes and set out how it will be taken forward (Figure 2.1). Achieving zero carbon includes three stages:

1. **Energy Efficiency**, the minimum level of which has not yet been agreed, but is likely to be measured in kWh/m²/year and differentiate between dwelling types. This stage will take account of building fabric energy efficiency such as U-values, air tightness, thermal bridging and thermal mass.
2. **Carbon Compliance**, set at 70% of regulated emissions (the DER) and will take account of systems and controls, such as heating/cooling systems, RLC technologies and mechanical ventilation.
3. **Allowable Solutions**, which will cover the remaining carbon emitted from the dwelling for 30 years. The final list has yet to be confirmed but may include:
 - o Further carbon reductions on site, through energy efficiency or on-site generation
 - o Energy efficient appliances
 - o Advanced forms of building control systems which reduce the level of energy use in the home
 - o Exports of low carbon or renewable heat from the development to other developments
 - o Investments in Renewable and Low Carbon community heat infrastructure

Other allowable solutions remain under consideration. A final Government announcement is expected towards the end of 2010.

The adoption of allowable solutions into Building Regulations means that there could be a significant investment in low carbon measures in local areas through developers either opting to save CO₂ offsite, or pay into an allowable solutions offset fund. It is currently not known how an offset fund would be administered or who (potentially a local authority) would be allowed to allocate funding. However this could be a future source of finance for local authorities which can be used to contribute to low carbon energy schemes.

⁸ Definition of zero carbon homes and non-domestic buildings (Department for Communities and Local Government, December 2008)

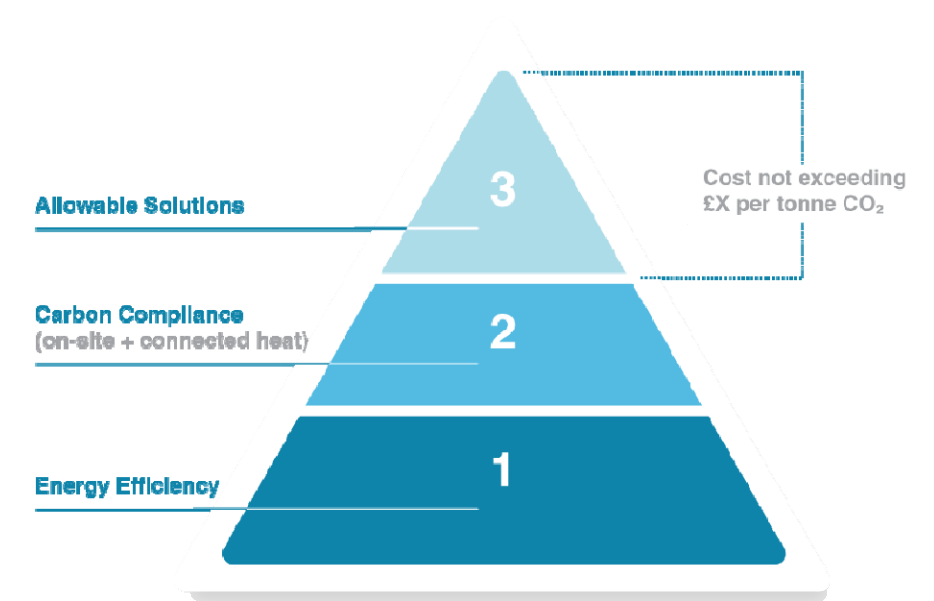


Figure 2.1: The Zero Carbon Hierarchy: stages of a zero carbon home

2.3 Measuring Sustainability

2.3.1 BREEAM

The Building Research Establishment Environmental Assessment Method (BREEAM) assesses the environmental performance of new and existing non-residential buildings. A BREEAM rating is awarded based on achievement of credits in categories such as energy, water, materials, waste, pollution, health and well-being, management, land use and ecology, and transport.

As of August 2008, the ratings that can be achieved are Pass, Good, Very Good, Excellent and Outstanding, with mandatory requirements for each rating. There is no legal requirement for non-domestic development to have a BREEAM rating, but they are commonly required by local planning authorities or as a condition of Government funding. For example, the Building Schools for the Future programme requires new school buildings to achieve at least a BREEAM Very Good rating.⁹

2.3.2 Code for Sustainable Homes

The Code for Sustainable Homes (the Code) is the national standard assessment system for new housing in England and came into effect in April 2007. The Code assesses a development against a set of criteria in nine categories: energy and CO₂ emissions, water, materials, surface water run-off, waste, pollution, health and well-being, management, and ecology.

The Code awards a rating to a dwelling, ranging from level 1 to level 6 (the highest level of performance). The rating depends on whether the dwellings meet a set of mandatory standards for each level, as well as their overall score. (Table 2.1)

Code Levels	Mandatory Requirements		Total Points Score out of 100
	Energy Improvement over TER ¹⁰	Water Litres/person/day	
Level 1 ★	10%	120	36
Level 2 ★★	18%	120	48
Level 3 ★★★	25%	105	57
Level 4 ★★★★	44%	105	68
Level 5 ★★★★★	100%	80	84
Level 6 ★★★★★★	Zero Carbon	80	90

Table 2.1: Minimum requirements for the six levels under the Code

⁹ An introduction to Building Schools for the Future (produced for department of Children, Schools and Families by 4ps and Partnerships for Schools, 2008)

¹⁰ TER refers to the target emission rate which dwellings are required to achieve under Part L of the Building Regulations.

Since May 2008 it has been compulsory for new homes to have a Code rating as part of the Home Information Pack, although homes that have not undergone a Code assessment will automatically be issued with a 'nil-rated' certificate.

Residential developments supported by funding from the Homes and Communities Agency (i.e. affordable housing), or any other government-funded support mechanism, are currently required to achieve Code level 3. Although development seeking funding from the next round in 2011 will now have to achieve Code level 4.

