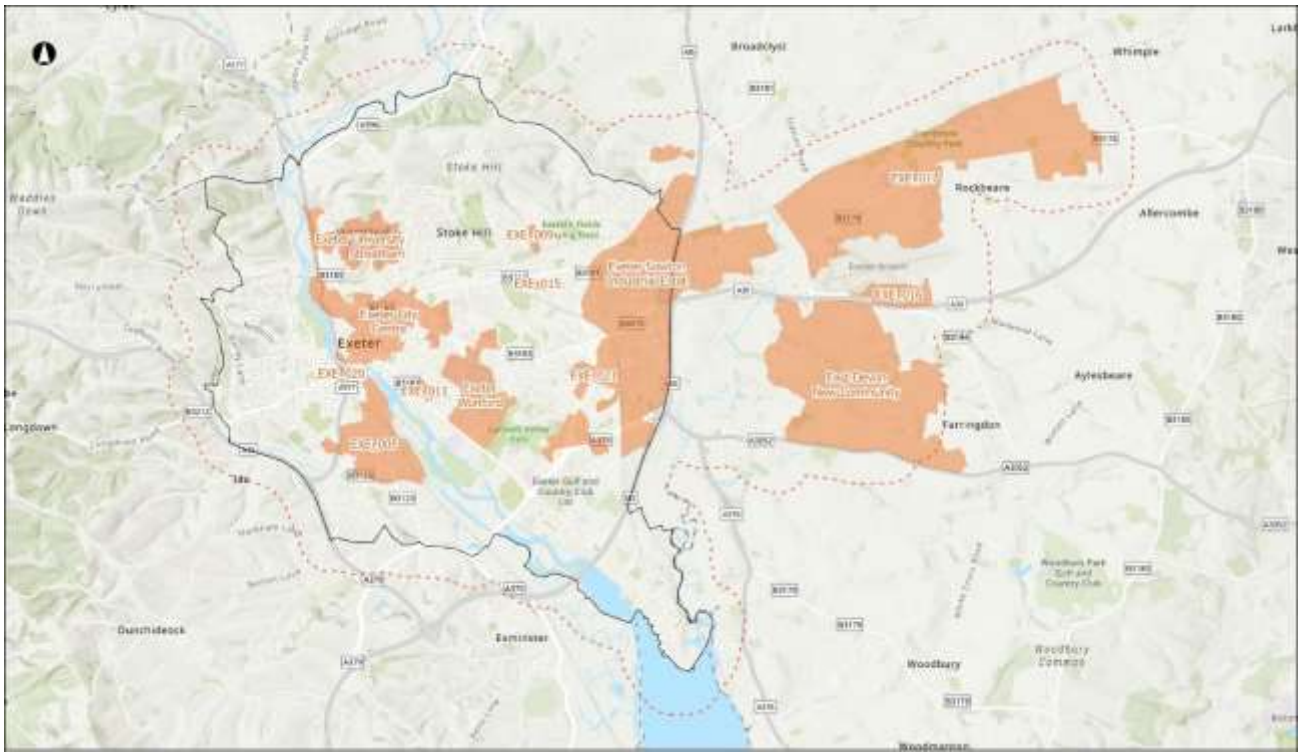
Department for Energy Security & Net Zero

Exeter

Heat Network Zoning

Zone Opportunity Report



June 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

This document was produced by AECOM in partnership with Exeter City Council and East Devon District Council. We are grateful to all stakeholders who participated in the Pilot programme.

Any enquiries regarding this publication should be sent to us at:
hnzoning@energysecurity.gov.uk

Contents

Executive Summary

About Exeter: Exeter is a city in the Southwest of England, located on the River Exe, with a population of approximately 130,800.

Local Energy Policy: Exeter City Council declared a Climate Emergency in 2019, aiming for net zero greenhouse gas emissions by 2030. East Devon District Council aims for carbon neutrality by 2040.

Existing heat networks: There are two existing heat networks within Exeter: Monkerton heat network and Cranbrook heat network, both projected to expand. Exeter Energy Network is a large-scale proposed network across the city centre.

Zones identified: 13 potential heat network zones were identified in Exeter, with a total annual heat demand of up to 250GWh/yr for all buildings potentially required to connect in these zones.

Strategic heat network zones: Five strategic heat network zones were identified in Exeter, with a total annual heat demand of 175GWh/yr for all buildings potentially required to connect within these strategic zones.

Key heat demands: The total annual heat demand for buildings connected to the initial zone opportunities identified is 150GWh/yr. Key buildings include Heavitree Hospital, University of Exeter, and Royal Albert Memorial Museum.

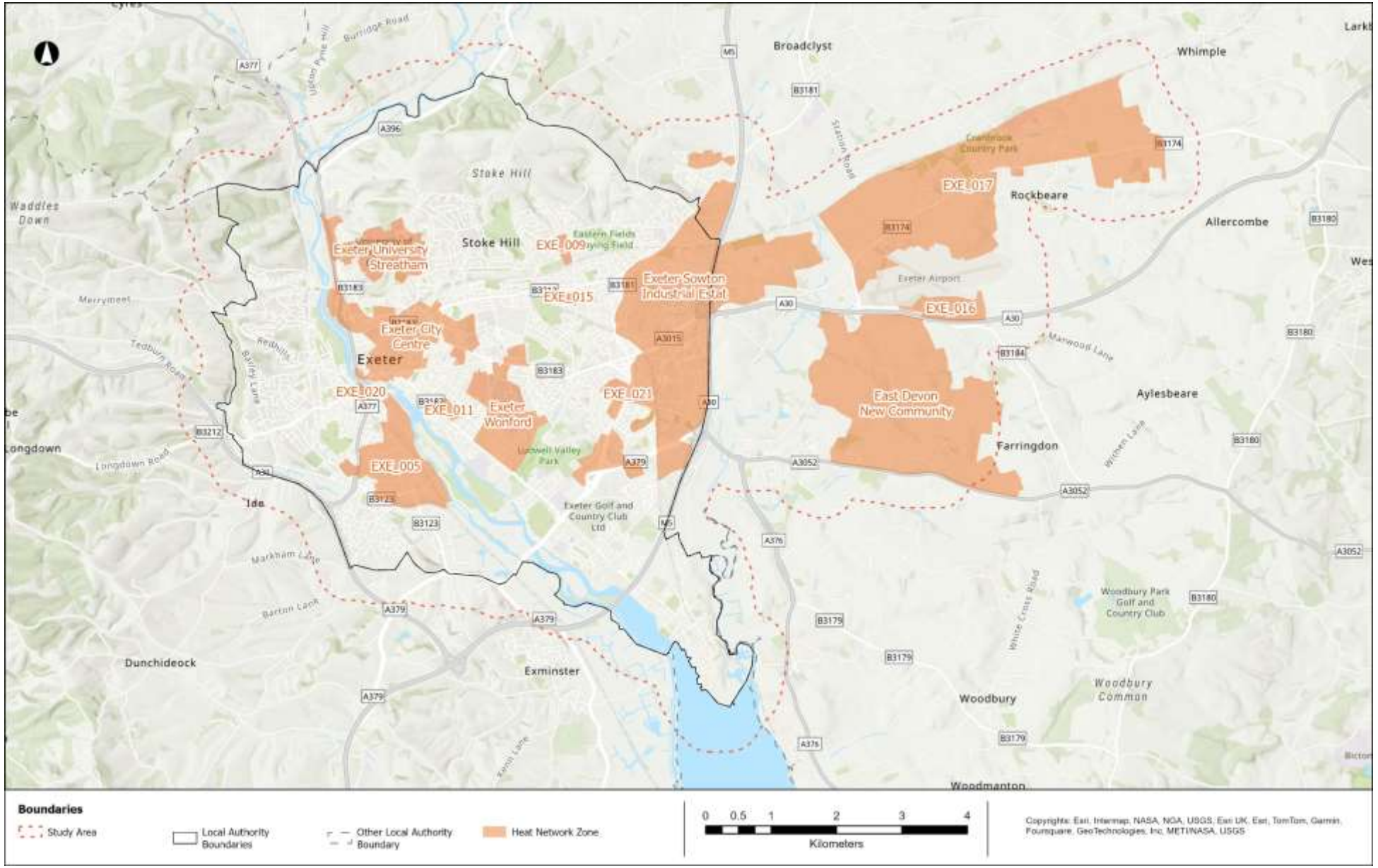
Key heat sources: Potential heat sources include ASHPs, WSHPs, and EfW plants. The Hill Barton EfW plant is a significant source for several zones.

