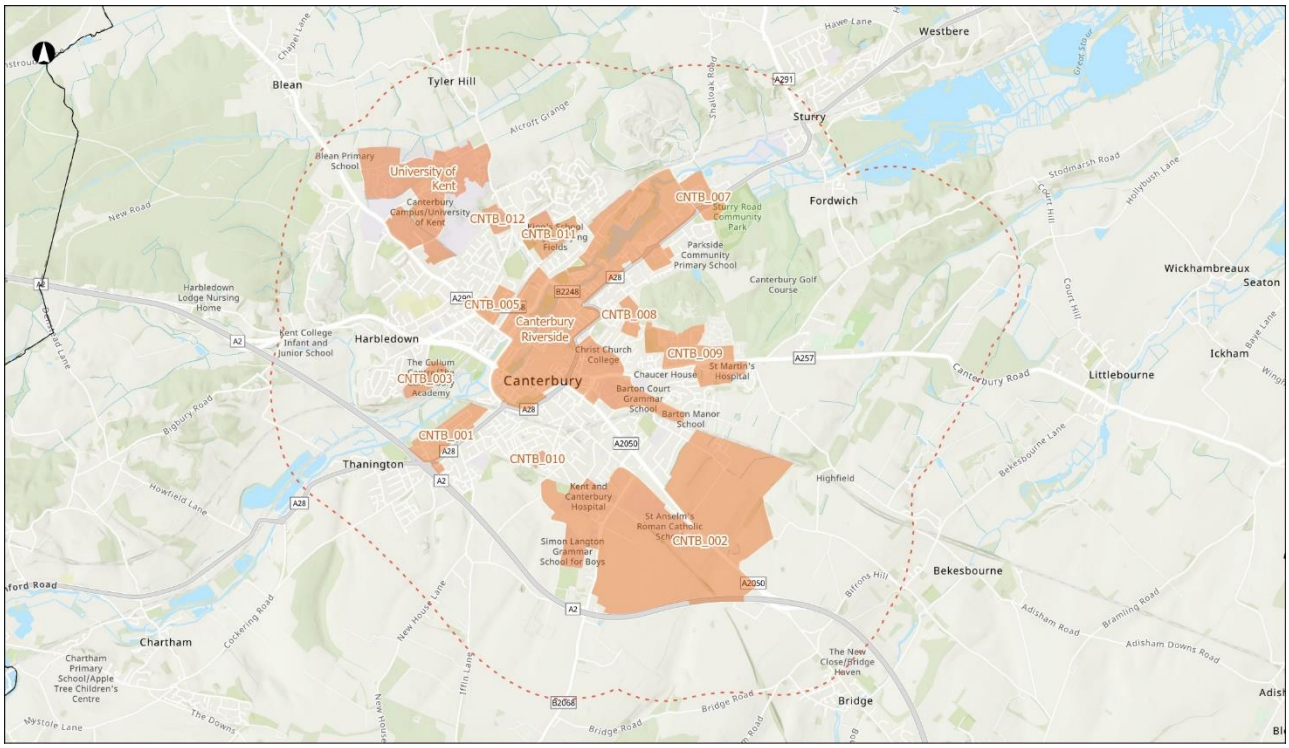
Department for Energy Security & Net Zero

Canterbury

Heat Network Zoning

Zone Opportunity Report



February 2025

Disclaimer

Please read the following licence conditions thoroughly to understand your responsibility for use of this report and data presented within it.

This report contains outputs from the Heat Network Zoning Pilot Programme. The Pilot was undertaken prior to full details of the Heat Network Zoning policy being available. Therefore, the contents, including data shown in maps, technical and economic data within the report, are likely to change and potentially sensitive information is withheld. No part of this report shall be relied upon for any business decisions.

Acknowledgements

BURO HAPPOLD

canterbury city council

This document was produced by Buro Happold with support from Canterbury City Council. We are grateful to all stakeholders who participated in the Pilot programme.

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Contents

Executive Summary

About Canterbury: Canterbury is a historic city in southeast England, known for its UNESCO World Heritage sites and dense urban centre. Canterbury City Council declared a climate emergency in 2019.

Local Energy Policy: There is an aim for net zero emissions from Council operations by 2030 and across all activities by 2045. The Local Plan requires low carbon or heat network schemes for significant developments.

Existing heat networks: Canterbury has three existing heat networks located at the University of Kent, Canterbury Christ Church University, and Kent and Canterbury Hospital.

Zones identified: Twelve heat network zones were identified in Canterbury. The total annual heat demand for all buildings required to connect within these zones is around 100GWh/yr.

Strategic heat network zones: Two strategic zones, the University of Kent and Canterbury Riverside, were identified. The overall heat demand for all buildings required to connect within these strategic zones is approximately 50GWh/yr.

Key heat demands: The initial zone opportunities identified would connect to about 35GWh/yr of heat. Key buildings include the University of Kent and Canterbury Christ Church University.

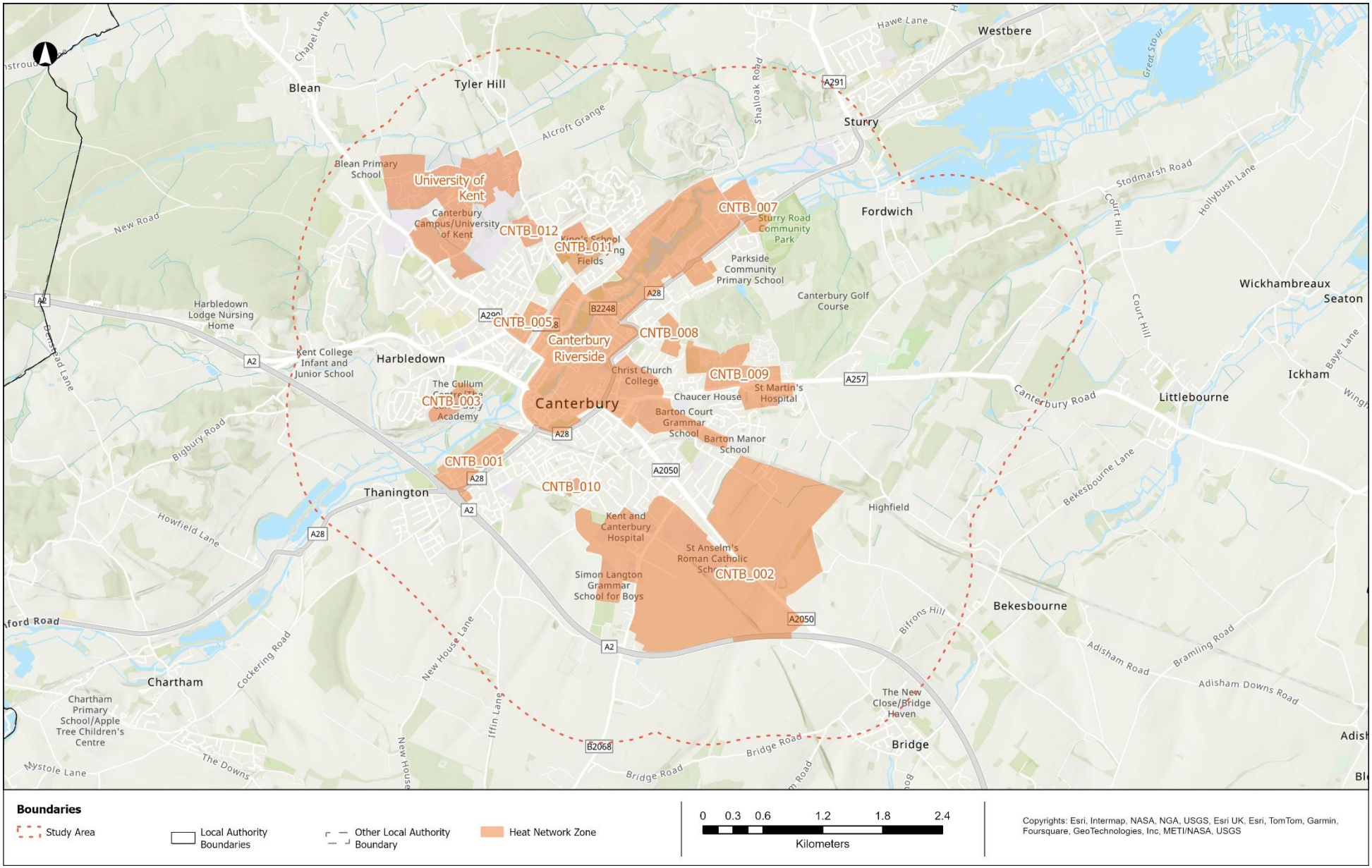
Key heat sources: Potential heat sources include river, mine water, waste water, and air source heat pumps.

Estimated CapEx: The high-level estimate of capital expenditure to network all buildings required to connect in all zones is approximately £125m, of which the initial zone opportunities amount to approximately £50m.

Other heat network zones: Smaller heat network zones were identified in a range of other commercial and industrial areas.

Carbon savings: The initial zone opportunities identified could deliver carbon savings of more than 5ktCO_{2e} annually.

Figure 1: Overview of Heat Network Zones in Canterbury



1) Introduction

Heat networks will play a crucial role in decarbonising heat in buildings. Heat networks take heating, cooling or hot water from a central source(s) and deliver it to a variety of premises such as public buildings, shops, offices, hospitals, universities, and homes. They are also an important part of securing the UK's energy independence through local, low carbon heat sources and reducing the cost of living through efficient, affordable heating in densely populated areas. Analysis shows that heat networks could provide about 20% of total heat by 2050. They currently provide about 3%.

The Department for Energy Security and Net Zero (DESNZ) is enabling the development of heat network infrastructure through a range of targeted funding, policy and legislative support to de-risk projects and attract investment. The Energy Act 2023 establishes the regulatory framework for heat networks in Great Britain and provides powers to introduce heat network zoning in England through secondary legislation. A heat network zone (HNZ) is a formally designated geographical area in England where heat networks are expected to provide the lowest-cost solution for decarbonising heating.

Under heat network zoning, central and local government will work with industry and local stakeholders to identify and designate areas of England where heat networks are expected to be the lowest-cost solution to decarbonising heat. Heat network zoning will be essential to speeding up the development of new heat networks and we hope to catalyse growth where it's most needed.

Heat network zoning will significantly increase private sector investment in the sector by removing the barriers which currently limit the pace of developing large scale heat networks. It will also give local communities the tools to accelerate the development of heat networks in their own areas and ensure that more homes and businesses can have access to greener, cheaper heat. It also has the potential to create tens of thousands of jobs across the country.

This report shows the Pilot programme outputs for Canterbury and is intended to showcase potential heat network zones in the city. The report indicates the heat network investment opportunity at a city scale, the potential location of heat network zones, and key opportunities for initial heat network development within those potential zones

Please note that all information presented in this report, including the location of identified heat network zones, is subject to change. These are the findings of Pilot programme that were developed alongside the emerging Heat Network Zoning policy and therefore reflect our understanding at a moment in time. As the methodology improves, we will update these reports to improve our understanding of how heat network zoning may be rolled out in each area. Any potential zones that are identified fully, or partly, in an adjacent local authority area will need to be discussed further once local zone co-ordinators are established.

Heat Network Zoning Pilot Methodology

Heat network zones will be identified using a standardised national zoning methodology[1]. The Heat Network Zoning Pilot Programme (hereafter Pilot programme) set out to develop a process to identify potential zones in a consistent and standardised manner across a range of towns and cities in England. The programme was fully funded and led by DESNZ, working alongside 28 Local Authorities, and multiple consultancy firms, to develop and test this approach at a local level. As such the final outputs are supported by each Local Authority but do not reflect an approved, endorsed, or adopted position on how zones may be delivered.

Lessons from the Pilot have been used to inform the development of the Heat Network Zoning policy. This includes improvements to the identification approach itself, but also wider policy design relating to the number and size of potential zones; existing heat networks; and the impacts of the policy on a range of stakeholders. Once the response to the heat network zoning consultation is published, we will update the methodology to reflect the final policy position.