2.4 The County of Hertfordshire

Hertfordshire, one of the Home Counties, is part of the East of England region and is the most southernly county in the region. It is bordered by Greater London, Buckinghamshire, Bedfordshire (the unitary authorities of Luton and Central Bedfordshire), Cambridgeshire and Essex. Hertfordshire is made up of 10 districts/boroughs, 9 of which are participants in this study. (Figure 2.2)

The County has a land area of 1,634 square kilometres, and comprises one city (St Albans) and a variety of market towns, industrial towns, new towns, commuter villages and rural villages. At the last census (2001), Hertfordshire had a population of approximately 1,034,000, 87% of whom live in the 45 settlements of over 3,000 people. The four southernmost districts/boroughs of Broxbourne, Hertsmere, Watford and Three Rivers, and Stevenage towards the north, are the most urban, with East Hertfordshire and North Hertfordshire having large rural, fairly sparsely populated areas.

The County has the following 'Special Designations':

- Green Belt
- Chiltern Area of Outstanding Natural Beauty
- Colne Valley & Lea Valley Regional Parks
- Garden Cities (Letchworth, Welwyn Garden City)
- New Towns (Stevenage, Hatfield, Hemel Hempstead, Welwyn Garden City)
- Conservation Areas
- Area of confirmed Community Forest (Watling Chase)
- Aldenham Country Park
- National Trust Land - at Ashridge and Shaw's Corner (Ayot St Lawrence)
- English Heritage – i.e. Berkhamsted Castle
- SSSIs - there are 43 Sites of Special Scientific Interest in the County
- Scheduled Ancient Monuments - statutory protected archaeological sites
- Sites of European Designation

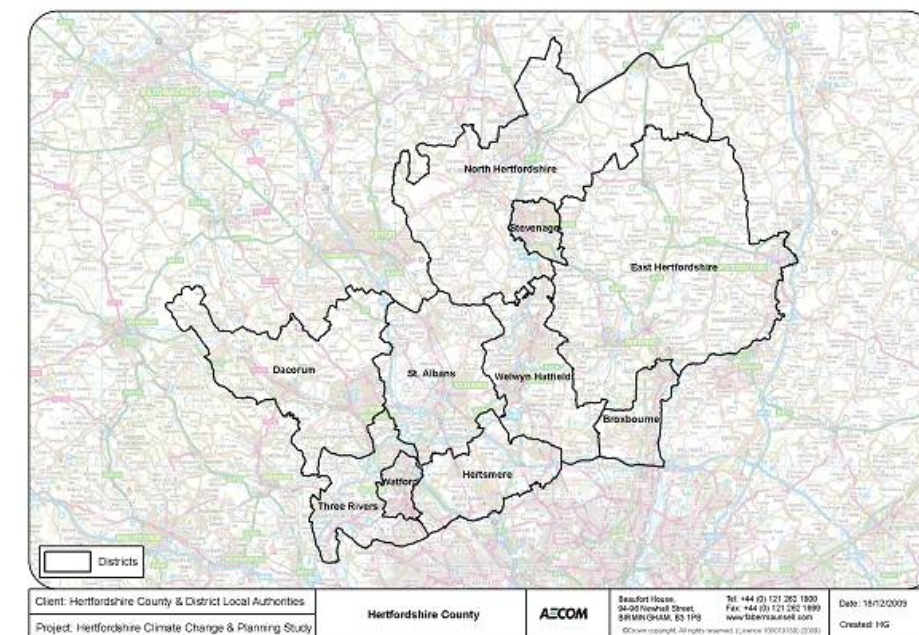


Figure 2.2: Map of Hertfordshire Districts and Boroughs

2.5 Existing Building Stock

2.5.1 Housing

There were approximately 420,650 households in Hertfordshire at the time of the last Census in 2001 (although current statistics suggest this figure is now around 457,000) and the majority are owner-occupied (Table 2.2). The total number of household spaces including vacant properties and holiday accommodation/second residence equates to just over 430,300. The majority of dwellings in Hertfordshire are terraced or semi-detached (Figure 2.3).

Housing Tenure	Number of households*	Proportion
Owned	305,171	73%
Social rented	79,162	19%
Private rented/other	36,317	8%
Total	420,650	100%

Table 2.2: Housing Stock in Hertfordshire by Tenure (Source: Office of National Statistics, based on the 2001 census) *with residents.

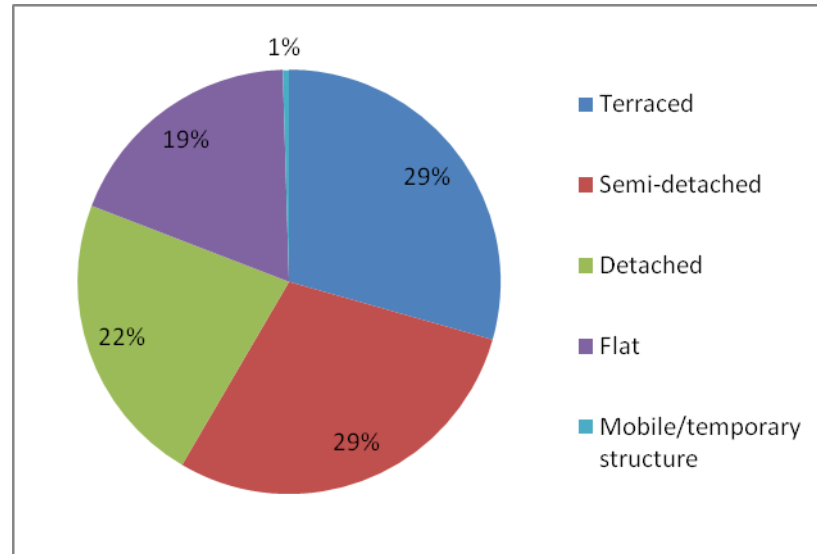


Figure 2.3: Housing stock by type (Source: Office of National Statistics, 2001 Census)

It should be noted that this information has been provided for context only and that the population figures and tenure breakdown does not inform the modelling or policy testing in this study.