Estimated CapEx: The estimated capital expenditure for the full rollout of heat networks within identified zones is up to £275m of which the initial zone opportunities amount to approximately £200m.

Other heat network zones: Smaller heat network zones identified include areas like Marsh Barton Industrial Estate and Cranbrook.

Carbon savings: The initial zone opportunities identified could deliver carbon savings of more than 20ktCO_{2e} annually.

Figure 1: Overview of Heat Network Zones in Exeter



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 Exeter 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.

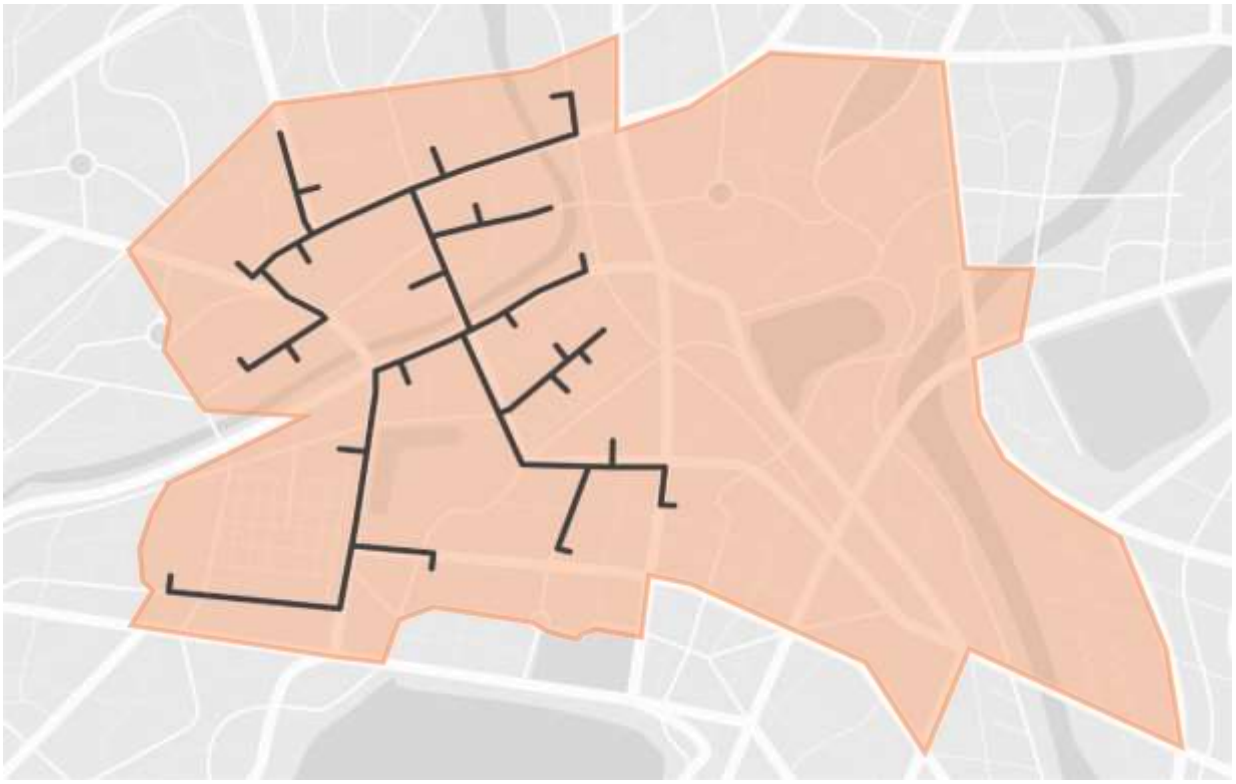
[1] More information can be found in the Heat Network Zoning Methodology Statements (Appendix 3, 4 & 5)

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 potentially 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 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 potentially 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) Exeter Heat Networks Context

2.1) Exeter City Overview

Exeter is a city in the Southwest of England, located on the River Exe approximately 30km inland from the South Coast of England. The city population is estimated at around 130,800 and covers approximately 1,191 hectares. Exeter is a non-metropolitan district with Exeter City Council (ECC) serving as the local authority, a lower-tier district authority, with Devon County Council (DCC) providing county-level services. The study boundary also extends eastwards into East Devon, where East Devon District Council (EDDC) is the local authority.

In the 2021 census[3], a total of 17% of homes across the local authority district are identified as social rented housing, 9% of which are rented from the local authority. 25% of homes are privately rented.

2.2) Exeter Net zero targets and commitments

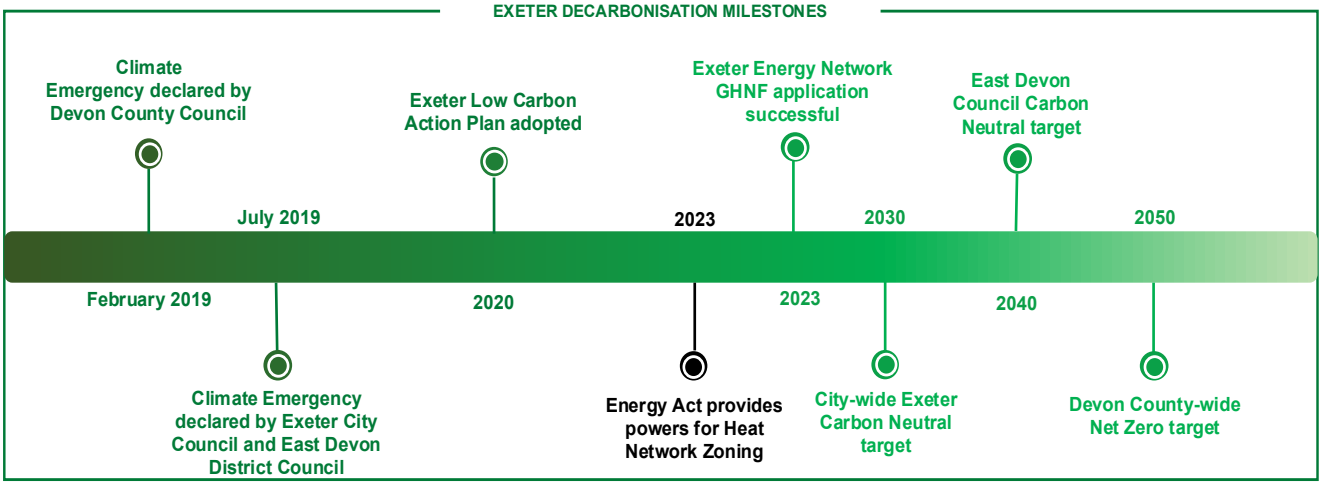
In July 2019, ECC declared a Climate Emergency and set out aims to achieve net zero greenhouse gas emissions. ECC made the commitment to make Exeter a carbon-neutral city by 2030.

EDDC declared a climate emergency in 2019, committing to ensure East Devon is Carbon Neutral as a council by 2040. DCC also declared a climate emergency in February 2019, committing to ensure Devon is Carbon Neutral by 2050.

Exeter City Futures is a collaboration of key stakeholders including ECC, DCC, and the University of Exeter. It is working to help achieve ECC's 2030 target through the Net Zero Exeter Plan and has been exploring the opportunity for heat networks in Exeter. A Green Heat Network Funding (GHNF) application was successful, awarding nearly £42.5m towards the Exeter Energy Network[4]. Figure 3 summarises key dates in ECC, EDDC and DCC plans for decarbonisation.

[3] Office for National Statistics (2021) – Census. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housingenglandandwales/census2021
[4] Triple Point Heat Networks (2024) Available at: https://tp-heatnetworks.org/funded-projects/

Figure 3: Exeter Decarbonisation Milestones



2.3) Delivering Heat Networks in Exeter

There are currently two existing heat networks within the Exeter study boundary, both projected to expand. Monkerton heat network is located in the north of Exeter, serving a mix of domestic and non-domestic buildings and Exeter Science Park. More detail on this heat network can be found in Section 3.2.2. Cranbrook heat network is located in East Devon to the east of Exeter, serving a mix of domestic and non-domestic buildings as well as the Skypark network.[5] More detail on this heat network can be found in Section 3.4.2.