The key concepts, definitions and complementary workstreams relevant to this report are introduced below. For a fuller description of the Heat Network Zoning policy, and up to date information regarding its implementation, please visit https://www.gov.uk/government/collections/heat-network-zoning.

Heat Network Zone Identification

Heat network zones will be identified using a standardised national zoning methodology. The December 2023 consultation on Heat Network Zoning proposes that the methodology will consist of two stages:

1. a national mapping exercise (using a data-led spatial energy model – the National Zoning Model, (or NZM), to identify indicative heat network zones across England;
2. a refinement stage where relevant local stakeholders will input to the review and refinement of potential heat network zones prior to formal designation.

For the purposes of this study, indicative heat network zones have been identified using a prototype version of the NZM. These indicative zones were then refined by technical consultants with input from local stakeholders. The NZM outputs are already of considerably higher quality than those shared for this work and therefore these reports will improve over time.

This study split heat network zones into two different categories. These are **'strategic'** zones – the largest zones which are generally seen as strategically significant to developing heat networks in an area; and **'other'** zones – which are generally smaller and discrete. These are terms specific to the Pilot programme and the report focuses primarily on the strategic zones.

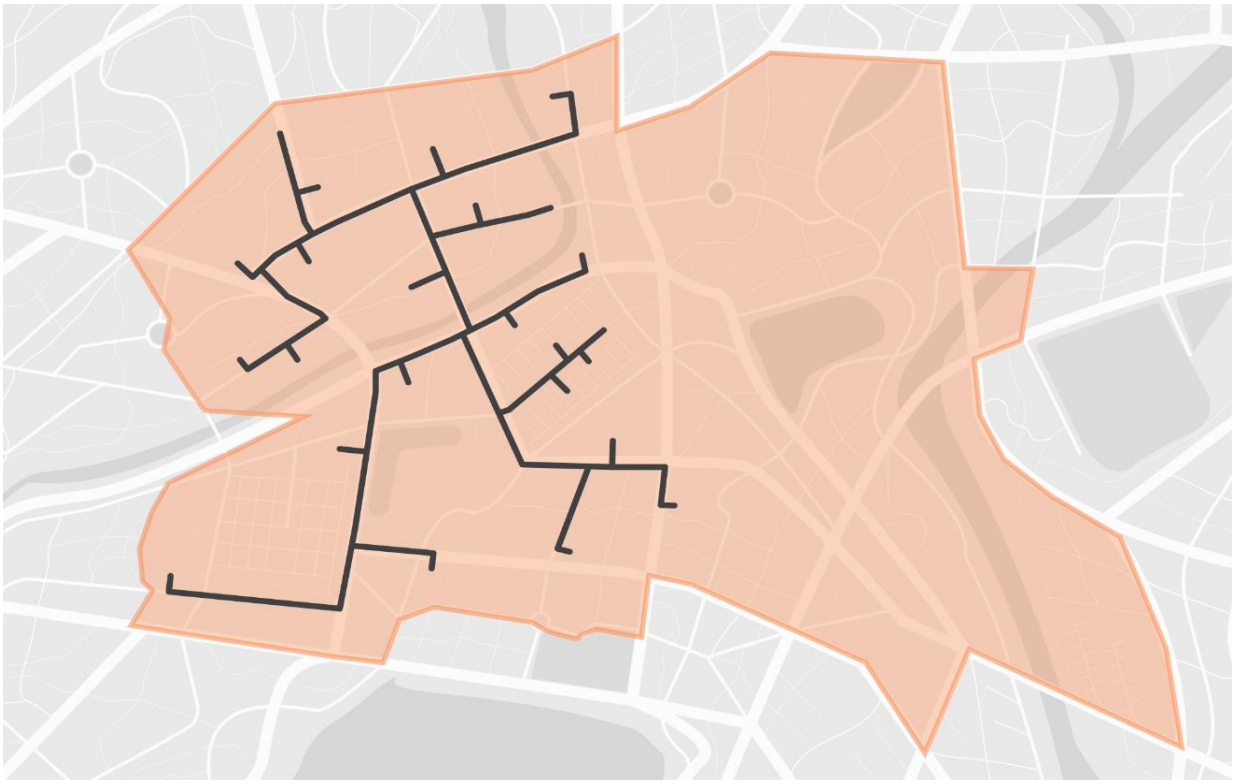
[1] More information can be found in the Heat Network Zoning Methodology Statements (Appendices 3, 4 & 5)

Initial Zone Opportunities

Alongside the identification of potential heat network zones, the Pilot programme has attempted to define areas within zones where the most attractive heat network development opportunities might exist. For the purposes of this programme *only* these are called an "initial zone opportunity" (or IZO). The approach considered economic viability, investment scale and returns, decarbonisation impact and deliverability. They were developed solely around buildings which could be required to connect[2] under the proposed Heat Network Zoning policy and did not consider potential voluntary connections.

Initial zone opportunity design targeted a linear heat density (LHD) of 4MWh/m/yr, for the existing built environment. This is considered a relatively low proxy for economic viability with the heat network sector in England. A more flexible approach was used for new development sites, where different economic success criteria are likely to be applied. To standardise the way opportunities were assessed, the IZOs presented in this report may differ from, or overlap with, existing or planned heat network infrastructure. Campus style heat networks (e.g. in hospitals or university campuses) were considered as potential heat loads with a single point connection. Figure 2 below shows an example of a heat network zone and an IZO.

Figure 2: Illustration of a Heat Network Zone (HNZ) and an Initial Zone Opportunity (IZO)



[2] The building categories being considered as required to connect include new developments, large non-domestic buildings, and communally heated residential blocks as described in Heat Network Zoning Consultation (2023)

Study Scope

This document is presented as a zone opportunity report as it was developed in advance of the final policy design. As such, the report does not include:

- references to the **central authority** or **zoning co-ordinator** roles;
- assumptions about rights of **existing heat networks,** or **zone delivery areas**;
- an options appraisal on which **routes to market** may be taken;
- calculations on the **cost of heat** (connection/tariffs) to specific buildings**;**
- any inferences as the suitability for **public/private sector delivery** unless it's matter of fact (existing network or Heat Network Investment Project/Green Heat Network Fund project);
- references to **local community benefit** or **consumer protection** (subject to a live consultation).

In the future, it is intended that a document, similar in style, will be produced to incorporate these policy design aspects and be used as a Zone Market Prospectus (ZMP) to market heat network zoning opportunities in an area. Further detail on the methodology and initial zone opportunity criteria is provided in Appendix 4 and Appendix 5.

2) Canterbury Heat Networks Context

2.1) Canterbury City Overview

Canterbury is a historic city located in southeast England in the ceremonial county of Kent. Canterbury City Council (CCC) is the local authority for the city of Canterbury as well as the coastal towns of Herne Bay, Whitstable, and 24 surrounding villages. This two-tier local government system includes Kent County Council, which handles broader strategic issues. The population of Canterbury City is approximately 69,000, whilst the local authority area is estimated to be 157,400.

The city of Canterbury is renowned for its history, architecture, and three UNESCO World Heritage sites. It has a dense urban city centre containing retail, commercial office, and historic sites, as well as several industrial areas and low-rise residential housing on the fringe of the city centre. The city is home to three universities; the University of Kent, Canterbury Christ Church University, and the University of Creative Arts. Herne Bay and Whitstable in the north of the wider local authority area are coastal towns with rural settlements bordering them to the south. In 2022 CCC took ownership of all the social housing within the local authority area from East Kent Homes.

2.2) Canterbury Net Zero Targets and Commitments

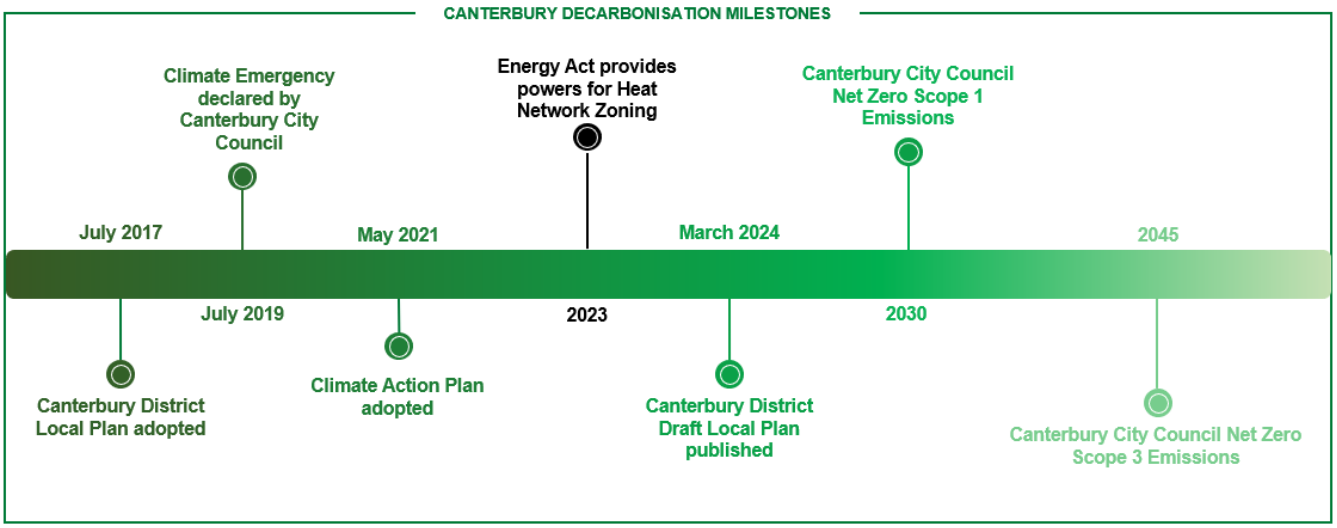
In 2019 CCC declared a climate emergency. In May 2021 CCC adopted a district wide Climate Action Plan. The Plan outlines how CCC will achieve net zero for Council operations and assets by 2030, and the full range of activities needed to support CCC's work by 2050. The latter has since been brought forward to 2045 by signing up to the UK100 initiative.

Canterbury's Local Plan, adopted in July 2017, sets out requirements for district and decentralised energy. As part of this, strategic sites and residential sites with over 200 units, facilities, education institutions and schools, and substantial commercial developments, should provide a site wide low carbon or heat network scheme unless demonstrated not to be feasible or if an appropriate alternative carbon reduction strategy is proposed.

In March 2024 Canterbury's Draft Local Plan was published for a three-month public consultation.

Figure 3 summarises key dates in CCC's plans for decarbonisation and demonstrates their progress towards decarbonisation targets.

Figure 3: Canterbury Decarbonisation Milestones



2.3) Delivering Heat Networks in Canterbury

There are three existing heat networks within the Canterbury area. Two of these networks are located on university campuses and one is located on a hospital site and are summarised below. At present, there are no known plans for further heat networks in the area.

University of Kent: An existing heat network is located at the University of Kent Canterbury campus. This network currently serves around 24 buildings. It consists of two separate pipe systems which connect to a gas fired energy centre. There are currently no known plans to extend this network. For further detail, please refer to Section 3.1.2.

Canterbury Christ Church University: An existing heat network at Canterbury Christ Church University campus serves most buildings on the campus. There are currently no known plans to extend this network. For further detail, please refer to Section 3.2.2.

Kent and Canterbury Hospital: An existing heat network serves Kent and Canterbury Hospital.

A study was completed in 2014 which identified opportunity areas for heat networks in Kent. This suggested a network serving the existing Canterbury Christ Church University heat network as well as adjacent loads, however this was never taken forward.

Please refer to Appendix 2 for further information about the evidence compiled for heat network opportunities in Canterbury. This includes a stakeholder directory and records of interactions with those stakeholders as well key studies and reports.