2.5.2 Non-residential

Employment locations are concentrated primarily in urban locations such as Welwyn Garden City, Watford, Hemel Hempstead, St Albans, Bishop Stortford, Borehamwood and Cheshunt (and Stevenage).

2.6 Future Development

2.6.1 Housing

The East of England Plan (Policy H1) sets Hertfordshire a target of 83,200 new homes between 2001 and 2021. Of this, 17,480 dwellings have already been built between 2001 to 2006. This target, when broken down per district/borough (Table 2.3), sees the highest distribution of new housing within East Herts.

District / Borough *Figures excluded pending legal challenge and repair	Minimum to build (April 2001 to March 2021)	Of which already built (April 2001 to March 2006)
Broxbourne	5,600	1,950
Dacorum*	-	-
East Hertfordshire	12,000	2,140
Hertsmere	5,000	1,080
North Hertfordshire	6,200	1,900
St Albans	7,200	1,830
Stevenage	n/a	n/a
Three Rivers	4,000	1,010
Watford	5,200	1,410
Welwyn Hatfield*	-	-

Table 2.3: Hertfordshire Housing Provision by District/Borough (Source: East of England Plan 2001 - 2021)

The published East of England Plan contained a housing requirement for Hertfordshire of 83,200 dwellings. *However, following a successful legal challenge there are currently no housing figures for Dacorum and Welwyn Hatfield districts. Figures for these two local authorities have therefore been excluded from the table.

Although housing provision targets have been set at the regional level for Hertfordshire, more recent Strategic Housing Market Assessments (SHMA) were carried out in 2008, and updated in September 2009. Three SHMAs were produced:

- (Draft) London Commuter Belt West: Dacorum, Three Rivers, St Albans, Hertsmere, Watford and Welwyn Hatfield;
- London Commuter Belt East: East Herts, Broxbourne (and Uttlesford in Essex);
- Stevenage and North Herts (it should be noted that there is a provision for a further 9,600 dwellings which will be provided as urban extensions to Stevenage within North Hertfordshire. This is likely to affect the scale of development that will take place in North Herts).

In addition to the SHMAs, the project group provided, where available, copies of their Strategic Housing Land Availability Assessments (SHLAAS). Based on these, Figure 2.4 maps out the housing development sites potentially coming forward.

Data from both the SHMAs and the SHLAAs, and where required the East of England Plan, has been used to inform the modelling undertaken for this study.

2.6.2 Employment Sites

The East of England Plan identifies Hemel Hempstead and Stevenage as regionally strategic employment locations, along with other locations in the County where this would support strong continued growth of mature and emerging clusters and sectors. This would include supporting the regeneration of the Lee Valley.

Policy E5 identifies Watford, Hemel Hempstead, St Albans and Welwyn Garden City (and Stevenage) as towns or regional centres of strategic importance for retail and other town centres purposes.

The London Arc Job Growth and Employment Study were used to inform the case studies against which policy options were tested (Chapter 8).

The East Herts Employment Land Review (October 2008) forecasts a significant growth in B1 (Office) employment.

Figure 2.5 shows the potential employment sites coming forward in Hertfordshire.