During the development of this work, proposals for a large-scale city centre network, the Exeter Energy Network, have been developed by the 1Energy Group and delivered by a Special Purpose Vehicle, Exeter Energy Ltd. A network of 20km is planned to supply a load of 61GWh/yr. More detail on this heat network can be found in Section 3.1.2.

The full draft of the new local plan from ECC – the Exeter Plan – went through consultation process late in 2023[6]. It contains Policy CC3, a strategic policy regarding local energy networks and aims to identify areas where local energy networks are feasible[7]. It also states that large scale residential and non-residential development proposals must show evidence that feasibility of energy network connection has been considered. This policy will encourage connection to planned or existing district heat networks. ECC is a founding member of Dextco, a joint venture set up to deliver efficient heat and power across Devon and is committed to the development of heat networks[8].

[5] East Devon District Council (2022) Available at: https://eastdevon.gov.uk/news/2022/05/heat-network-projects-awarded-funding-to-reduce-waste-and-create-energy/
[6] Exeter City Council (2023) Available at: https://exeter.gov.uk/media/xmenkshx/exeter-plan-full-draft.pdf
[7] University of Exeter (2023) Available at: https://res.cloudinary.com/commonplace-digital-limited/image/upload/v1697807555/projects/62bf1c11a56abd0b365a28db/media-upload/Heat%20network%20evidence%20to%20support%20emerging%20Exeter%20Plan%20policy%20CC3.pdf/eq8idbv6uvfdfui5m1bs.pdf
[8] Dextco (2017) Available at: https://www.dextco.org.uk/

Please refer to Appendix 2 for further information about the evidence compiled during the Pilot programme and held by DESNZ for Exeter. This includes a fully populated stakeholder directory and records of interactions with those stakeholders as well key studies and reports shared with DESNZ.

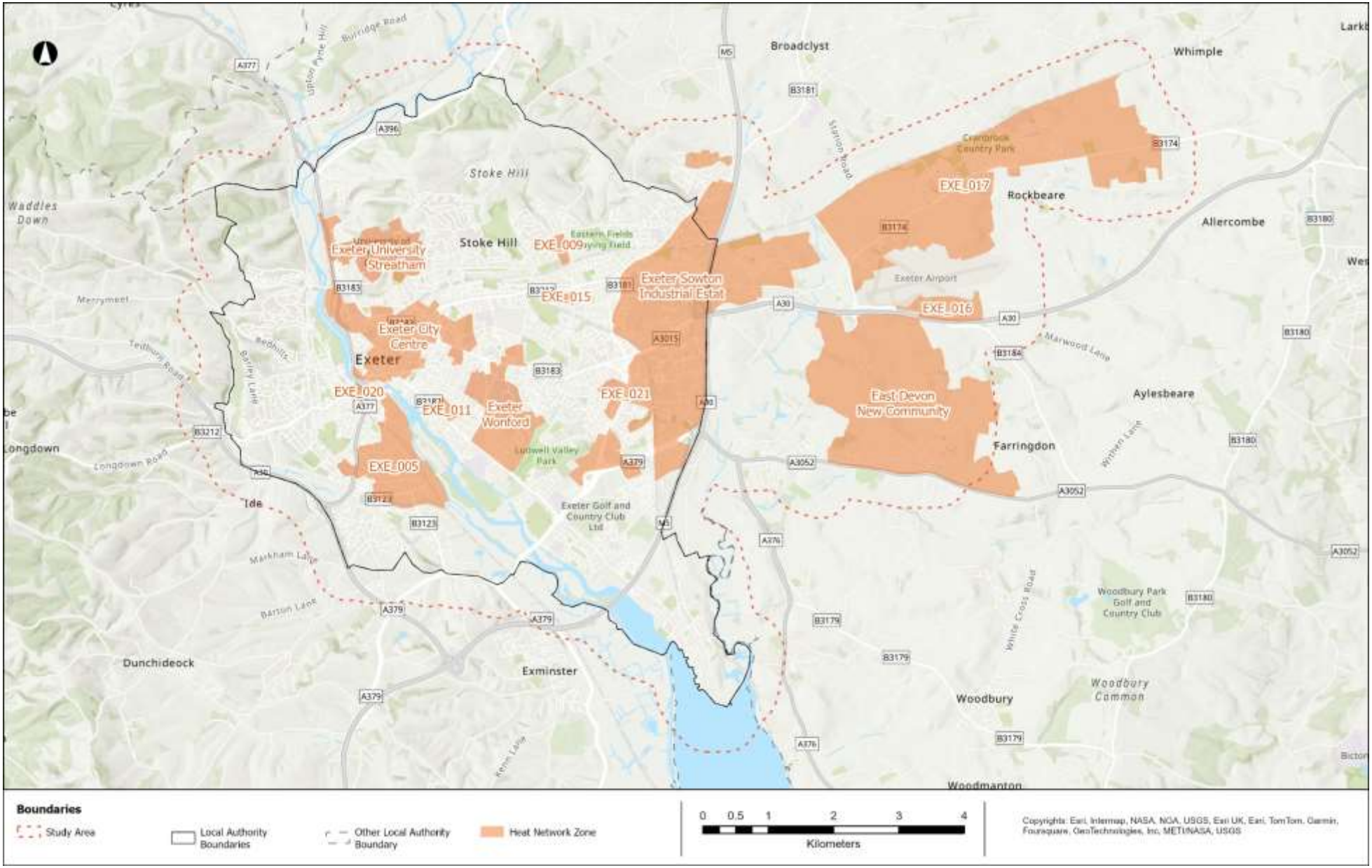
2.4) Exeter Heat Network Zones

A total of thirteen potential HNZs were identified in Exeter, with five considered Strategic HNZs. Figure 4, below, shows the study area boundary as well as the boundaries of all HNZs identified within Exeter. 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 potentially 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 HNs and planned extensions to them as well as any planned HNs in advanced stages of development.
- E: Key Constraints Map – Shows key topographical constraints identified.
- F: Off Gas Grid – presents areas with differing levels of properties off the gas grid within the study area.

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



3) Strategic Heat Network Zones

Strategic HNZs in Exeter

This section examines the five 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 Exeter. 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[9]	250
All buildings required to connect in strategic zones	175
All buildings connected to the IZOs	150

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 five 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.

Exeter City Centre HNZ covers the area from the River Exe across to Heavitree Hospital. In this zone, a single IZO was identified. A total of 72 existing buildings and 3 future developments could be required to connect. The CapEx required to construct the IZO is estimated at circa £50m and has the potential to deliver over 30GWh/yr. For more information, please see Section 3.1.

[9] Row 1 is an estimate of heat demand across buildings potentially 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.

Exeter Sowton Industrial Estate HNZ covers the Sowton Industrial Estate to the west of the M5, as well as Monkerton to the north, and Exeter Science Park. In this zone, a single IZO was identified. A total of 42 existing buildings and 1 future development could be required to connect to this IZO. The CapEx required is estimated at circa £55m and has the potential to deliver about 35GWh/yr. For more information, please see Section 3.2.