2.4) Canterbury Heat Network Zones

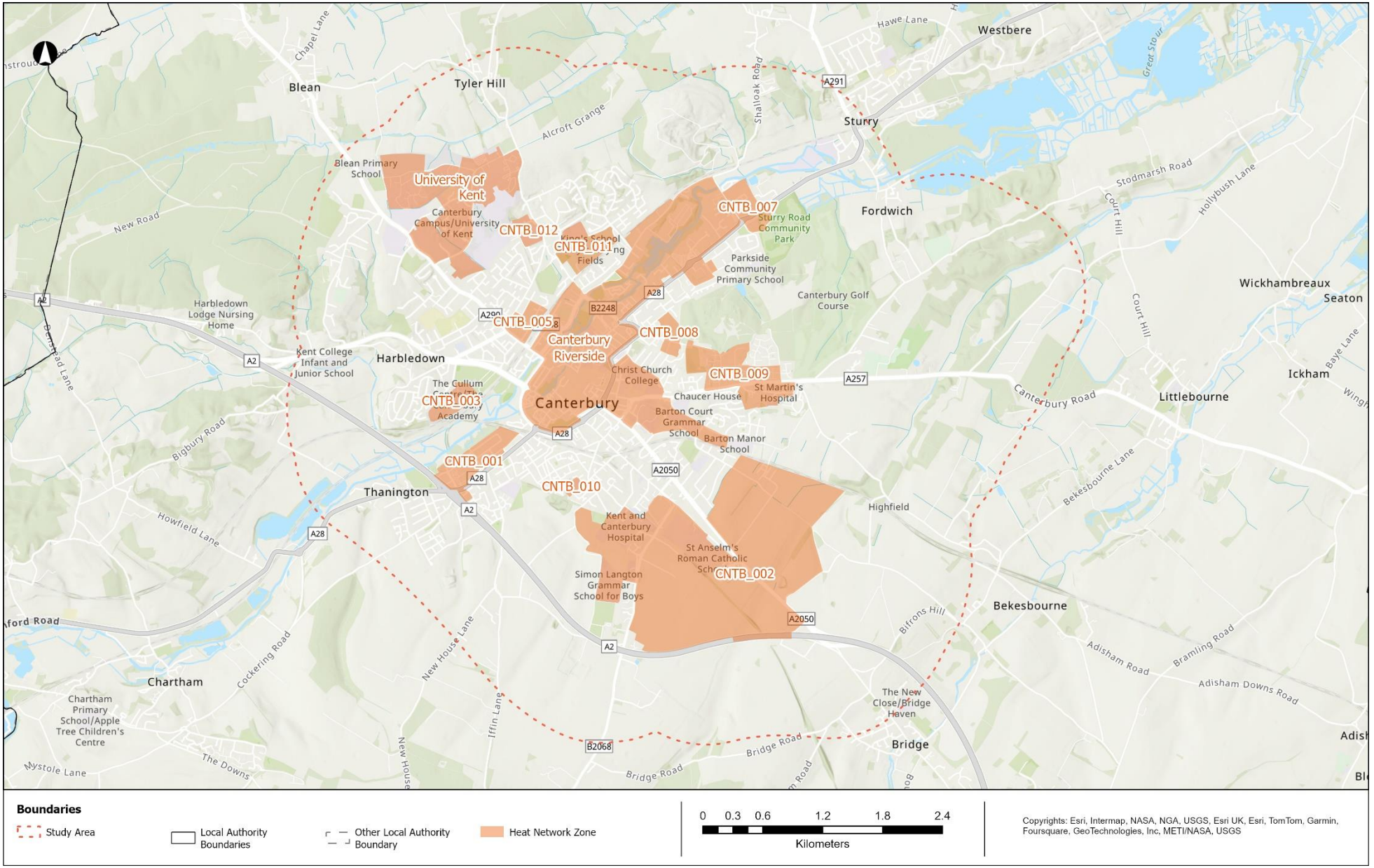
A total of twelve potential HNZs were identified in Canterbury, with two considered Strategic HNZs. Figure 4, below, shows the study area boundary as well as the boundaries of all HNZs

identified within Canterbury. Strategic HNZs have been allocated a meaningful name agreed as relevant from a local perspective whilst Other HNZs have a reference number allocated instead. In both cases, these names are shown on the map.

Please see Appendix 1 for the following maps giving more detail:

- A: City Typology Map – shows building typologies which dominate by area.
- B: Key Heat Loads Map – highlights key buildings required to connect by heat demand.
- C: Key Heat Sources Map – highlights key heat sources by type and potential energy centre locations as well as any existing district heat network energy centres.
- D: Existing / Planned Heat Networks Map – shows existing heat networks, planned extensions, and planned networks at an advanced development stage.
- E: Key Constraints Map – shows key topographical constraints identified.
- F: Off-gas Grid Areas – presents areas with differing levels of properties off the gas grid within the study area.

Figure 4: Heat Network Zones Identified within the Canterbury Study Area



3) Strategic Heat Network Zones

Strategic HNZs in Canterbury

This section examines the two strategic HNZs and the IZOs identified within each. This covers the key heat demands, heat sources, energy centre locations and potential constraints for each IZO identified. Heat network distribution routes are conceptual and designed to illustrate the potential size and scale of the heat network opportunity that may be realised as part of the upcoming Heat Network Zoning policy. Other heat network zones are listed in Section 4.

Table 1 below presents a high-level estimate of the scale of opportunities across Canterbury. Please refer to Appendix 4 for more detail.

Table 1: Annual Heat Demand for Buildings in All Zones, Strategic Zones and IZOs

Scope	Annual heat demand (GWh/yr)
All buildings required to connect in all zones[3]	100
All buildings required to connect in strategic zones	50
All buildings connected to the IZOs	35

Existing/planned heat networks that overlap with IZOs are described, though their locations may vary due to different approaches. The Pilot programme applied a standard set of technical and economic assumptions across each of the 28 areas that participated in the programme and uses a proxy for economic viability (see Section 1 and Appendix 4 for more detail). Existing and planned networks will often be based on more detailed design work and have taken account of strategic and commercial considerations that were relevant at the time of their development. Future iterations of this report will consider how to better align local studies whilst retaining a nationally consistent approach.

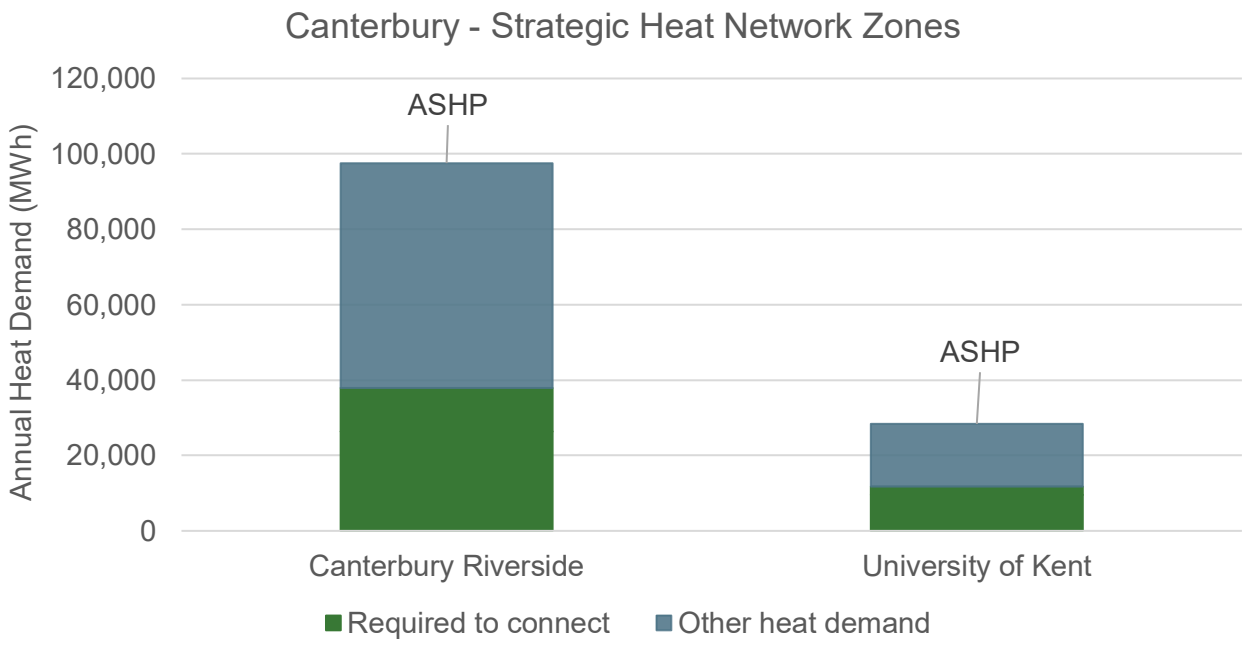
The two strategic zones are summarised below. Figure 5 illustrates the size of each, alongside the key potential heat source and the proportion of buildings that may be required to connect.

University of Kent is a strategic zone located in the north-west of the city, covering the University of Kent campus, nearby low-rise university residential areas, Canterbury Innovation Centre and two adjacent schools**.** In this zone, one IZO was identified which is supplied by heat from an air source heat pump (ASHP). For more information, please see Section 3.1.

[3] Row 1 is an estimate of heat demand across buildings required to connect in all zones identified. Row 2 is as per row 1, but only within strategic zones. Row 3 includes buildings connected to the IZOs described and largely comprise of buildings potentially required to connect. Figures are generally rounded up to the nearest 25 or 50GWh/yr.

Canterbury Riverside is a large strategic zone covering Canterbury City Centre. It includes the Westgate area and extends north-east into the Northgate area. The zone includes a mix of retail areas, educational campuses, residential (including student housing), and the new mixed-use Kingsmead Depot (Riverside) development. In this zone, one IZO was identified which is supplied by heat from an ASHP. For more information, please see Section 3.2

Figure 5: Summary of Heat Demands in all Strategic HNZs Identified



3.1) University of Kent

3.1.1) University of Kent – HNZ Summary

The University of Kent HNZ covers the University of Kent's Canterbury campus which is in the north-west of Canterbury. The zone is categorised as strategic because there is good heat density, and an existing heat network on the university campus. Many of the buildings in this zone are educational and residential and includes 38 buildings which may be required to connect. The HNZ includes good space availability for installing heat network infrastructure including a new energy centre.

3.1.2) University of Kent - Existing Heat Networks

University of Kent Heat Network

The University of Kent heat network supplies heat to 24 buildings on its own campus. It provides heat to several of the universities key buildings including the Templeman Library, Cornwallis North East, Marlowe Building and The Registry. The network consists of two hydraulically separate networks served from a gas-fired energy centre located on Library Road (see Figure 6). It is understood there is no spare capacity on this network and no known planned network extensions.

3.1.3) University of Kent - Initial Zone Opportunities

A single IZO was identified in the University of Kent zone. Potential routing[4] for the IZO is shown in Figure 6 and summary statistics provided in Table 2.