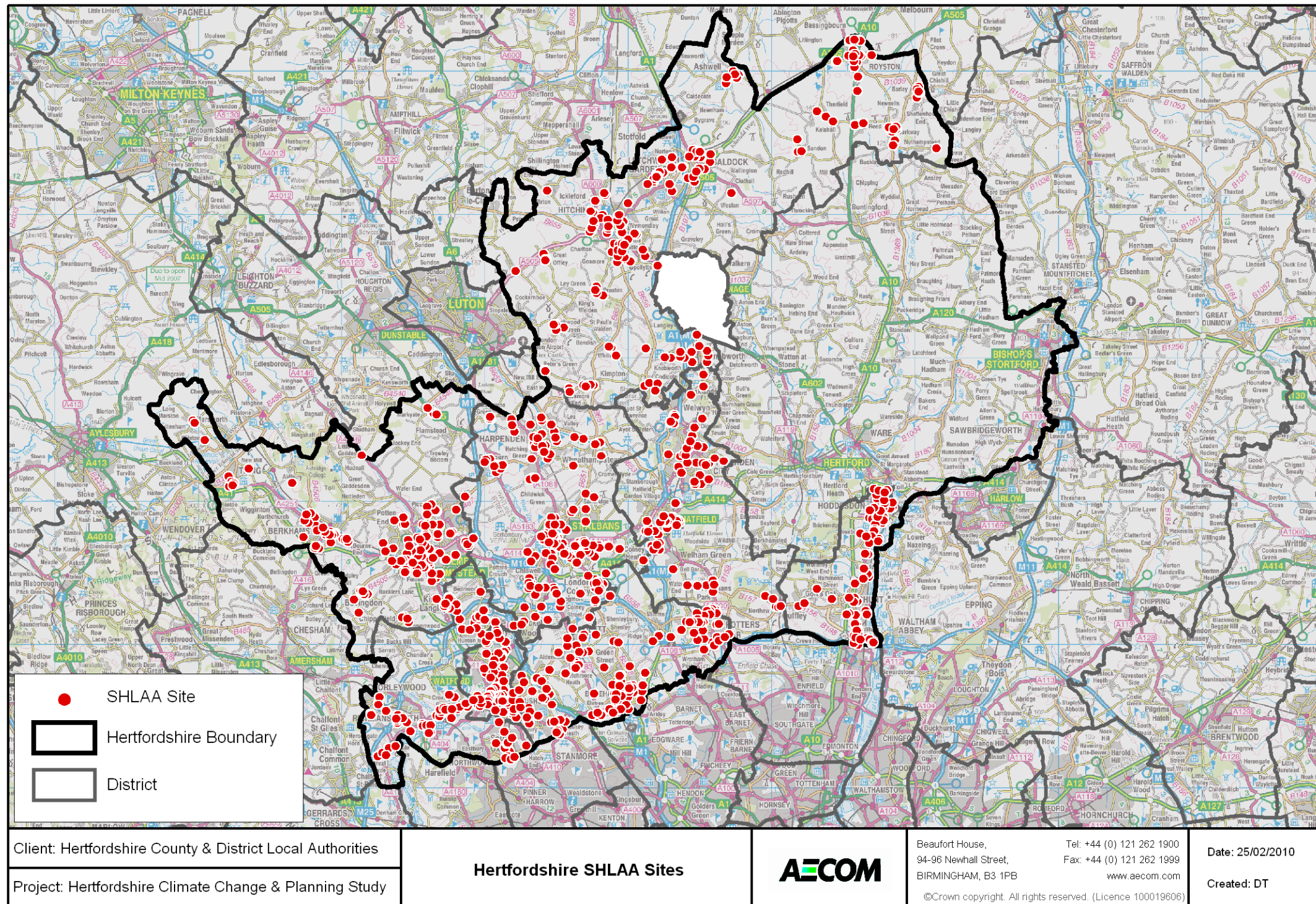


Figure 2.4: Map of potential housing development sites from SHLAA studies, rejected sites removed (data on potential housing development was unavailable for East Herts)

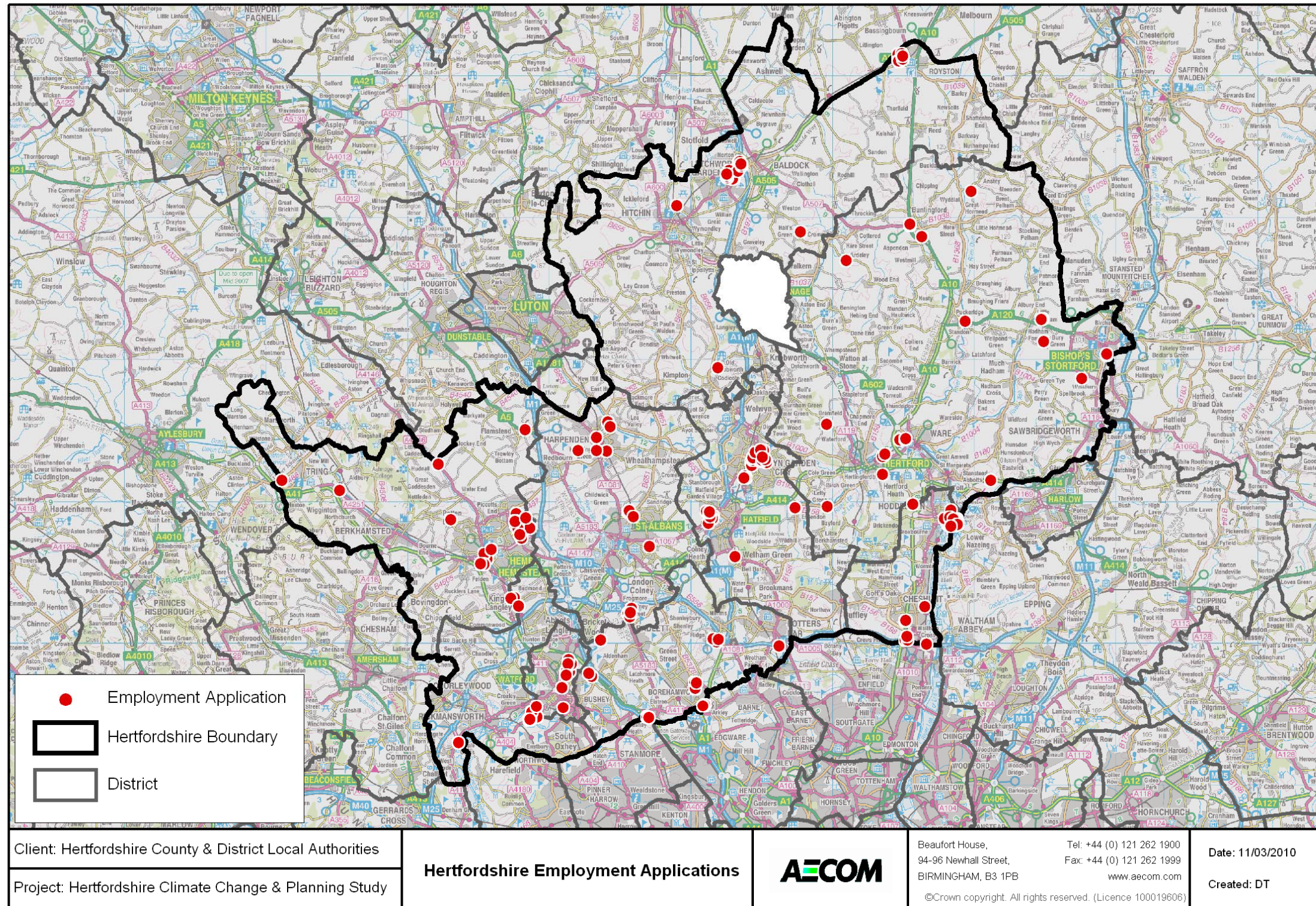


Figure 2.5: Map of employment application sites in Hertfordshire over 1000sqm (Information provided by the County Council)

2.7 Baseline Energy Consumption and CO₂ Emissions

The National Indicator (NI) 186 statistics provides a breakdown of CO₂ emission sources for each local authority area across three sectors – Industry/Commercial, Domestic and Road Transport. The summary data for the ten local authorities in Hertfordshire is presented opposite in Table 2.4. (Stevenage figures have been provided for comparison)

This data shows that the sector responsible for the largest volume of CO₂ emissions is domestic (40% across the County), followed by Industry/Commercial (38%) and Transport (22%). This is shown graphically in Figure 2.6.