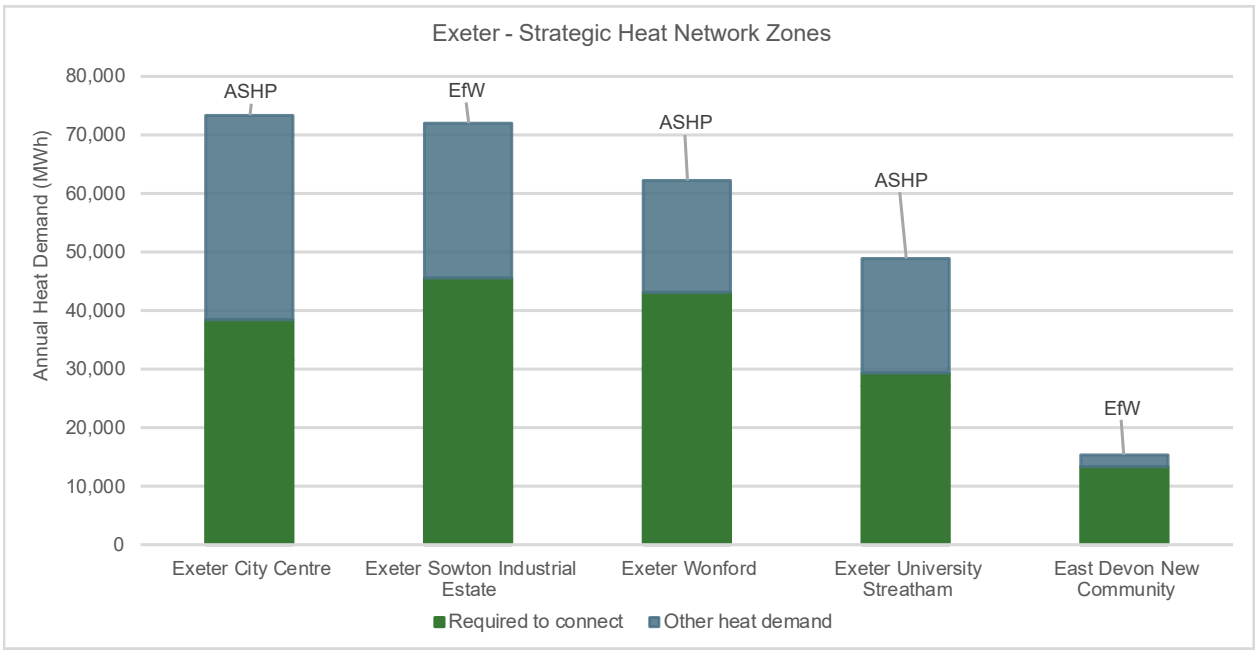
Exeter Wonford HNZ covers the Wonford area, including the RD&E Wonford Hospital estate and Exeter School. In this zone, a single IZO was identified. A total of 35 existing buildings could be required to connect. The capital expenditure required to construct the IZO is estimated at circa. £30m and it has the potential to deliver around 45GWh/yr. For more information, please see Section 3.3.

East Devon New Community HNZ covers an area east of Exeter in East Devon surrounding Hill Barton Business Park; the land is designated as a site for a new residential community. A single IZO was identified consisting of 9 existing buildings and a future development. The capital expenditure required to construct the IZO is estimated at around £20m and has the potential to deliver about 15GWh/yr. For more information, please see Section 3.4.

Exeter University Streatham HNZ is north of the city centre and covers the University of Exeter Streatham Campus as well as the area around Exeter St David's Station. A single IZO was identified consisting of 43 existing buildings and a future development. The capital expenditure required to construct the IZO is estimated at about £30m and the IZO has the potential to deliver around 30GWh/yr. For more information, please see Section 3.5.

Whilst Marsh Barton has been identified as an 'Other' HNZ in this report (see Section 4), in late 2024 it was designated as a Regeneration Opportunity Area in the Exeter Plan and is set for future brownfield development with local policy supporting decentralised low-carbon energy networks.

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



3.1) Exeter City Centre

3.1.1) Exeter City Centre – HNZ Summary

The Exeter City Centre HNZ covers the city centre, from the River Exe at the western point of the zone across to Heavitree Hospital. There are 108 existing buildings and 3 planned new developments that are potentially required to connect to a heat network within the zone, including a large proportion of non-domestic buildings such as offices and retail units, as well as public sector and council owned buildings.

The zone includes a planned heat network, Exeter Energy Network, which is further outlined in Section 3.1.2 below. Concrete-capped foundations from historical damage present a constraint which would need to be investigated, detailed in Section 3.1.7.

3.1.2) Exeter City Centre - Existing Heat Networks

There is one planned heat network in late-stage development identified in Exeter City Centre HNZ, described below and shown in Appendix 1, Map D.

Planned Heat Networks – Late stage

Exeter Energy Network

The Exeter Energy Network is a large-scale proposed network that covers several of the City Centre potential zones which were identified within this study. The project developed by the 1Energy Group, secured nearly £42.5m from the Green Heat Network Fund[10][11]. Exeter Energy Ltd (EEL), a Special Purpose Vehicle, will own and operate the network At the time of writing, the expected capital cost is over £100m with an expected heat load of at least 61GWh/yr. The network is planned to supply heat to 110 buildings initially, including the Royal Albert Memorial Museum in Exeter city centre. The University of Exeter, Heavitree Hospital and Wonford Hospital are amongst the largest anchor loads which this scheme would serve. The network is planned to incorporate large scale heat pumps, large scale thermal storage and is exploring heat offtake opportunities, including from Marsh Barton. The planned network is circa 20km in length and illustrated in Figure 6.

Table 2: Exeter Energy Network Key Metrics

Annual Demand	Heat Sources	Estimated CapEx	Construction Start Date
61GWh+	ASHPs & WSHPs	~£108m+	2025-2026

[10] Triple Point Heat Networks (2024) – Funded Projects. Available at: https://tp-heatnetworks.org/funded-projects/
[11] Department for Energy Security and Net Zero (2024) – Heat Networks Pipeline. Available at: https://www.gov.uk/government/publications/heat-networks-pipelines

3.1.3) Exeter City Centre - Initial Zone Opportunities

A single IZO was identified in Exeter City Centre zone. Potential routing[12] for the IZO is shown in Figure 6 and summary statistics provided in Table 3.

Table 3: Exeter City Centre - Summary Statistics for Initial Zone Opportunities[13]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£50m	>30GWh/yr	>20km	~5ktCO_{2e}/yr	4.9MWh/m	ASHP

The IZO was chosen based on the high heat demand and density within the city centre. A total of 72 existing buildings and three future developments potentially required to connect are associated with this IZO. Key anchor loads include Heavitree Hospital, University of Exeter St Luke's Campus, the Royal Albert Memorial useum and the Liveable Exeter North Gate, East Gate and South Gate planned new developments. The council owned Magdalen Road Car Park at Magdalen Road and Western Way has been identified as a potential site for an energy centre, with heat sourced via air source heat pumps (ASHPs).

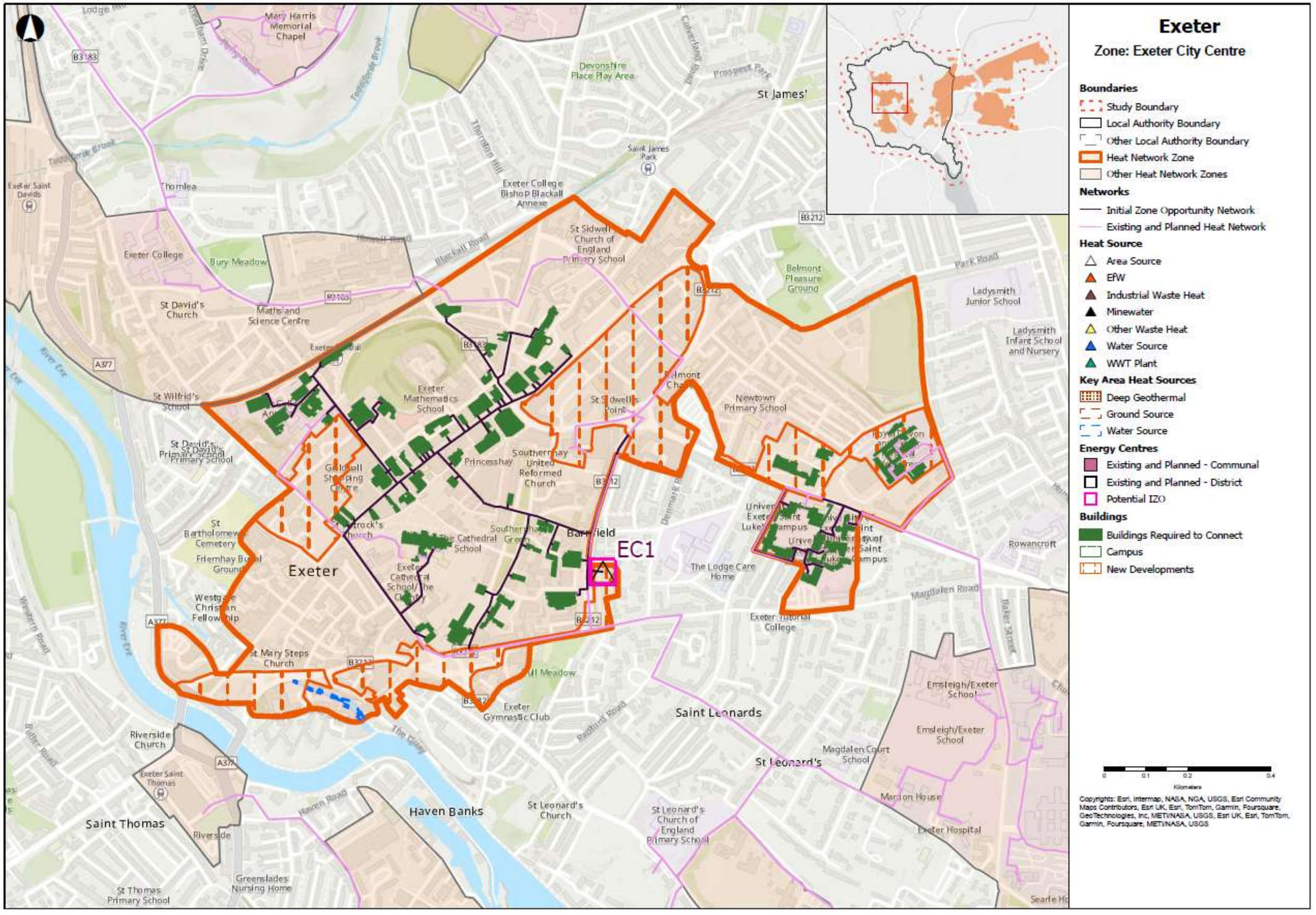
The IZO generally aligns with the proposed Exeter Energy Network and connects to buildings on the planned network. It also aligns with the Exeter City Heat Network Strategy completed in 2018 which intends to inform future expansion and decarbonisation of the city's existing and proposed heat networks.