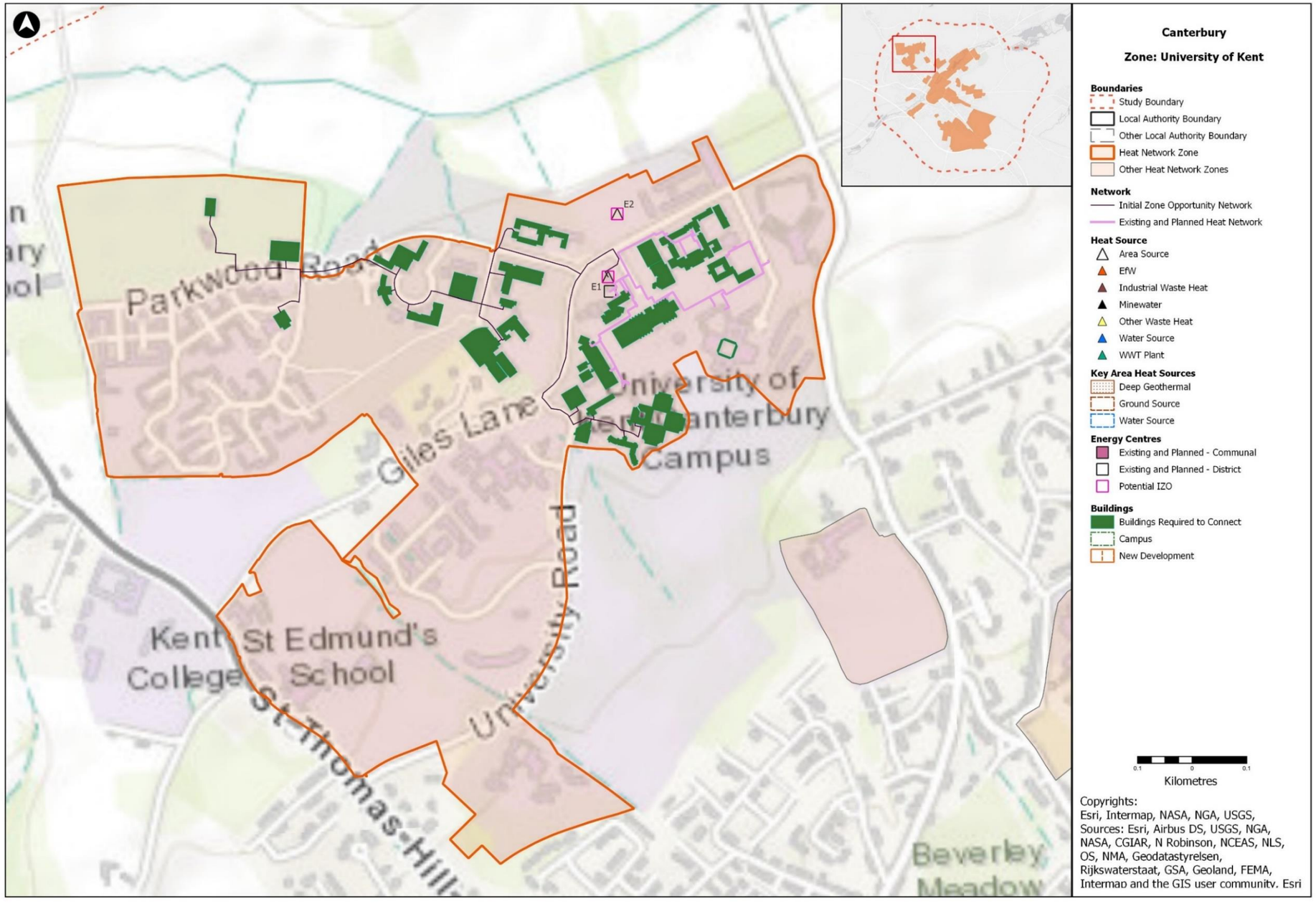
Table 2: University of Kent - Summary Statistics for Initial Zone Opportunities[5]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
£10m	~10GWh/yr	2km	2ktCO_{2e}/yr	4.8MWh/m	ASHP

The identified IZO connects to 26 buildings potentially required to connect within the zone, including buildings connected to the existing University of Kent heat network. This equates to a heat demand of around 10GWh/yr. ASHPs have been identified as the preferred primary low-carbon heat source to supply the IZO.

[4] Routes can be expected to change as a better understanding of local constraints is developed through design.
[5] Please see Appendix 3 – Glossary, "Specific definitions" of the main report for definitions related to this table.

Figure 6: Initial Zone Opportunities in University of Kent HNZ



3.1.4) University of Kent – IZO Heat Demands

The heat demands identified within the IZO are described below. The Pilot programme used several sources including local data collected from building owners; national energy demand datasets; benchmarks applied via the National Zoning Model (NZM); and a standardised approach to estimate the potential heat demands of new development sites. More information is provided in Appendix 4.

Where there are different values between datasets, the methodology prioritised the use of the early prototype version of the National Zoning Model, for consistency. This has led to an overestimation of some commercial and light industrial heat demands presented in this report. Large anchor loads that are already connected to existing district-scale heat networks are not listed.

The IZO identified in the University of Kent HNZ includes 26 buildings potentially required to connect. This equates to a heat demand of around 10GWh/yr. Figure 7 shows the distribution of heat demand across different types of buildings that may be required to connect. Around 85% of the connected load is public sector heat demand which comprises of the University's buildings. Further details of the key heat demands for buildings that may be required to connect are provided in Table 3.

Figure 7: University of Kent - Categorisation of Heat Demand for Buildings Required to Connect Buildings in IZOs

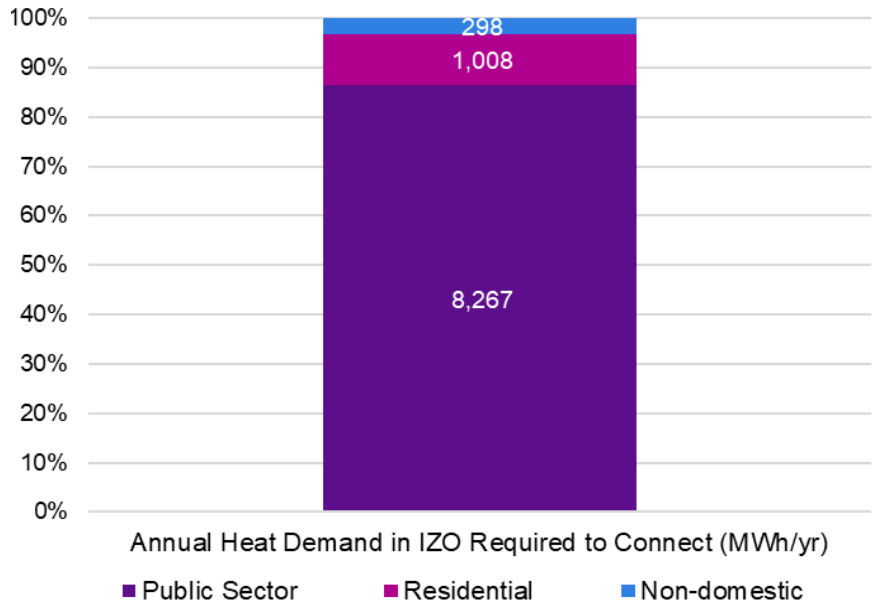


Table 3: University of Kent - Key Heat Demands Required to Connect in the IZOs[6]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Templeman Library	Public sector	1	1,400	Benchmark (NZM)
Eliot College	Residential	1	900	Benchmark (NZM)
University of Kent Sports Centre	Public sector	1	850	Benchmark (NZM)
Cornwallis North East	Public sector	1	800	Benchmark (NZM)
Marlowe Building	Public sector	1	550	Benchmark (NZM)
Ingram Building	Public sector	1	500	Benchmark (NZM)
University of Kent Tennis Centre	Public sector	1	450	Benchmark (NZM)
Telephone Exchange	Public sector	1	350	Benchmark (NZM)
The Registry	Public sector	1	300	Benchmark (NZM)
Jennison Building	Public sector	1	300	Benchmark (NZM)

3.1.5) University of Kent – IZO Heat Sources

The main heat source identified to supply the IZO is a large-scale ASHP. This ASHP could be located next to, or in place of, the existing University of Kent heat network energy centre on Library Road. There is also additional space at Giles Lane car park which could potentially accommodate an energy centre.

There are open green spaces nearby to the IZO where a ground source heat pump (GSHP) solution could be explored. More detailed studies, including borehole assessments, are

[6] Please refer to Appendix 3 for definitions related to building categories in this table.

needed to assess the viability of this option. Therefore, it has been discounted for this stage of IZO work but may be considered in the future.

Table 4 and Table 5 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 6 in Section 3.1.3 and Appendix 1: Map C. The capacities shown in Table 4 represent the assumed capacity which could be supplied by the ASHP.

Table 4: University of Kent - Key Heat Source Opportunities for the IZOs

Heat source type	Capacity (kWp)	Temperature (ºC)	Potential Energy Centre (Ref number)
ASHP	2,500	5-15 ºC	E1, E2

Table 5: University of Kent - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)	Ownership	Heat Source
E1	Land	850	University of Kent	ASHP
E2	Car park	9,000	University of Kent	ASHP

3.1.6) University of Kent – IZO Heat Distribution

The approach to developing the heat network route considered economic viability, investment scale and returns, decarbonisation impact and deliverability. These criteria were applied in a standardised manner across all opportunities identified in the Pilot programme and therefore may not reflect detailed designs or proposed routes identified in more detailed feasibility work. Routing within the site boundary of a building or campus may not have been included if insufficient information was available. The IZO routing was developed solely around buildings which could be required to connect and did not consider potential voluntary connections.

The purpose of the concept heat network route is to define the scale, potential routing and identified associated constraints within the zone. Further work will be required to undertake a more detailed route assessment to take account of the buried utilities, building connections and other local strategic and local planning considerations.

It is proposed that the IZO connects into the existing network at the current energy centre location on Library Road, and a main pipework trunk is installed down Giles Lane and Park Wood Road connecting to the Telephone Exchange before turning towards the Sports Centre Car Park and connecting to the Ingram Building. From the Sports Centre Car Park, a branch is routed south to connect to the Marlowe Building, and a branch is routed north-west past the Jennison Building along Park Wood Road toward the Tennis Centre and the New Sports Pavilion.

Table 6 below, shows the network statistics for the IZO including the network length and associated cost. Please see Appendix 5 for related methodology statements and assumptions.

Table 6: University of Kent - Indicative Heat Network statistics for IZOs

IZO Heat Network description	Network length (km)	Network cost (£m)
University of Kent	2	5

3.1.7) University of Kent – IZO Key Constraints and Mitigations

There are no major constraints identified for the proposed IZO network route.

3.2) Canterbury Riverside

3.2.1) Canterbury Riverside – HNZ Summary

The Canterbury Riverside heat network zone encompasses the city centre of Canterbury, the Canterbury Christ Church University campus and extends north-east into the Northgate area. The zone has a high density of large heat loads including the Whitefriars Shopping Centre, Canterbury College and Canterbury Christ Church University. The Riverside, a large mixed-use urban regeneration site, presents a good opportunity for early heat network infrastructure installation in the zone.

The zone primarily encompasses non-domestic buildings, including commercial and educational facilities. However, the zone also includes several offices, sports, recreational, entertainment, industrial, and public buildings. There are 106 buildings potentially required to connect in the Canterbury Riverside zone and an existing heat network serving the Canterbury Christ Church University campus.

3.2.2) Canterbury Riverside - Existing Heat Networks

Canterbury Christ Church University Heat Network
The Canterbury Christ Church University campus heat network serves most existing buildings on the campus. The network connects to several of the University's largest buildings including: the Anselm Building, the Laud Building, the Ramsey Building and the Erasmus Building. There are no known planned extensions to this network.

3.2.3) Canterbury Riverside – Initial Zone Opportunities

A single IZO was identified in the Canterbury Riverside zone. Potential routing[7] for the IZO is shown in Figure 8 and summary statistics provided in Table 7.