This highlights that the existing residential building stock is responsible for a significant volume of total emissions, and since future overall housing growth is proposed this sector should provide a focus for reducing emissions from both future development and the existing building stock.

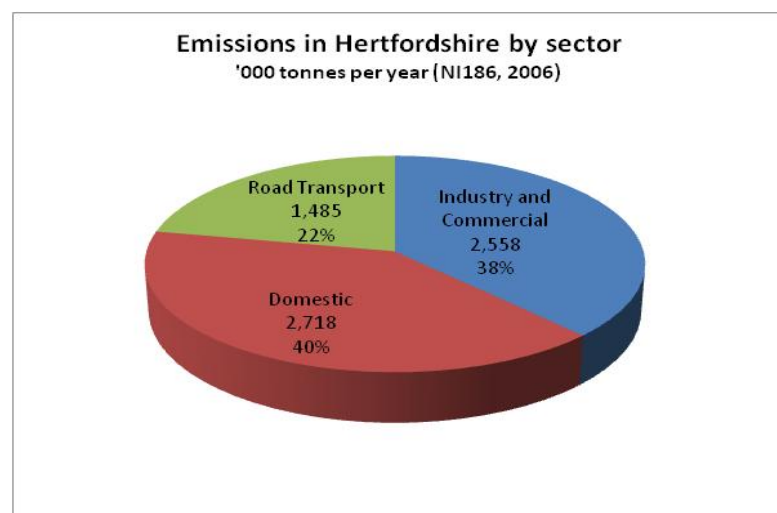


Figure 2.6: Emissions in '000 tonnes in Hertfordshire by sector - NI 186, 2006

Local Authority	Industry and Commercial				Population '000 (mid-year estimate 2006)	Per capita emissions (t)
	Domestic		Road Transport			
				Total		
Broxbourne	165	215	108	487	89	5.5
Dacorum	255	358	215	828	138	6.0
East Hertfordshire	339	351	281	971	133	7.3
Hertsmere	256	257	127	640	96	6.7
North Hertfordshire	301	312	197	810	122	6.7
St. Albans	247	358	174	779	131	5.9
Stevenage	270	176	75	521	79	6.6
Three Rivers	163	233	94	490	86	5.7
Watford	221	200	82	503	80	6.3
Welwyn Hatfield	341	258	132	732	106	6.9
County Total	2558	2718	1485	6761	1,060	6.4

Table 2.4: 2006 mid-year summary of emissions per sector for each of Hertfordshire's Local Authorities ('000 tonnes) (Source: National Indicator Set, Audit Commission, release date - 2009)

The proportion of emissions (and total emissions) varies significantly across the County, as shown in Table 2.4, reflecting to some degree the characteristics of the local authority. For example, some districts/boroughs have larger economic centres and therefore have more industrial and commercial buildings than others. In some of the larger and more rural authorities, such as East Herts, you would expect to see higher transport emissions from people have to travel further to reach amenities and places of employment.

Table 2.5 compares the emissions from the domestic sector across each local authority area between 2005 and 2006. Data from the National Indicator Set shows that on a per capita basis, the average domestic emissions across the East of England are 2.48 tonnes per year, compared with 2.53 tonnes per year for the UK. Table 2.5 below shows that in 2006 the County average exceeded both regional and national levels (figures for Stevenage are included for comparison).

	Domestic emissions (tonnes per capita)	
	2005	2006
Broxbourne	2.39	2.42
Dacorum	2.56	2.59
East Hertfordshire	2.58	2.64
Hertsmere	2.64	2.68
North Hertfordshire	2.52	2.56
St. Albans	2.70	2.73
Stevenage	2.20	2.23
Three Rivers	2.64	2.71
Watford	2.45	2.50
Welwyn Hatfield	2.38	2.43
Average	2.51	2.55

Table 2.5: Domestic per capita emissions from Hertfordshire Local Authorities

2.8 Mapping Energy Demand and CO₂ Emission

The County's CO₂ emissions presented in this chapter are reflective of the baseline energy consumption, or 'demand', from Hertfordshire's existing built environment. To better enable a clear picture of where these demands are highest, and subsequently help identify 'anchor load' locations for potential district heating schemes, information received from the project group on building energy consumption has been modelled. A number of outputs have been produced – heat and electricity demand maps show the average consumption density per square km (calculated as kWh of energy consumption divided by (8760 hours per year x sqkm)). The electricity and heat demand maps give a spatial indication of how electricity and heat are being consumed in Hertfordshire. A CO₂ map shows how CO₂ emissions are distributed spatially in Hertfordshire.

The outputs from the model have been plotted onto maps using GIS. Figures 2.7 and 2.8 show density of average heat and electricity demand from existing buildings across Hertfordshire, based on the model, with Figure 2.9 showing in more detail areas where heat demand is over 3,000 kWh/km²/year. The last map in this chapter (Figure 2.10) shows modelled CO₂ emissions per unit area related to energy use in existing buildings.