Please note that the HNZ Pilot Programme uses a standardised methodology which was developed alongside, but independently of, the detailed network designs for the Exeter Energy Network. Whilst there is general alignment between the IZOs identified within each potential zone, and the proposals of the Exeter Energy Network, the latter spans three of the proposed zones identified within this study, the City Centre (Section 3.1), Wonford (Section 3.3) and University Streatham (Section 3.5) which are presented independently within this report.

The methodology used in the Pilot Programme means that these potential zones were identified separately as they did not meet a sufficient level of linear heat density when combined. However more localised detailed design work has proved that it is possible to combine areas into a single larger network, which is thus the proposal being taken forward.

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

Figure 6: Initial Zone Opportunities in Exeter City Centre HNZ



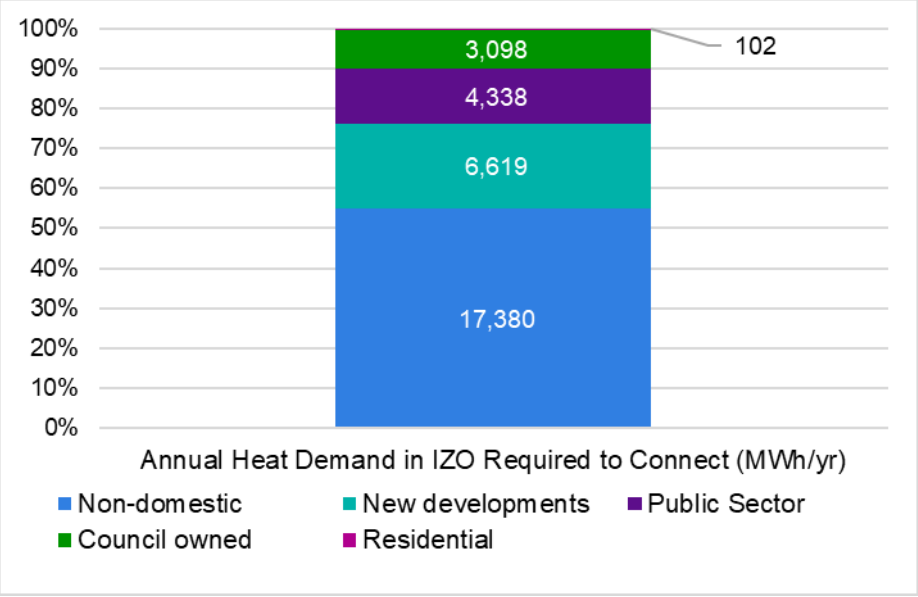
3.1.4) Exeter City Centre – IZO Heat Demands

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 led to an overestimation of some commercial and light industrial heat demands in this report. Large anchor loads that are already connected to existing district-scale heat networks are not listed.

The IZO connects to 72 existing buildings and three new development sites which could be required to connect to a heat network, with an annual heat demand over 30GWh/yr. Figure 7 provides a breakdown of heat demand per building typology. The majority of heat demand is from non-domestic buildings, making up 55% of the heat demand. New developments including Liveable Exeter North Gate, East Gate and South Gate, make up about 20%. Public sector buildings and council owned buildings each make up about 10%.

Figure 7: Exeter City Centre - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



Further details of the key heat demands for buildings potentially required to connect are provided in Table 4. Three of the top ten largest demands are new developments. Each of these new developments are a mix of residential properties and retail space, with East Gate also planned to develop office spaces.

Heavitree Hospital has a campus steam distribution network with a single central boiler room, serving multiple plant rooms and multiple buildings on the campus. Demands for all buildings have been consolidated a single figure in Table 4. It is assumed that this boiler room will be the

only connection. Eastgate is a large retail unit on the high street in the city centre. The Senate is a large office block on the Southernhay business park.

Table 4: Exeter City Centre - Key Heat Demands Required to Connect in the IZO[14]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Liveable Exeter East Gate	New development	1	3,800	Pilot methodology
Heavitree Hospital	Public Sector	1	2,850	ERIC
Liveable Exeter North Gate	New development	1	1,750	Pilot methodology
Royal Albert Memorial Museum	Council owned	1	1,300	DEC
Liveable Exeter South Gate	New development	1	1,100	Pilot methodology
Eastgate	Non-domestic	1	900	Benchmark (NZM)
Exeter Town & County Court	Public Sector	1	750	DEC
Mercure Exeter Southgate Hotel	Non-domestic	1	750	Benchmark (NZM)
The Senate	Non-domestic	1	750	Benchmark (NZM)
Mercure Exeter Rougemont Hotel	Non-domestic	1	750	Benchmark (NZM)

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

3.1.5) Exeter City Centre – IZO Heat Sources

There is strong potential for ASHPs to supply low carbon heat to the IZO. ASHPs are a location-agnostic technology and potential available land has been identified to house a new energy centre and large-scale ASHPs. A potential additional or alternative heat source is a water source heat pump (WSHP) recovering heat from the River Exe. Further feasibility studies would be required to estimate the available heat offtake and therefore this hasn't been selected as the preferred heat source.

Table 5 and Table 6 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 on Map C in Appendix 1, matching by reference number.

Table 5: Exeter City Centre - Key Heat Source Opportunities for the IZO

Heat source type	Supplied capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
ASHP – location agnostic	7,200	5-15 ºC	EC1
WSHP – River Exe	4,000	5-10 ºC	EC1

Table 6: Exeter City Centre - Potential IZO Energy Centre Locations

EC Ref #	Site type	Size (m^2)	Ownership	Heat Source
EC1	Land	3,750	Council	ASHP or WSHP

3.1.6) Exeter City Centre - 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. Table 7 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.

The potential energy centre location identified for this IZO is at Magdalen Road Car Park. From here, heat will be distributed north-west across the existing city centre and new developments, as well as north-east to Heavitree Hospital and University of Exeter t Luke's campus.

Table 7: Exeter City Centre - Potential Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£)
Exeter City Centre	20	30

3.1.7) Exeter City Centre – IZO Key Constraints and Mitigations

[C1] Concrete-capped foundations: An area of Exeter City Centre includes portions of Exeter High Street contains foundations with concrete capping for support due to historical damage. An assessment would be required into the feasibility of trenches being dug through this area and would require engagement with ECC.