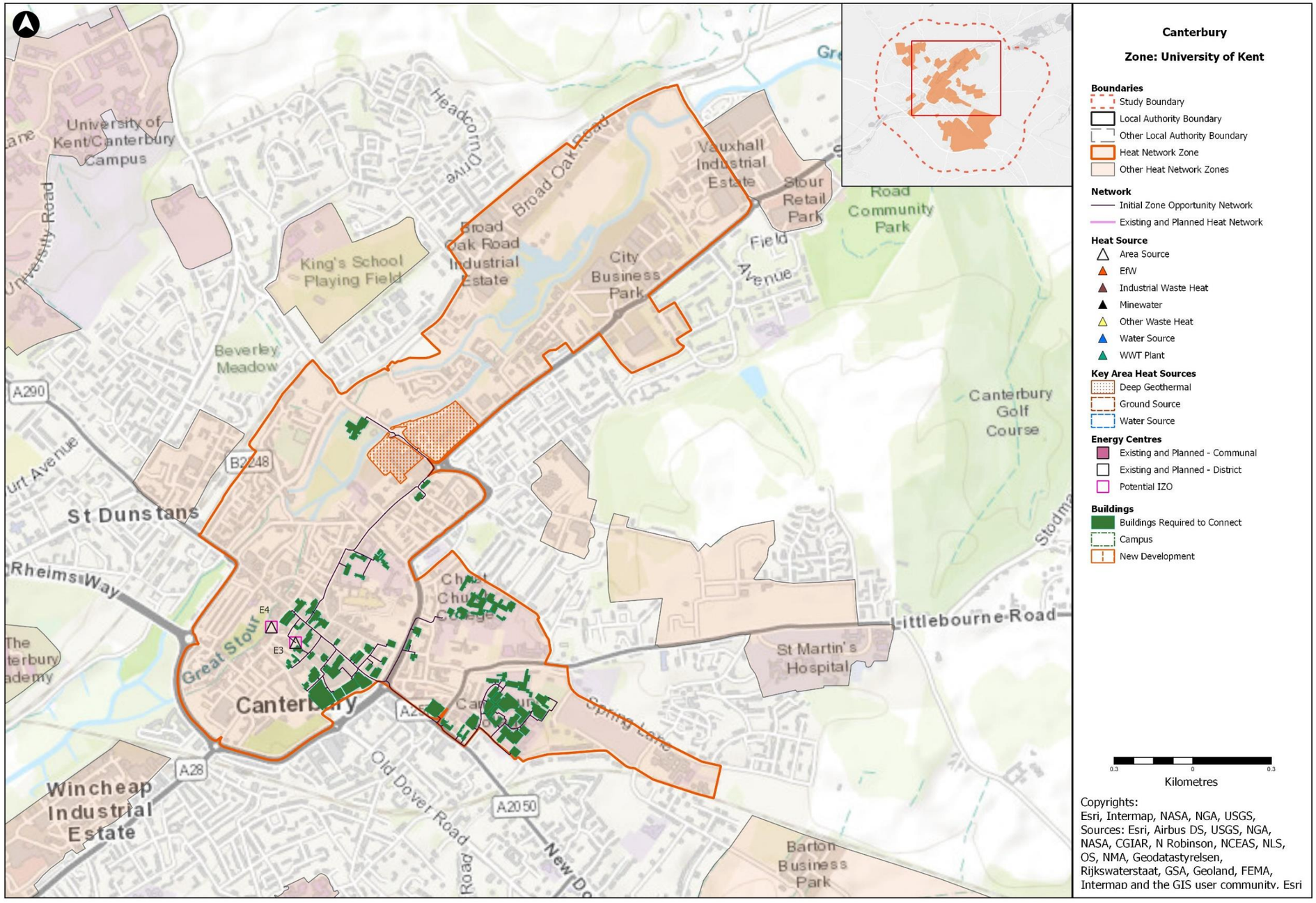
The identified IZO connects to about 70% of the buildings potentially required to connect within the zone, covering the city centre of Canterbury. About a fifth of these buildings are connected to the existing Canterbury Christ Church University campus heat network.

Table 7: Canterbury Riverside - Summary Statistics for Initial Zone Opportunities[8]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
£50m	~25GWh/yr	7km	5ktCO_{2e}/yr	3.9MWh/m	ASHP

[7] Routes can be expected to change as a better understanding of local constraints is developed through design.
[8] Please see Appendix 3 – Glossary, "Specific definitions" of the main report for definitions related to this table.

Figure 8: Initial Zone Opportunity in Canterbury Riverside HNZ

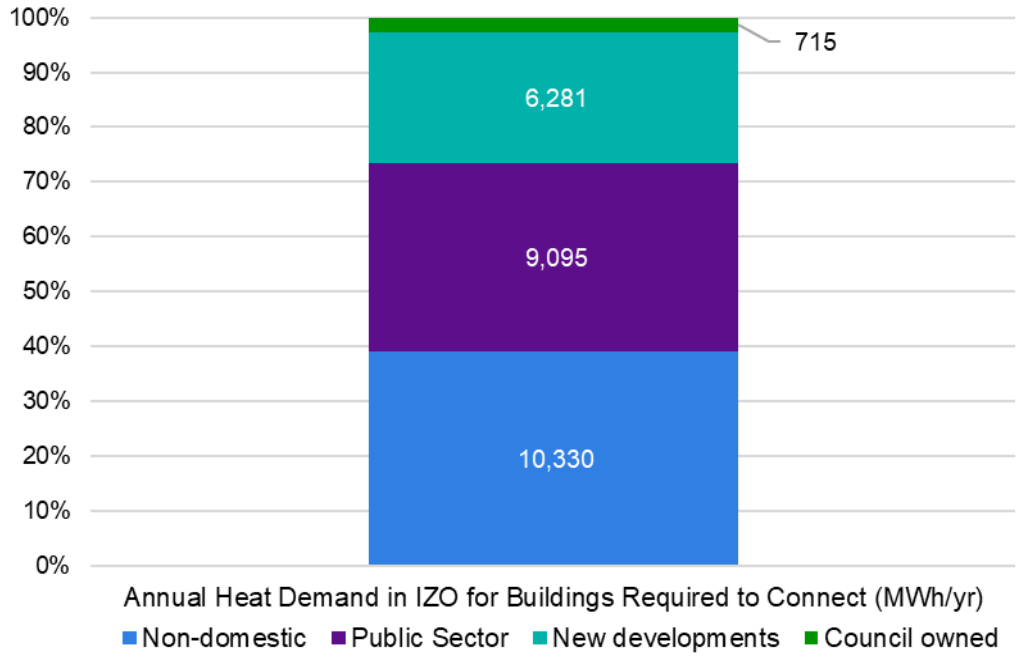


3.2.4) Canterbury Riverside – IZO Heat Demands

The IZO identified in the Canterbury Riverside HNZ includes a total of 66 buildings potentially required to connect, equating to heat demand of circa. 25GWh/yr[9]. Figure 9 shows the distribution of heat demand across different types of buildings that may be required to connect. Many of these buildings are within the city centre and comprises non-domestic and public sector buildings.as well as new development.

Further details of the key heat demands for buildings that may be required to connect are provided in Table 8. A significant proportion of the heat demand connected to the IZO (30%) is from the new mixed-use development at Kingsmead Depot, which is part of the Riverside urban regeneration and will consist of a cinema, cafes, bars and restaurants as well as a substantial amount of student accommodation. Other key heat demands include the Whitefriars Shopping Centre which is owned by CCC. There are three large educational areas connected to the IZO: Canterbury Christ Church University, Canterbury College, and the University of Creative Arts. The IZO also connects a smaller number of public sector loads which are used for educational purposes.

Figure 9: Canterbury Riverside - Categorisation of Heat Demand for Buildings Required to Connect in IZO



[9] Please refer to section 3.1.4 for a description of IZO heat demands.

Table 8: Canterbury Riverside - Key Heat Demands Required to Connect in the IZO[10]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Kingsmead Depot (Riverside)	New development	1	6,300	Pilot Methodology
Whitefriars Shopping Centre	Non-domestic	10	5,300	Benchmark (NZM)
Canterbury College	Public Sector	7	3,050	Benchmark (NZM)
Canterbury Christ Church University	Public Sector	8	2,950	Benchmark (NZM)
University of Creative Arts	Public Sector	3	900	Benchmark (NZM)
The Precincts	Non-domestic	1	900	Benchmark (NZM)
Kingsmead Leisure Centre	Council owned	1	700	Benchmark (NZM)
The King's School	Public Sector	2	600	Benchmark (NZM)
Waitrose	Non-domestic	1	550	Benchmark (NZM)
Barton Grammar School	Public Sector	1	550	Benchmark (NZM)

3.2.5) Canterbury Riverside – IZO Heat Sources

The main heat source identified to supply the IZO is a large-scale ASHP. Two separate locations have been identified for hosting the ASHP and associated energy centre infrastructure. The first option is a car park located off Hawk's Lane, which is the preferred site when aiming to maximise network linear heat density. The second option uses space on the land off Stour Street. Current uncertainties involve land ownership, spatial needs, and proximity to other buildings, which will require further study.

There is potential to use a WSHP, owing to the proximity to the River Stour. However, there are some potential key risks associated with the deliverability of this option, notably river water abstraction and discharge systems, along with the water quality. A more detailed study is required to understand the viability of this option. There is also potential for waste heat

[10] Please refer to Appendix 3 for definitions related to building categories in this table.

recovery from the Asda supermarket on Sturry Road, and Waitrose on St George's Place. Additionally, there are several electric substations with waste heat potential. However, these are not perceived significant enough to be a primary heat source and are not listed below.

Table 9 and Table 10 summarise the key heat sources and potential energy centre locations identified. These are also shown in Figure 8 in Section 3.2.3 and Appendix 1: Map C. The capacities quoted relate to the assumed supply capacity of heat pumps on the site.

Table 9: Canterbury Riverside - Key Heat Source Opportunities for the IZOs

Heat source type	Capacity (kWp)	Temperature (ºC)	Potential Energy Centre (Ref number)
ASHP	6,500	5-15 ºC	E3, E4

Table 10: Canterbury Riverside - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)	Ownership	Heat Source
E3	Car park	900	Unknown	ASHP
E4	Land	950	Unknown	ASHP

3.2.6) Canterbury Riverside – IZO Heat Distribution

Table 11 shows the network statistics for the IZO including the network length and associated costs. Please refer to Section 3.1.6 and Appendix 5 for the assumptions used.

The key heat network infrastructure within the IZO is the pipework from the proposed energy centre at the White Horse Lane to the heat demands connected. The proposed IZO includes a main trunk of pipework heading down High Street, Parade, and St George's Street with branches to several demands including Whitefriars Shopping Centre. The network splits at the St George's Roundabout, with one branch heading north to Canterbury Christ Church University and the other heading east to Canterbury College and University of Creative Arts. Another branch from the High Street, heading down Guildhall Street and Palace Street serves The King's School, before heading down Northgate Road and on to Kingsmead Road to serve Kingsmead Depot (Riverside) and Kingsmead Leisure Centre.

Table 11: Canterbury Riverside - Indicative Heat Network statistics for IZOs

IZO Heat Network description	Network length (km)	Network cost (£m)
Canterbury Riverside	7	30

3.2.7) Canterbury Riverside – IZO Key Constraints and Mitigations

[C1] Archaeology: Canterbury City Centre is classified as an area of Archaeological Significance. This could present some challenges for the proposed heat network routing which is proposed to pass through this area. This potential constraint likely requires a monitoring procedure during the pipe installation. Should something of archaeological interest be encountered, then works would have to stop to allow a thorough investigation. It is recommended that an archaeological consultant should conduct a desk-based feasibility study to identify likely trial pit locations, manage risks proactively, and minimise project disruptions.

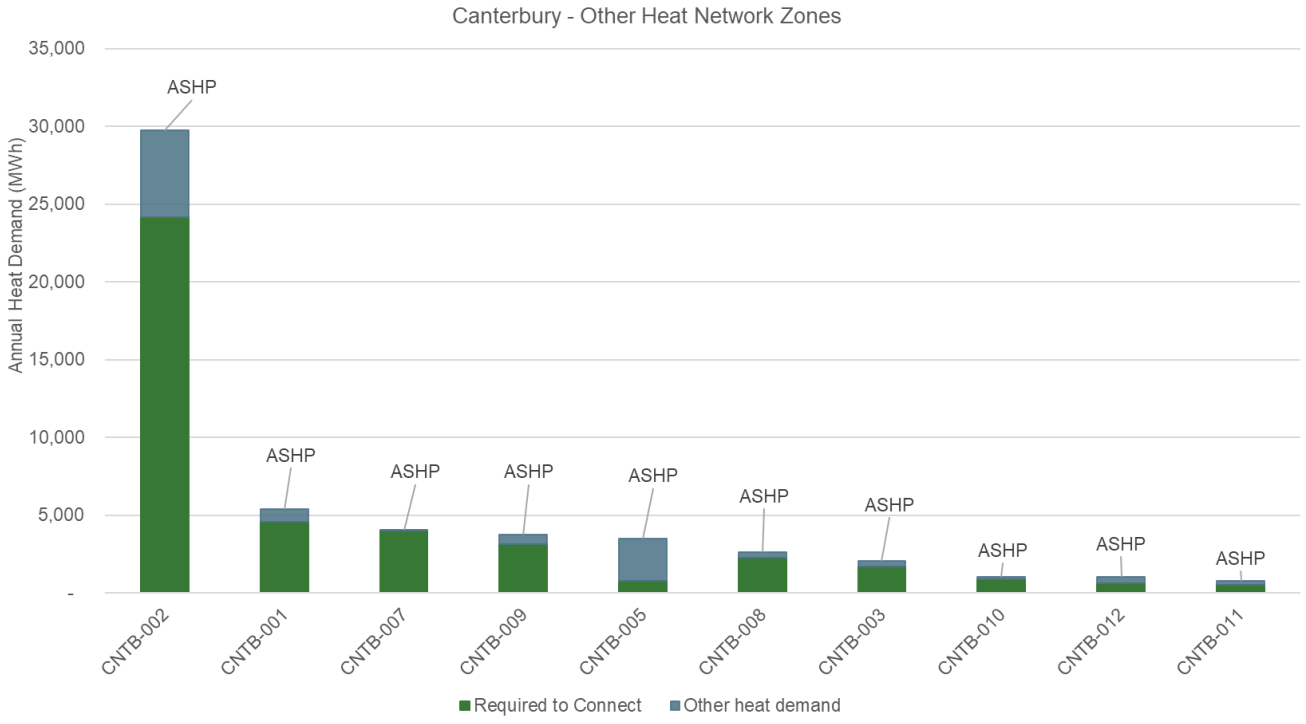
[C2] River crossing: The proposed network route connects the city centre to Kingsmead Leisure Centre on Kingsmead Road which requires crossing the River Stour. The feasibility of using Kingsmead Road should be explored, including its structural integrity, regulatory compliance, and safety concerns.