2.9 Key Considerations Emerging from this Chapter

- National CO2 emissions reduction and renewable energy generation targets are very demanding.
- Domestic per capita CO2 emissions in the County are higher than both the regional and the national average.
- Hertfordshire will have to deliver its share of renewable and low carbon energy generation in line with current and emerging regional targets, informed by local resource assessments.
- Hertfordshire is expected to deliver many tens of thousands more homes by 2021.
- Updates to Part L and the Zero Carbon Hierarchy will see renewable and low carbon technologies playing a significant role in the development of new homes from 2013 through Building Regulations.
- Local planning policy will need to play a major role in gearing the house building industry and supply chain up to meeting the zero carbon homes policy.
- There is an increasing emphasis through emerging government energy policy on the role of district heating to meet future energy demand, and the requirement for strategic level planning to facilitate its delivery. Local authorities are expected to play a key role.
- CO2 emissions from existing buildings are also an important consideration. A significant proportion of existing housing is in private ownership and therefore the responsibility for improving the energy efficiency of the dwelling lies with the householder. Local authorities play a role too by encouraging improvements through promotion and incentive.
- Areas of high energy demand and related CO2 emissions from existing buildings are concentrated in the higher density areas of the major settlements. Buildings and developments in these areas offer the biggest potential as anchor loads for district heating opportunities.
- New housing development tends to be focused in or around existing urban settlements with very few in outlying/rural areas. Therefore, future

new development may offer opportunities to improve the energy performance of existing development through the delivery of district heating systems.

- This study is based on data and information that was correct at the time of writing. However it should be noted that the RSS is under review and future revisions may have implications for the key considerations emerging from this chapter.

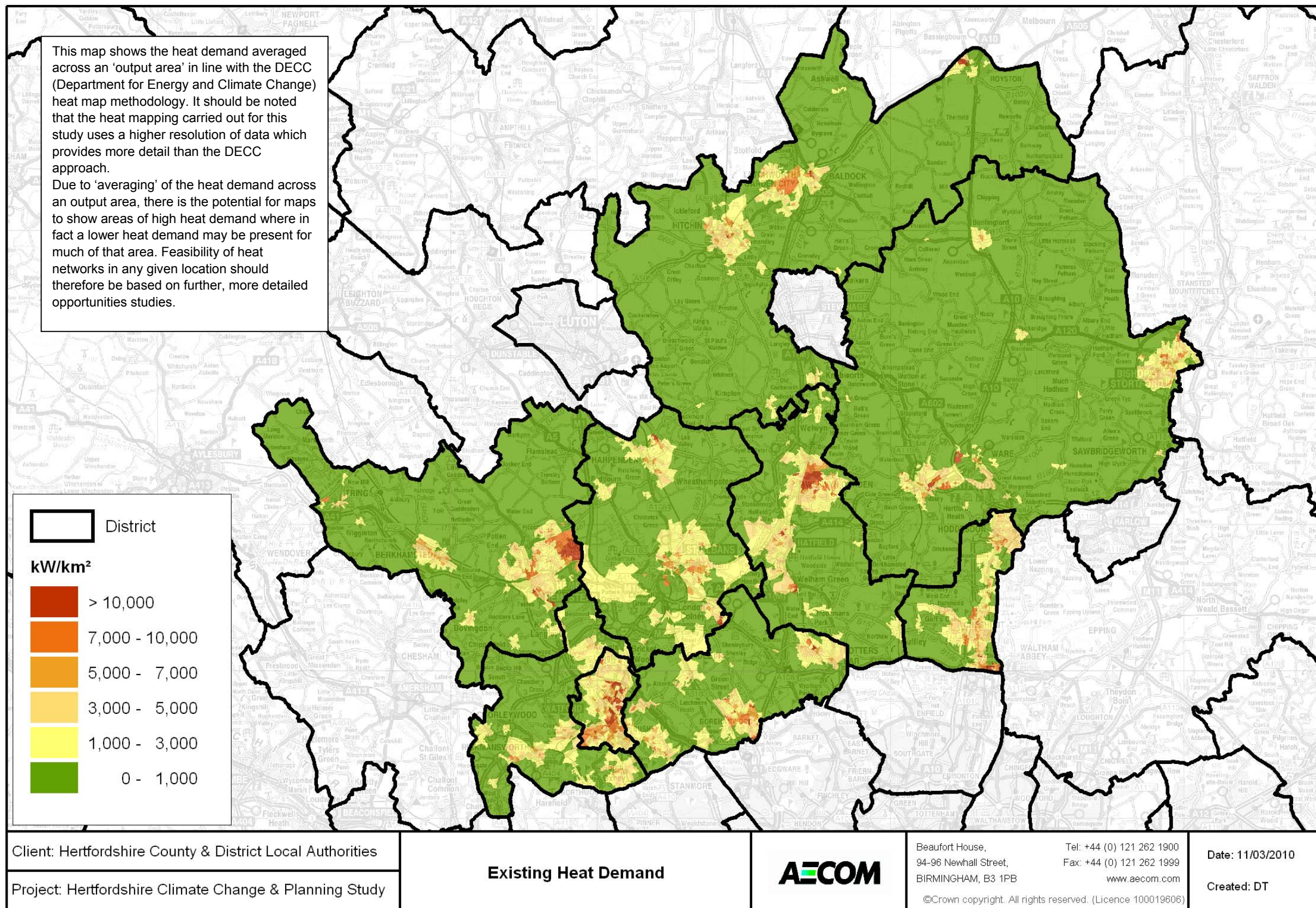


Figure 2.7: Average heat demand density map for existing buildings in Hertfordshire, 2009, in kW/km² (Source: Hertfordshire energy model, AECOM)