3.2) Exeter Sowton Industrial Estate

3.2.1) Exeter Sowton Industrial Estate – HNZ Summary

Exeter Sowton Industrial Estate HNZ covers the Sowton Industrial Estate on the east side of Exeter adjacent to the M5, and the Monkerton and Pinhoe areas north of the A30 as well as Exeter Science Park. The HNZ includes 79 existing buildings and one new development that could be required to connect to a heat network, with the majority of buildings being offices and retail buildings. Key low carbon heat sources identified for the HNZ include the Energy from Waste (EfW) facilities at Hill Barton, east of Exeter.

One existing heat network currently operates within Exeter Sowton Industrial Estate serving mostly residential properties in Monkerton and West Clyst. The link to Exeter Science Park will form part of an interconnector to connect to the Cranbrook and Skypark networks. It is currently served from Monkerton Energy Centre by a 3MW combined heat and power (CHP) engine and a 500kW biomass boiler. Details are outlined in Section 3.2.2.

Key constraints include crossing the M5 and A30 highways, detailed further in Section 3.2.7. This does not prohibit the development within the HNZ.

3.2.2) Exeter Sowton Industrial Estate - Existing Heat Networks

There is one operational heat network in the HNZ, as described below and shown in Appendix 1, Map D.

Operational Heat Networks and Planned Expansions

Monkerton Heat Network

When fully built out, the Monkerton Heat Network will serve around 2,800 residential properties in Monkerton, Pinhoe and West Clyst and over 800sqft of commercial space, including the Exeter Science Park.[15] It currently has a peak demand of 15MW.

Monkerton Heat Network Planned Extension

The Monkerton Heat Network is currently undergoing development which would connect it to the existing Cranbrook and Skypark networks. The Cranbrook network has extension works planned as well, and these networks will be connected via an interconnector. A new EfW plant located at Hill Barton Business Park, currently undergoing development, has been identified as a new source of heat to deliver over 20MW of heat across all connected networks[16].

[15] Exeter City Council (2016) – Related documents. Available at: https://exeter.gov.uk/planning-services/permissions-and-applications/related-documents/?appref=16/0024/FUL#
[16] Environment Agency (2020) – Consultation Available at: https://consult.environment-agency.gov.uk/psc/ex5-1dr-exeter-waste-to-energy-limited/

3.2.3) Exeter Sowton Industrial Estate – Initial Zone Opportunities

A single IZO was identified in Exeter Sowton Industrial Estate zone. Potential routing[17] for the IZO is shown in Figure 8 and summary statistics provided in Table 8.

Table 8: Exeter Sowton Industrial Estate - Summary Statistics for Initial Zone Opportunity[18]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£55m	~35GWh/yr	~16km	~5ktCO_{2e}/yr	5.5MWh/m	EfW

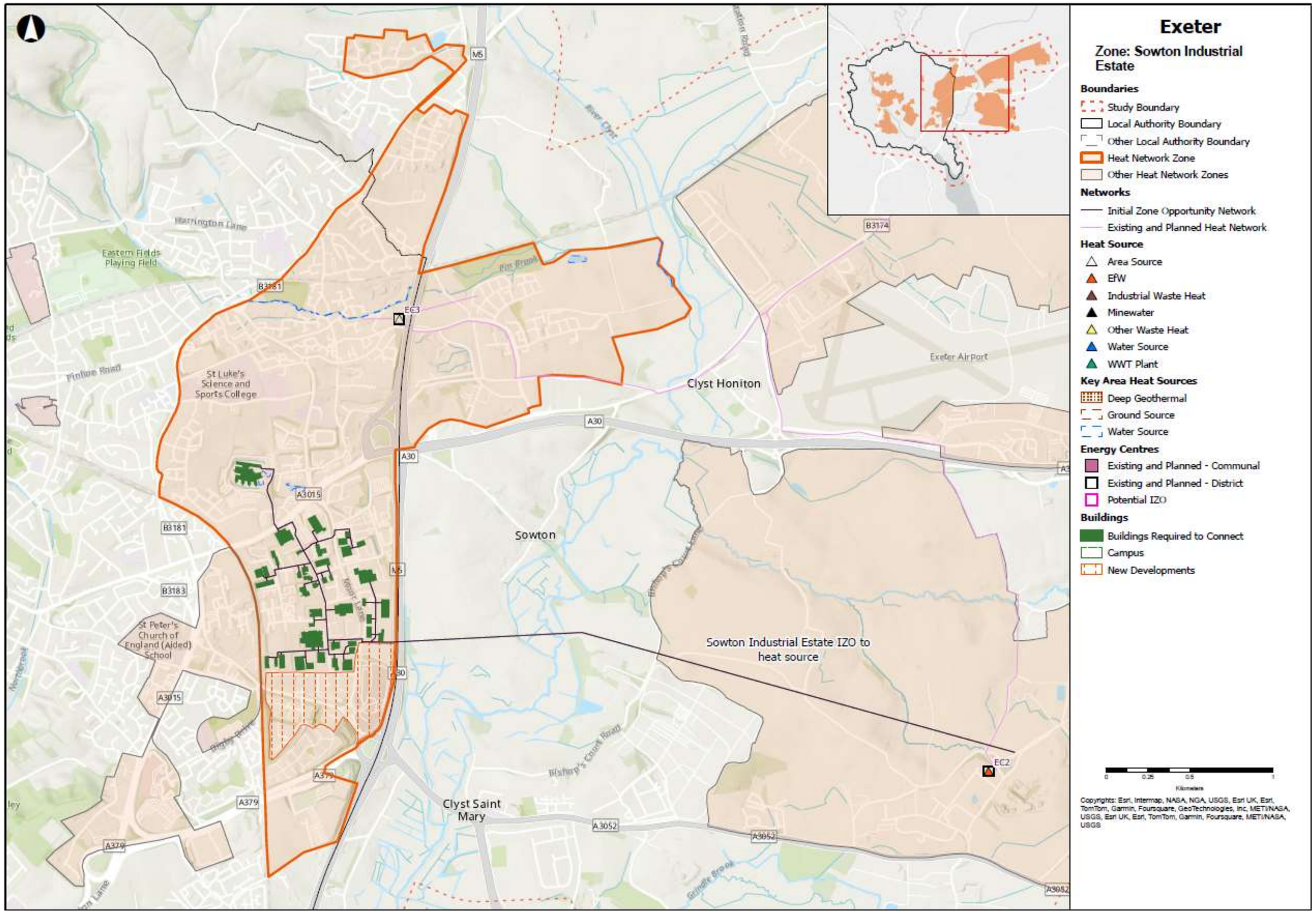
The IZO was chosen based on the high heat demand and density within the Sowton Industrial Estate, as well as the fact that is an area designated for redevelopment by the local authority.

A total of 42 existing buildings and one future development could be required to connect to this IZO. Anchor loads include the Met Office and the Liveable Exeter Sandy Gate development. The new EfW plant at Hill Barton Business Park is currently planned to serve the planned interconnected Cranbrook, Skypark and Monkerton heat networks and has been identified as a potential primary low carbon heat source for this IZO.

The close proximity of the Industrial Estate to the existing Monkerton Heat Network also presents potential for the expansion of the network. The existing Monkerton Energy Centre is located in Monkerton, north of Sowton Industrial Estate.