4) Other Heat Network Zones

This section describes the 'Other' potential heat network zones that were identified in Canterbury. These are areas where heat networks were deemed to offer the lowest carbon route to decarbonising heat but are often much smaller or discrete in nature than the 'Strategic' heat network zones identified. The approach taken in the Pilot programme did not apply a minimum threshold for zone identification and therefore future work will need to consider factors such as size and aggregation to ensure efficient and effective delivery of heat networks in the area.

Figure 10 illustrates the total annual heat demand, and the proportion of which is associated with buildings that may be required to connect within each zone. Where potential heat sources have been identified these are labelled against each bar. A map of all zones can be found in Figure 4.

Figure 10: Total Heat Demand and Proportion Required To Connect In Other HNZs



CNTB-001: is situated south-west of the city centre. The area is dominated by buildings of a commercial and industrial nature and contains loads such as Go Outdoors, Dunelm Mill, and Stellison Ltd. An ASHP is likely the most suitable heat source for this zone. The River Stour which flows near the zone could as also be explored as a potential heat source.

CNTB-002: is situated south of the city centre. The area is dominated by new residential buildings and contains key anchor loads such as Kent and Canterbury Hospital, and Simon Langton Grammar School for Girls. An ASHP is likely the most suitable heat source for this zone, however given the large amount of land availability, a GSHP may also be feasible.

CNTB-003, CNTB-005, CNTB-007, CNTB-008, CNTB-009, CNTB-010, CNTB-011, CNTB-012: are situated outside of the city centre, with relatively small heat demands compared to all other zones identified. They mainly represent a single network opportunity around multiple campus or estate buildings.

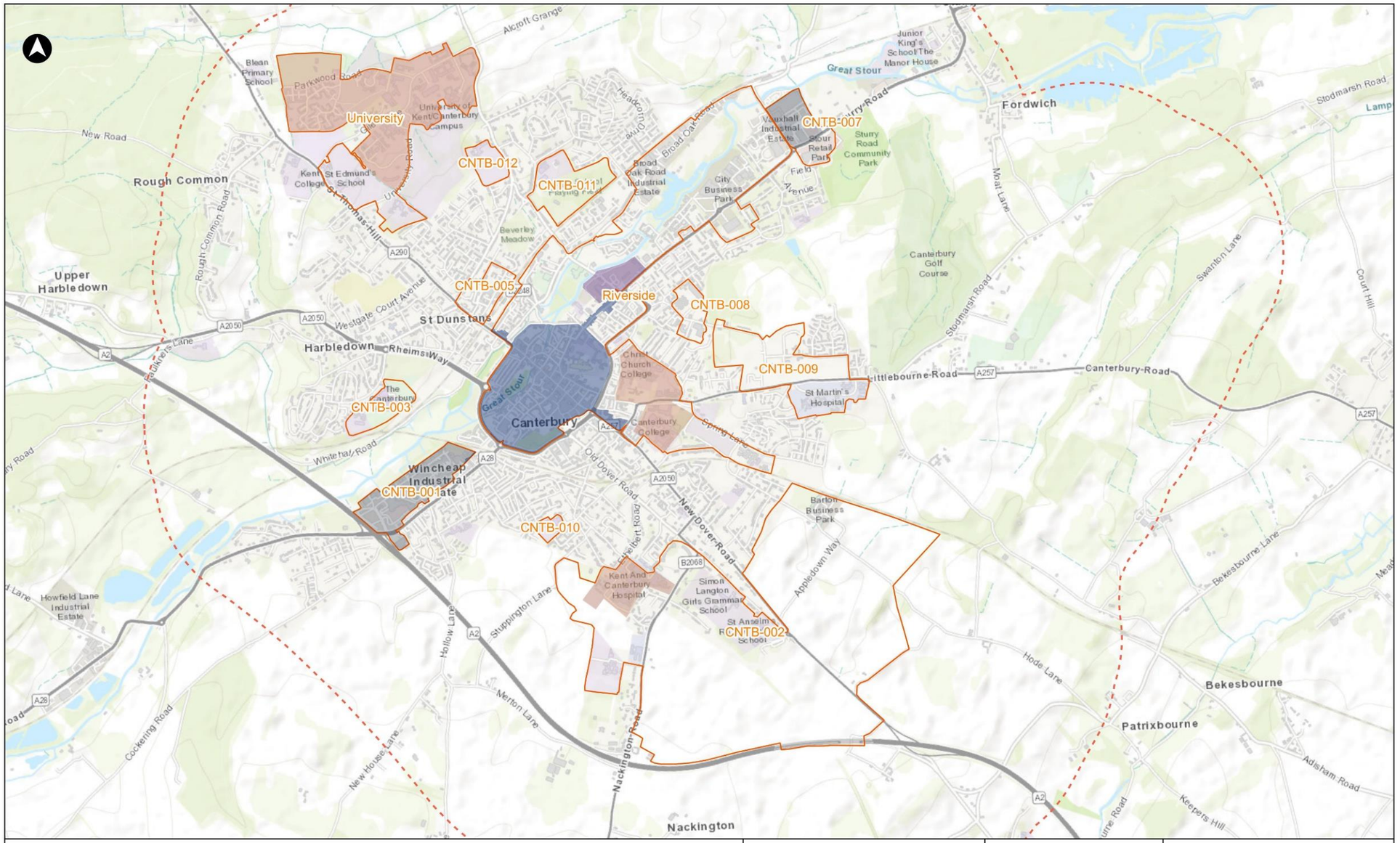
Appendix 1: Maps and Legends

This section provides guidance on interpreting the icons and legends used throughout this report and Maps A-F that follow:

Legend / icon	Relevant map(s)	What this represents on the map	Comments on interpretation
	Report maps	Study boundary	Extends 1km beyond Local Authority boundary to include cross boundary opportunities
	Report maps	Local Authority boundary	
	Report maps	Other Local Authority boundary	
	Report maps	Heat network zones	This includes both Strategic HNZs and Other HNZs.
	Report maps	Other heat network zones	Smaller or discrete heat network zone opportunities
	Report maps	New developments	New development within heat network zones and IZOs that will still be in construction post-2025
Gates Hill	Report maps	Heat network zone name / reference number	‘Strategic’ zones are named; ‘Other’ zones are represented by a reference number
	Report maps	Buildings potentially required to connect	Buildings that could be required to connect (as described in the HNZ Consultation 2023)
	Report maps	Campuses	Multiple buildings owned and operated by the same organisation (e.g. Universities, Hospitals)
	Report maps	Initial Zone Opportunity concept network route	Conceptual heat network pipe routes between buildings that could be required to connect
	Report maps	Existing and Planned Heat Networks	Known existing or planned heat network pipe routes as provided by local stakeholders
	Report maps	Potential energy centre - IZO	Potential energy centre location for an IZO (see section 3)
	Report maps	Existing/planned energy centre - Communal HNs	‘Communal’ energy centres are those operated within a single building or across a campus
	Report maps	Existing/planned energy centre - District HNs	‘District’ energy centres supply multiple buildings across multiple sites
Appendix 1: A – Typology map			
	Appendix 1: Map A	Dense City Centre	Locally recognised as the City or Town centre, where buildings development is most dense
	Appendix 1: Map A	City Centre Fringe	Around the City or Town Centre or at its outskirts, where both building density reduces
	Appendix 1: Map A	Mixed Use District	A variety of building typologies, with no single typology prevailing in the area
	Appendix 1: Map A	Social Housing	Public, private and third sector social housing
	Appendix 1: Map A	Campus (health / education)	Buildings that are owned and operated together (e.g. Universities, Hospitals)

	Appendix 1: Map A	Commercial / business office	Public & private office space
	Appendix 1: Map A	Industrial areas	Primarily used for manufacturing, engineering, and warehousing
Appendix 1: B – Key heat demands			
	Appendix 1: Map B	Top 10 Heat Demands	The largest (anchor) heat loads within the Pilot programme study area (see Section 3)
	Appendix 1: Map B	Local Authority	Buildings owned or operated by the Local Authority
	Appendix 1: Map B	Other public sector	Other buildings owned or operated by the public sector (e.g. hospital, universities, Govt. estates)
	Appendix 1: Map B	Residential with existing communal heating	Residential buildings with existing communal heating systems installed
	Appendix 1: Map B	Non-domestic private	Non-domestic private buildings (e.g. commercial, offices)
	Appendix 1: Map B	Industrial	Mixed industrial sites (e.g. light or heavy industry, manufacturing, warehouses and distribution)
400 - 600	Appendix 1: Map B	Building heat demand (MWh/yr)	Circle size increases with size of heat demand
Appendix 1: C – Key Heat Sources and Potential Energy Centres			
	Appendix 1: Map C	EfW plant	**Point heat sources** have known or likely points of heat offtake/abstraction Mine water and water source ‘points’ indicate potential abstraction points. Other waste heat sources include sewers, electrical substations and other sources of heat. See section 3 for more detail on heat source capacities, where known. On the City-level Map C only, the heat waste symbol is sized according to its scale in GWh/yr
	Appendix 1: Map C	Industrial Waste Heat	
	Appendix 1: Map C	Mine water	
	Appendix 1: Map C	Other Waste Heat	
	Appendix 1: Map C	Water Source	
	Appendix 1: Map C	Waste Water Treatment	
	Appendix 1: Map C	Deep geothermal or mine water heat	**Area heat sources** differ from point-heat sources in that the exact location for extracting heat from the resource is not yet determined
	Appendix 1: Map C	Ground source	
	Appendix 1: Map C	Water source	
Appendix 1: D – Existing and planned heat networks			
	Appendix 1: Map D	Existing and planned heat networks	At this scale the route of an existing HN cannot be displayed, so an area outline is used instead
Appendix 1: E – Physical constraints			
	Appendix 1: Map E	Key constraints	Key heat network routing constraints as described in section 3