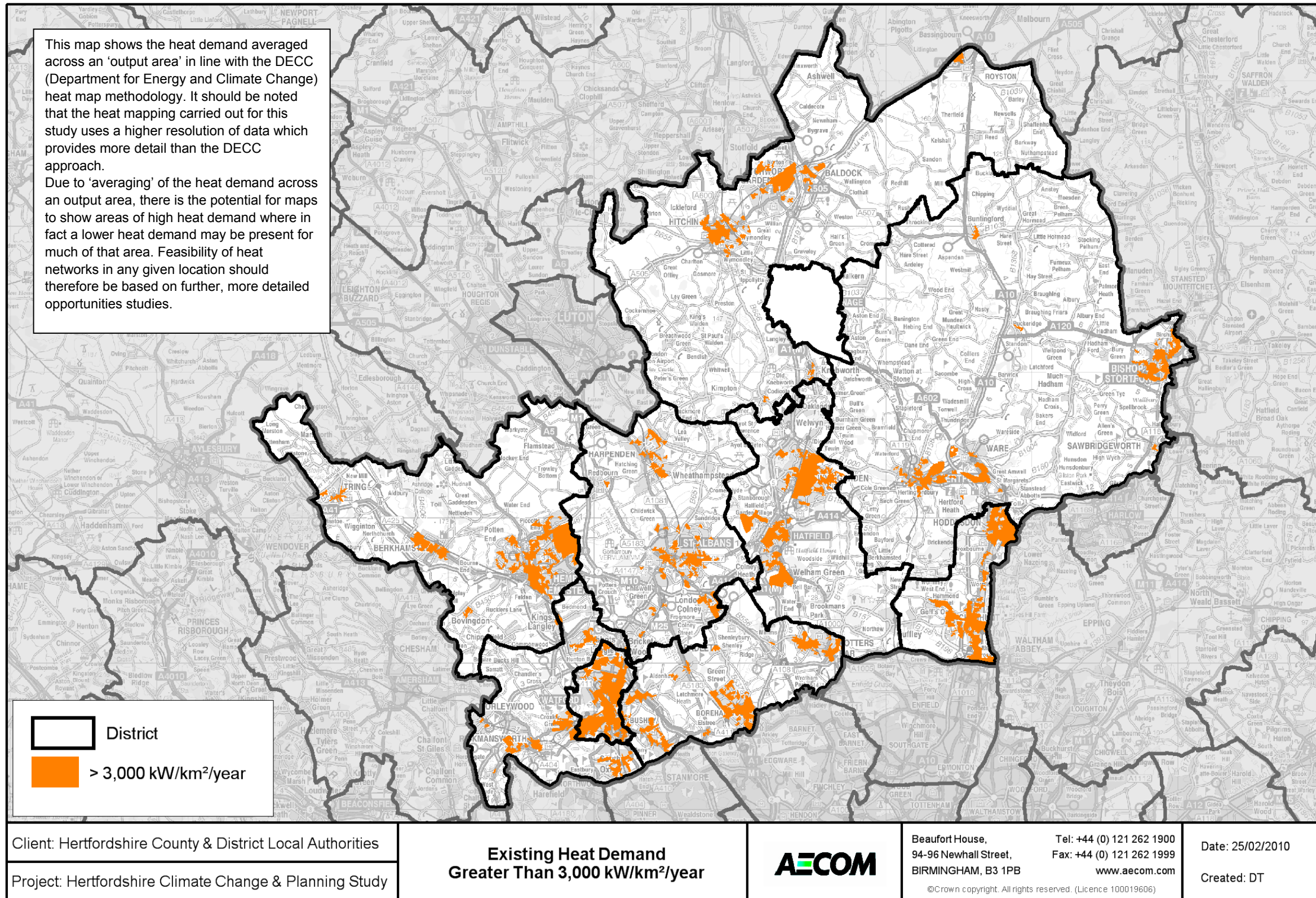


Figure 2.8: Heat demand density map for demand over 3,000 kW/km²/year, 2009 (Source: Hertfordshire energy model, AECOM)