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

Figure 8: Initial Zone Opportunity in Exeter Sowton Industrial Estate HNZ

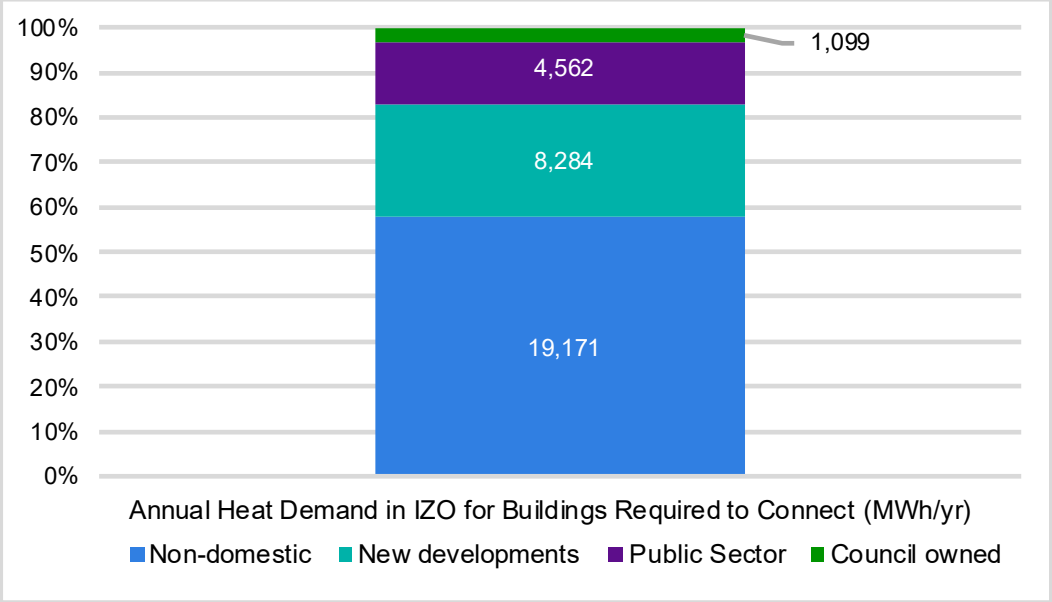


3.2.4) Exeter Sowton Industrial Estate – IZO Heat Demands

The IZO connects to 42 existing buildings and one new development site which could potentially be required to connect to a heat network. The overall annual heat demand is about 35GWh/yr.

A breakdown of the categorisation of heat demand can be found in Figure 9. This shows that the majority of heat demand connected to the IZO is from non-domestic buildings, primarily office buildings, making up 58% of the heat demand. New developments, including Liveable Exeter Sandy Gate, make up 25%, and public sector buildings a further 14%.

Figure 9: Exeter Sowton Industrial Estate - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



Further details of the key heat demands for buildings potentially required to connect are provided in Table 9. The largest demand connected to the IZO is the Liveable Exeter Sandy Gate new development. This is a mix of residential properties, retail space, offices, sports and recreation space, and educational buildings. The Met Office headquarters in Monkerton is the second largest heat demand and is currently not connected to the local Monkerton Heat Network. Two large buildings which Howmet Aerospace operate out of (a showroom and a factory) are connected. Great Moor House is a DCC office, and the South West Heritage Trust operates from the building as well as the Met Office Archive.

Table 9: Exeter Sowton Industrial Estate - Key Heat Demands Required to Connect in the IZO[19]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Liveable Exeter Sandy Gate	New development	1	8,300	Pilot methodology
Met Office	Public sector	1	4,500	DEC
Howmet aerospace showroom	Non-domestic	1	2,400	Benchmark (NZM)
Osprey House office block (National Grid)	Non-domestic	1	1,850	Benchmark (NZM)
Booker wholesale	Non-domestic	1	1,200	Benchmark (NZM)
Great Moor House	Council owned	1	1,100	DEC
Vapormatic office	Non-domestic	1	950	Benchmark (NZM)
DX Express warehouse	Non-domestic	1	850	Benchmark (NZM)
For Farmers Exeter (manufacturin)	Non-domestic	1	800	Benchmark (NZM)
Howmet aerospace factory	Non-domestic	1	750	Benchmark (NZM)

3.2.5) Exeter Sowton Industrial Estate – IZO Heat Sources

Within the HNZ, the existing Monkerton Heat Network supplies heat via the Monkerton Energy Centre which contains a gas-fired CHP and a biomass boiler. The newly developed Hill Barton EfW plant in East Devon could provide a low-carbon alternative to gas-fired CHP and is the preferred heat source for the IZO. This would require transmission pipes across East Devon

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

and the M5, as detailed in Section 3.2.7. The Hill Barton EfW plant is planned to have a 24MW capacity when built, which will also serve the Monkerton and Cranbrook existing networks.

Table 10 and Table 11 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 8 in Section 3.2.3 above and on Map C in Appendix 1, matching by reference number.

Table 10: Exeter Sowton Industrial Estate - Key Heat Source Opportunities for the IZO

Heat source type	Full capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
Hill Barton EfW	24,000	105 ºC	EC2
Existing heat network– Monkerton energy centre	15,000	80 ºC	EC3

Table 11: Exeter Sowton Industrial Estate - Potential IZO Energy Centre Locations

EC Ref #	Site type	Size (m^2)	Ownership	Heat Source
EC2	Planned Energy Centre	3,000	Exeter Energy Network	Hill Barton EfW
EC3	Existing Energy Centre	1,000	E.ON	Existing heat network

3.2.6) Exeter Sowton Industrial Estate - IZO Heat Distribution

Table 12 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 route identified distributes heat carried from an energy centre at the Hill Barton EfW plant in East Devon. Heat is distributed west, crossing the M5 and distributed across the Sowton Industrial Estate, up to the Met Office north of the A30 and south to the Sandy Gate new development.

Table 12: Exeter Sowton Industrial Estate – Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Exeter Sowton Industrial Estate	15	25

3.2.7) Exeter Sowton Industrial Estate – IZO Key Constraints and Mitigations

[C2] Road crossing: The M5 motorway is a six-lane dual carriageway running through the IZO. A feasibility assessment would be required to check suitability of the construction of a crossing to accommodate the heat network pipework (size and weight) and would likely require engagement with National Highways.

3.3) Exeter Wonford

3.3.1) Exeter Wonford – HNZ Summary

Exeter Wonford HNZ covers the area surrounding the Royal Devon and Exeter Wonford Hospital estate south-east of the city centre and west of Sowton Industrial Estate. There are 35 existing buildings that could potentially be required to connect within the zone, with a large proportion of heat demand being public sector and education buildings. Key anchor loads include Wonford Hospital and Exeter School.

3.3.2) Exeter Wonford - Existing Heat Networks

There is one planned heat network in late-stage development in Exeter Wonford HNZ, described below and shown in Appendix 1, Map D.

Planned Heat Networks – Late stage

Exeter Energy Network

See Section 3.1.2 for more information on the Exeter Energy Network and the alignment with the potential zones identified in this report.

3.3.3) Exeter Wonford – Initial Zone Opportunities

A single IZO was identified in Exeter Wonford zone. Potential routing[20] for the IZO is shown in Figure 10 and summary statistics provided in Table 13.

Table 13: Exeter Wonford - Summary Statistics for Initial Zone Opportunity[21]