A. Canterbury Typology Map



B. Key Heat Demands

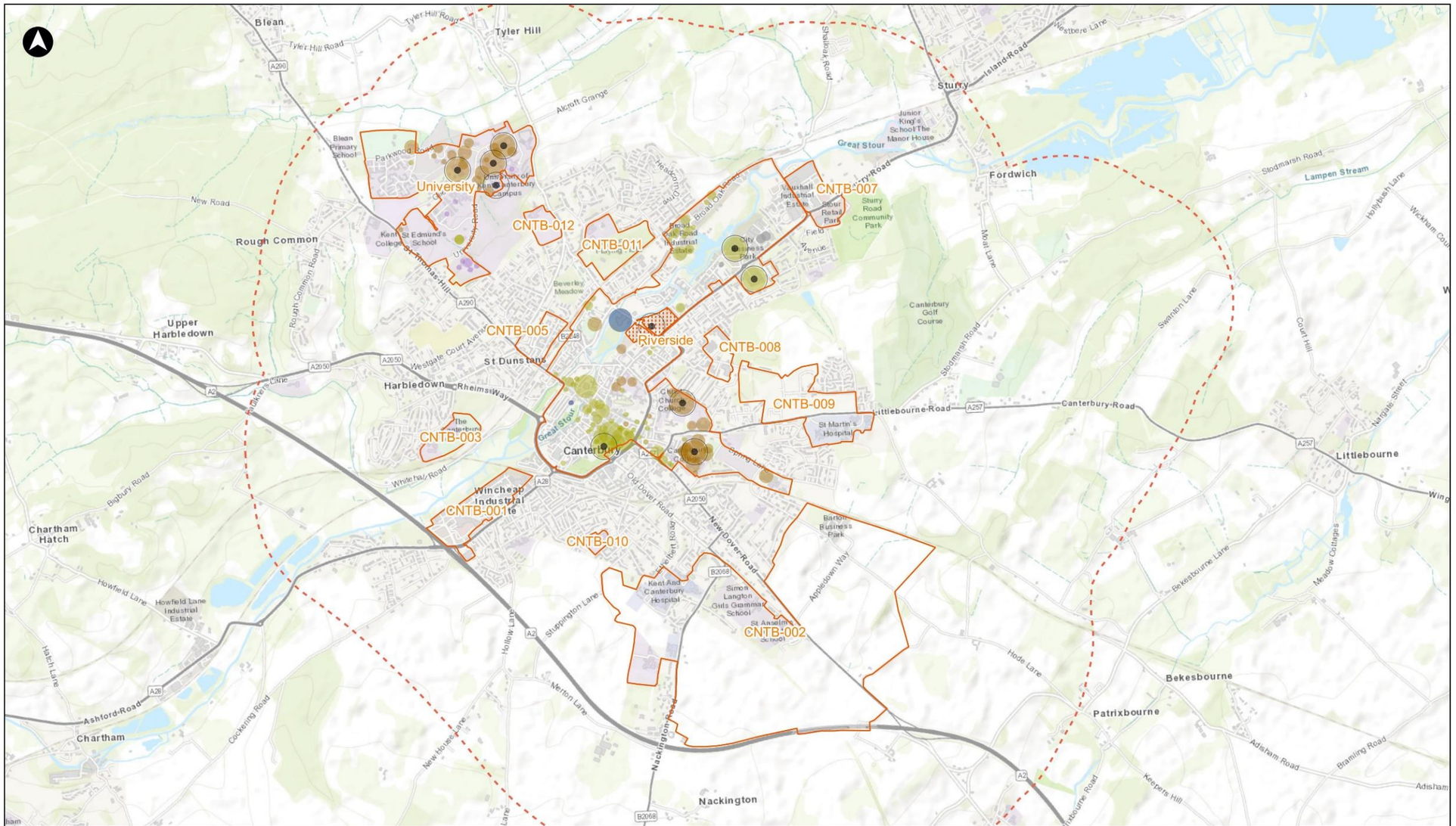
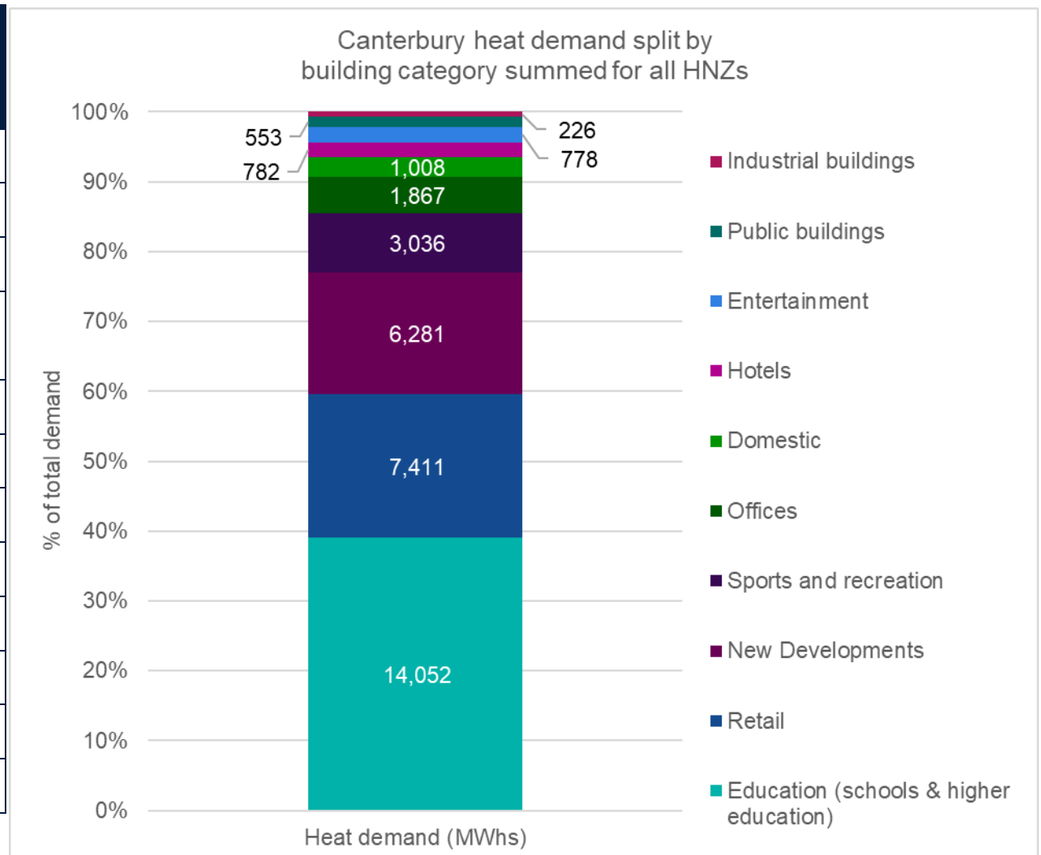


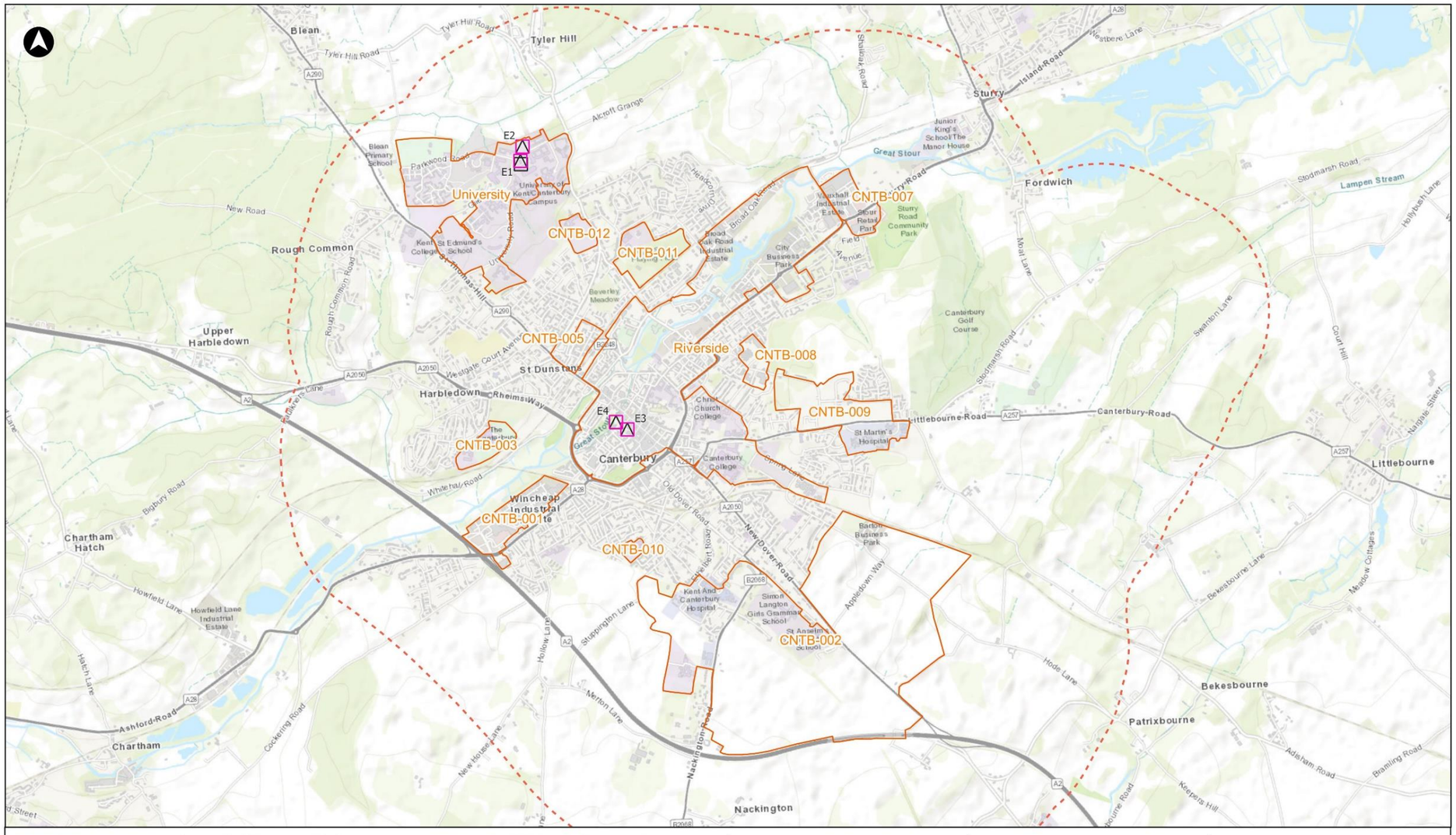
Table 12 Heat Demand split further by Building Categories across all Initial Zone Opportunities identified in Strategic HNZs in the Study Area

Building category	Number of buildings required to connect in this category	Annual Heat Demand of buildings required to connect across IZOs (MWh)
Domestic	2	1,008
Education (schools & higher education)	39	14,052
Entertainment	4	778
Hospitals and residential / nursing homes	-	-
Hotels	3	782
Industrial buildings	2	226
Offices	12	1,867
Public buildings	3	553
Retail	20	7,411
Sports and recreation	6	3,036
New Developments	1	6,281
Totals	**92**	**35,993**