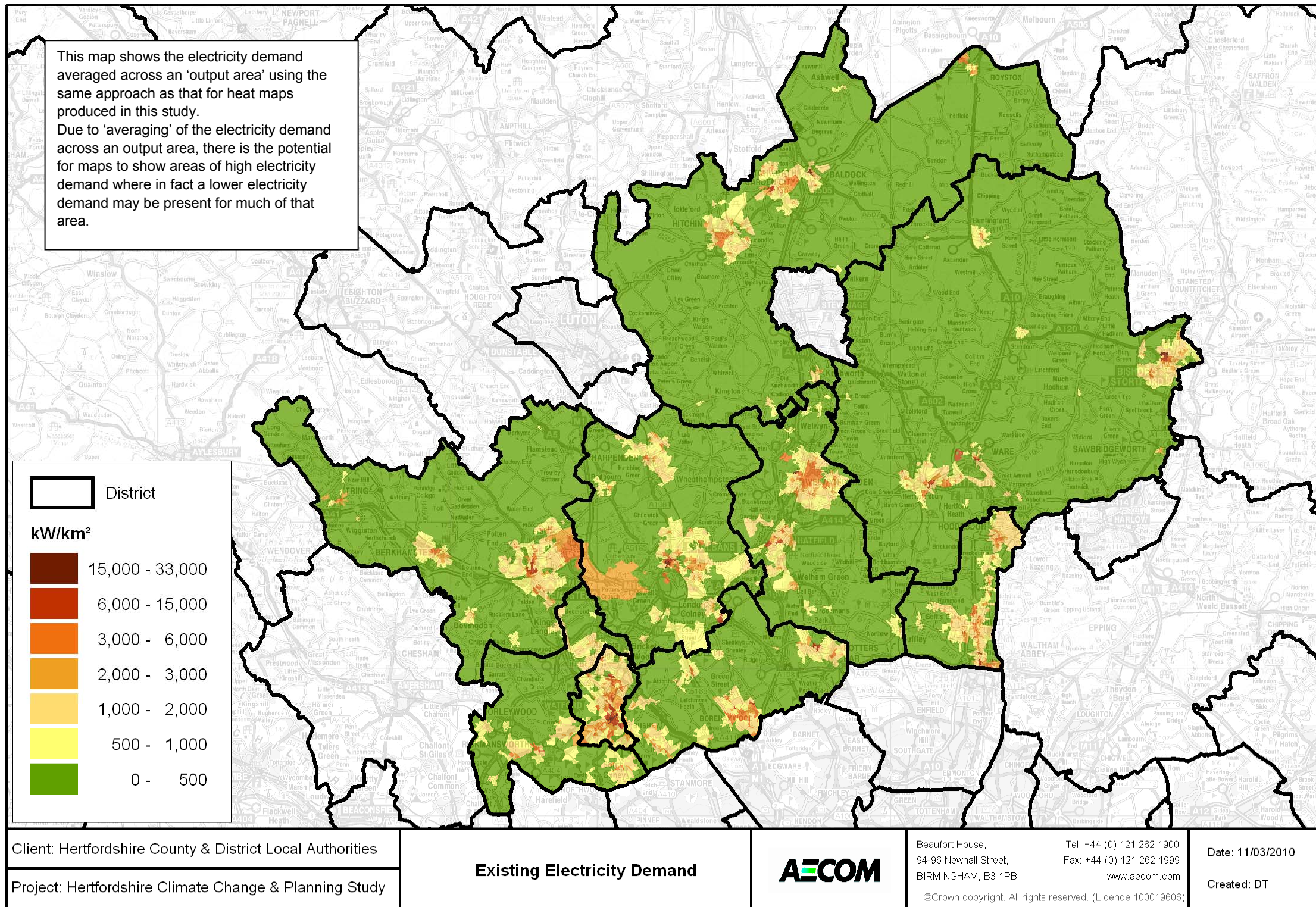


Figure 2.9: Average electricity demand density map for existing buildings in Hertfordshire, 2009, in kW/km² (Source: Hertfordshire energy model, AECOM)

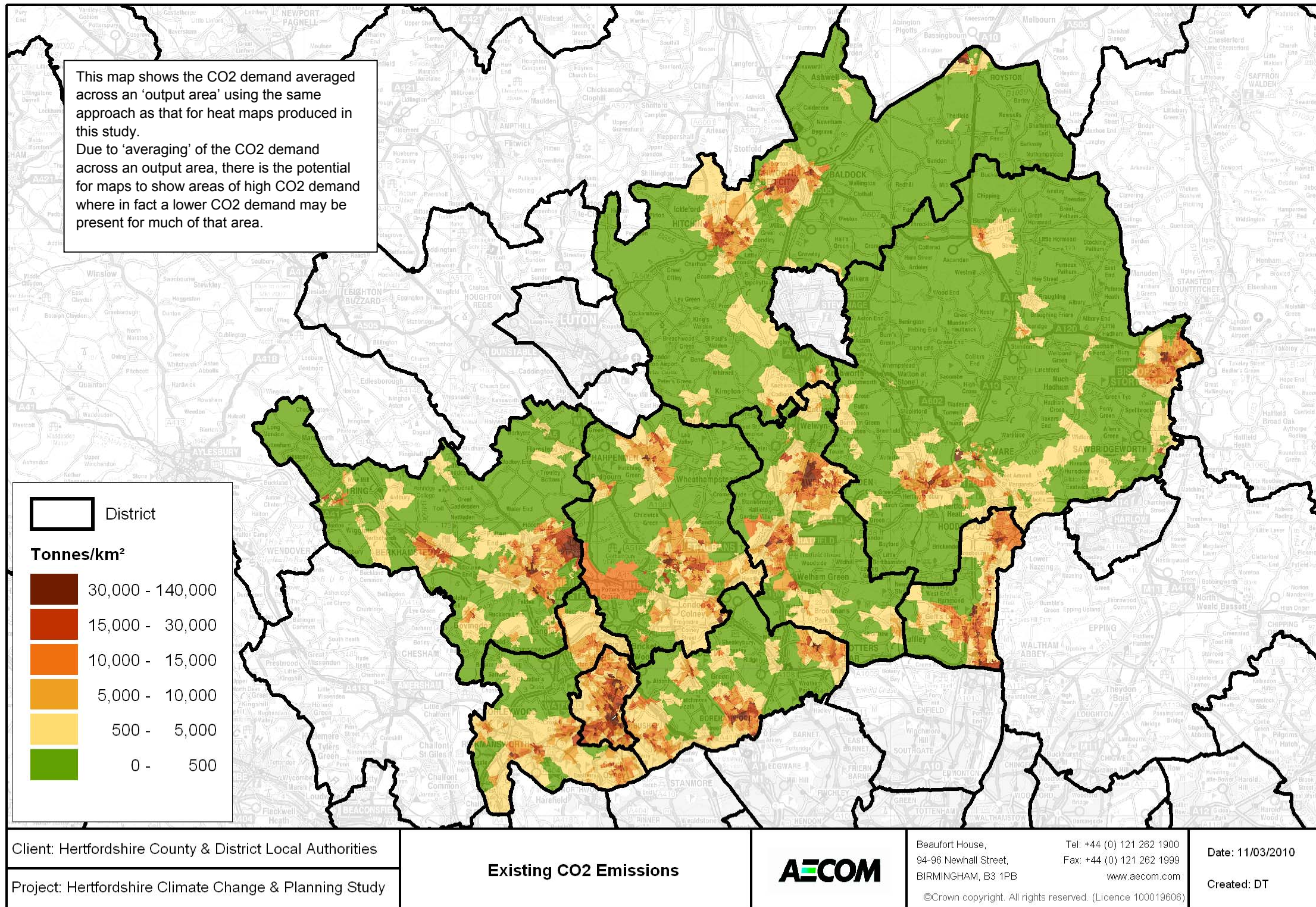


Figure 2.10: Annual CO₂ emissions map for existing buildings in Hertfordshire, 2009, in tonnes/km² (Source: Hertfordshire energy model, AECOM)