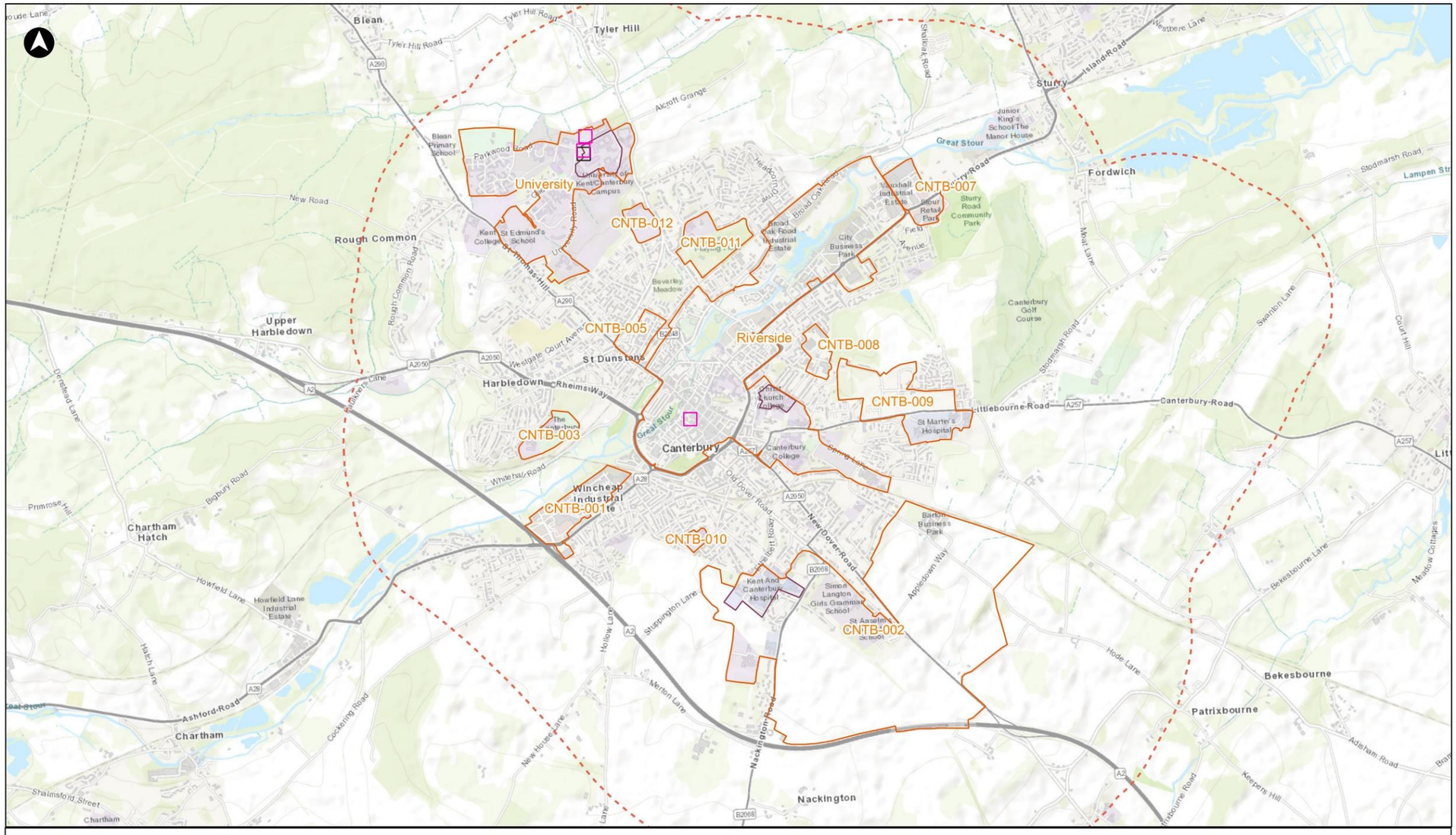


Note: In Canterbury there are twelve HNZs with a total of two IZOs identified across them. The table and graph above summarise the heat demand for buildings required to connect for these IZOs.

C. Key Heat Sources and Potential Energy Centres

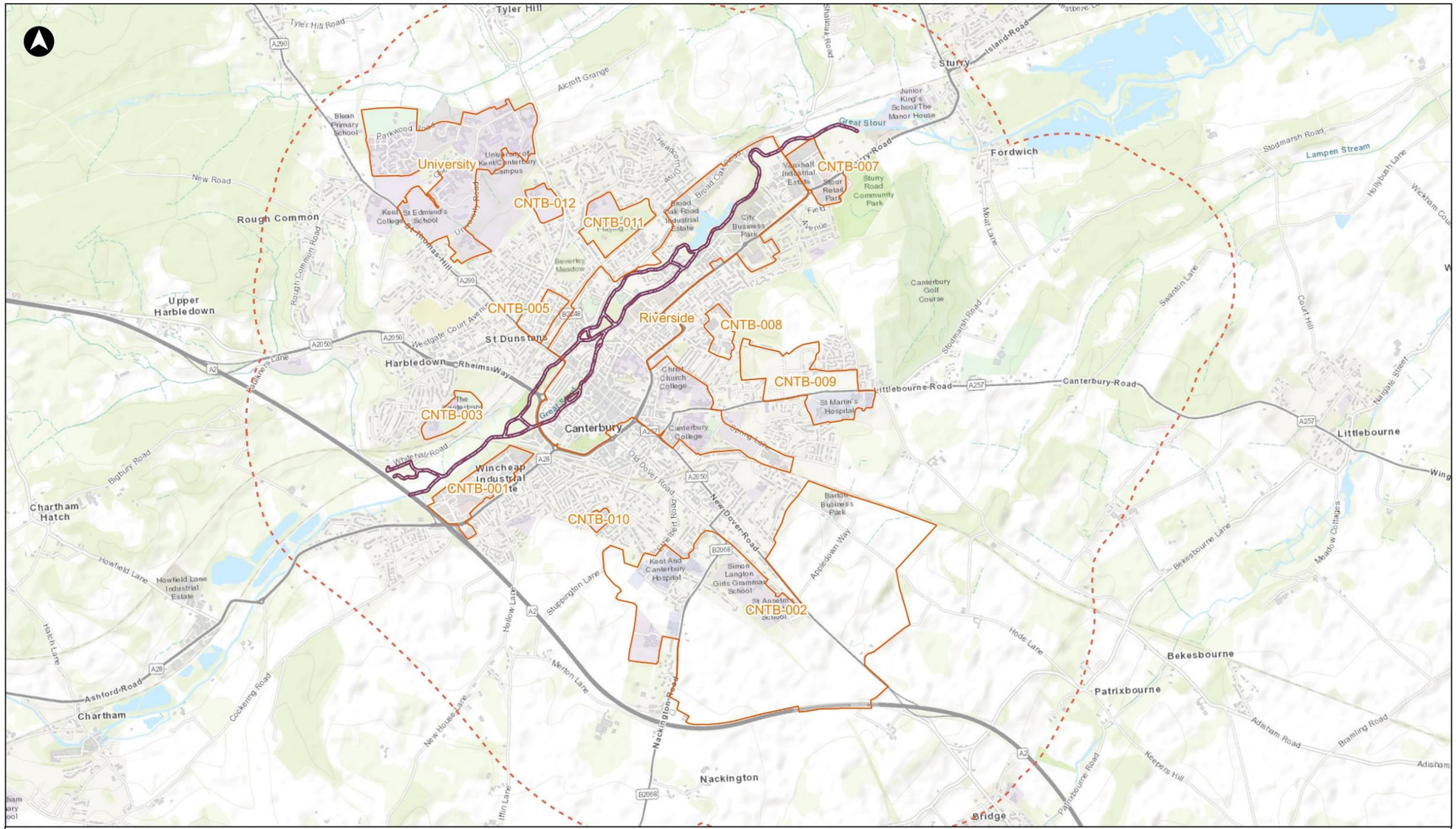


D. Existing and Planned Heat Networks

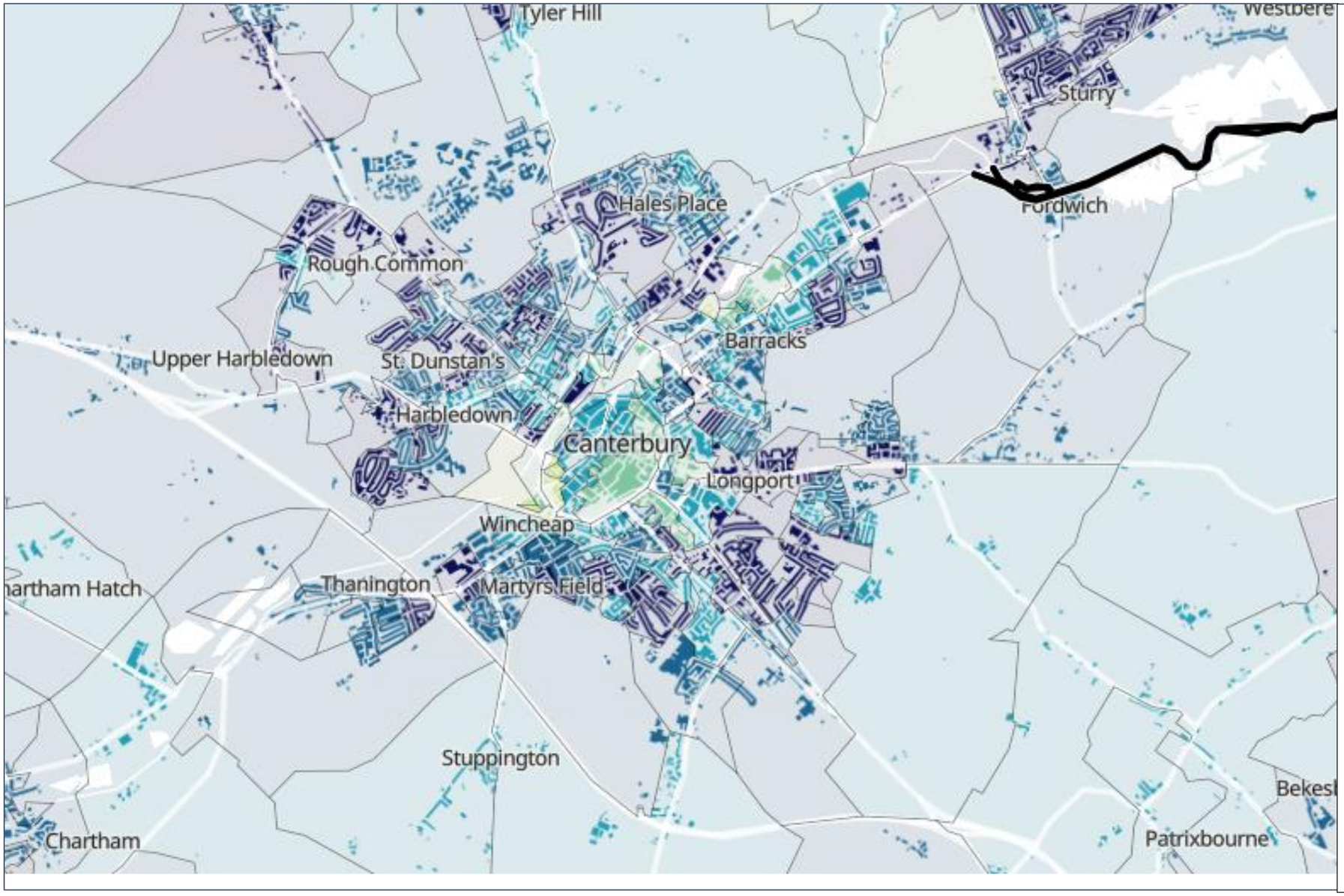


This document was prepared by on behalf of DESNZ in connection with the Heat Network Zoning Pilot Programme. It takes into account DESNZ' particular instructions and requirements and addresses priorities at the time of publication. This document is not intended for, and

E. Physical Constraints



F. Off-Gas Grid Areas in Canterbury



Credit: This is an excerpt from the ONS Census Maps 2021 which is available to explore online. The data shown is subject to Crown copyright protection, is published under the Open Government Licence (OGL) and embeds map data which is copyright of Ordnance Survey and Street maps.

Appendix 2: Data Room Resources

Throughout the delivery of the Pilot programme, information resources have been compiled for future use in relation to the development of heat network zones.

These resources will remain restricted to DESNZ and the local authority. This is to ensure that the department remains within its Data Privacy Notice as shared with stakeholders providing the information. GIS outputs are not being published alongside the report as they are subject to change.

Table 13 Pilot Programme Standardised Information Resources

Information resource	Description of resource
Stakeholder Directory	A directory listing key stakeholders identified and approached during the Pilot programme, including organisation name, address, or website, contact names, work title and contact details.
Stakeholder meetings log and records	A log of key meetings held and related meeting records.
Datasets Directory	A list of datasets / reports shared by stakeholders cross-referencing who provided the item from the stakeholder directory and a description of the dataset.
Geospatial packages and related geo-coded datasets	Geo-coded datasets and descriptions related to maps produced in this report.

Table 14 Pilot Programme Study-Area-Specific Information Resources

Information resource	Description of resource
Heat networks in Kent and Medway: pre-feasibility study (2014)	Pre-feasibility study into heat network opportunities in Kent and Medway.

This publication is available from: https://www.gov.uk/government/collections/heat-networks

If you need a version of this document in a more accessible format, please email alt.formats@energysecurity.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.