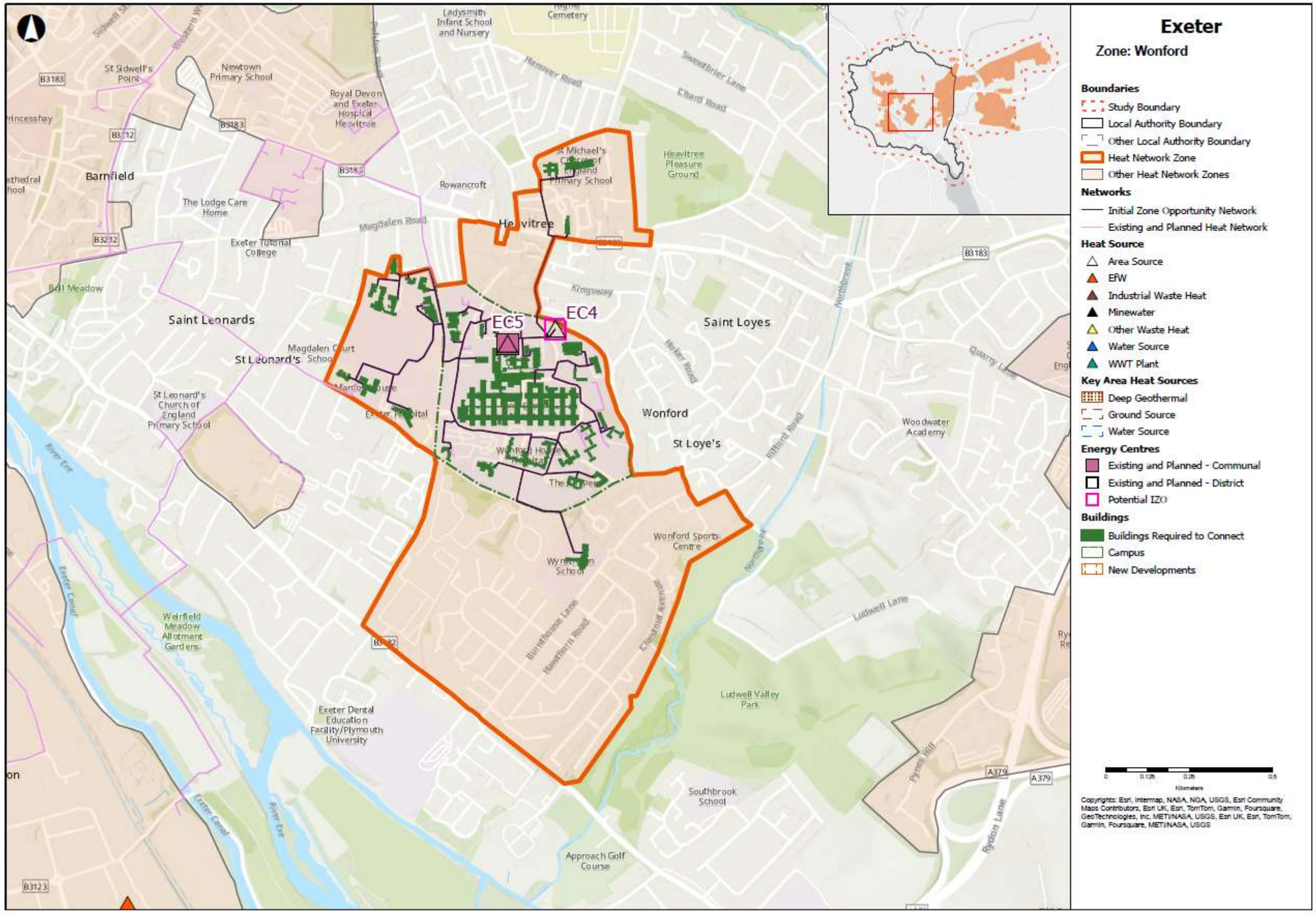
CapEx	Heat	Network	CO_2e savings	Linear Heat Density	Heat Sources
~£30m	~45GWh/yr	>5km	>7ktCO_{2e}/yr	8.3MWh/m	ASHP

The IZO was chosen based on the high heat demand and density in the Wonford area, including the large anchor load at Wonford Hospital. A total of 35 existing buildings are potentially required to connect in this IZO with a total annual heat demand of about 45GWh/yr.

The network aligns with a detailed feasibility study undertaken in 2013 as part of the ECC Local Plan. The study outlined a proposal for a heat network across the city centre and Wonford areas, including an opportunity to decarbonise the existing network at Wonford Hospital. It also presents an opportunity to decarbonise Exeter School. Furthermore, the IZO aligns with the Exeter City Heat Network Strategy completed in 2018.

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

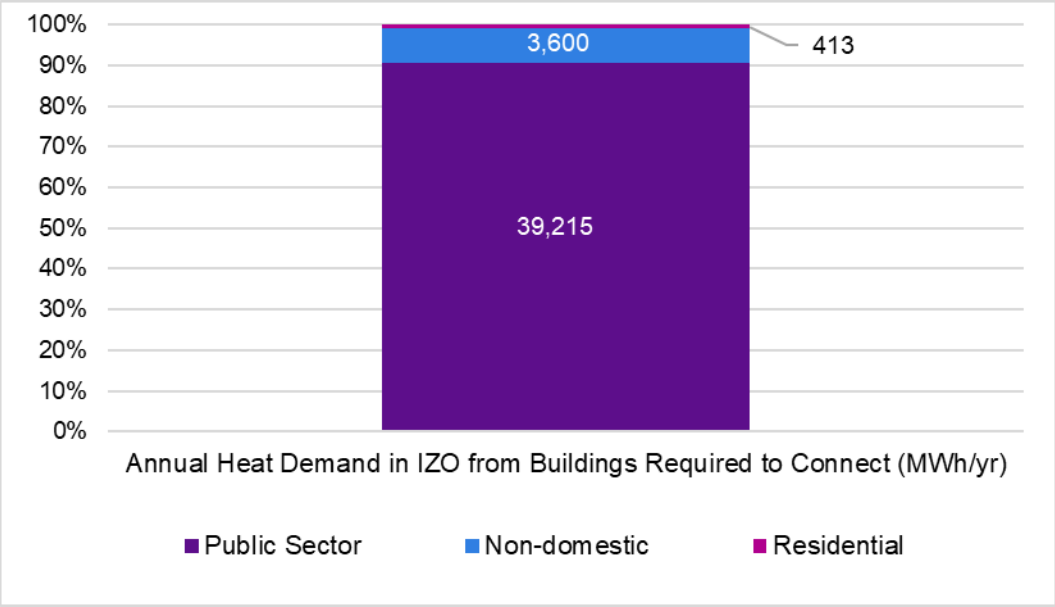
Figure 10: Initial Zone Opportunity in Exeter Wonford HNZ



3.3.4) Exeter Wonford – IZO Heat Demands

The IZO connects to 35 existing buildings which could be required to connect to a heat network, with an overall annual heat demand of about 50GWh/yr. A breakdown of the categorisation of heat demand can be found in Figure 11. This shows that the majority of heat demand connected to the IZO is from public sector buildings, making up 91% of the heat demand. Non-domestic buildings represent 8% of heat demand and residential buildings 1%. Hospital and residential/nursing home buildings represent 87.5% of the heat demand.

Figure 11: Exeter Wonford - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



Further details of the key heat demands for buildings potentially required to connect are provided in Table 14. The majority of the top ten heat demands are public sector buildings, including Wonford Hospital, Nuffield Health Hospital and NHS buildings on the surrounding Wonford Hospital estate. Wonford Hospital is the largest heat demand at almost 32GWh/yr. These hospital sites currently have separate heating or steam systems which only supply one or two buildings. Exeter School is a private day school to the west of Wonford Hospital with multiple buildings with the second largest demand in total.

Table 14: Exeter Wonford - Key Heat Demands Required to Connect in the IZO[22]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
RD&E Wonford Hospital	Public sector	4	31,800	ERIC
Exeter School	Non-domestic	5	2,250	Benchmark (NZM)
Nuffield Health Hospital	Public sector	1	2,100	DEC
Wonford House Hospital	Public sector	1	900	DEC
RILD (Research Innovation Learning & Development) NHS teaching	Public sector	2	900	DEC
Mardon Centre NHS	Public sector	1	450	DEC
NHS Distribution Centre Deliveries	Public sector	1	500	Benchmark (NZM)
RD&E Flats	Residential	2	400	Benchmark (NZM)
Wynstream Primary School	Public sector	1	350	DEC
The Cedars NHS	Public sector	1	300	Benchmark (NZM)

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

3.3.5) Exeter Wonford – IZO Heat Sources

ASHPs have been identified as the most appropriate technology to supply the required heat demand of the IZO. Land on the Wonford Hospital estate has been identified as a potential location to build a new energy centre. There is also an existing energy centre at Wonford Hospital which could be used. This energy centre serves the main hospital with hot water, electricity and laundry, and contains a CHP plantroom with two CHP units as well as a high temperature hot water plantroom containing gas boilers. A feasibility study into the potential to retrofit the existing energy centre to house ASHPs would be needed, to ensure there is enough room for equipment (pumps, heat exchangers etc.), maintenance and pipework.

Table 15 and Table 16 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 10 in Section 3.3.3 above and on Map C in Appendix 1, matching by reference number.

Table 15: Exeter Wonford - Key Heat Source Opportunities for the IZO

Heat source type	Supplied capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
ASHP – location agnostic	9,300	5-15 ºC	EC4 or EC5

Table 16: Exeter Wonford - Potential IZO Energy Centre Locations

EC Ref #	Site type	Size (m^2)	Ownership	Heat Source
EC4	Land	1,800m^2	NHS	ASHP
EC5	Existing energy centre	Unknown	NHS	ASHP

3.3.6) Exeter Wonford - IZO Heat Distribution

Table 17 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.

At this stage a potential energy centre located adjacent to Bovemoors Lane on the Wonford Hospital estate could distribute heat across the Hospital estate buildings, north to St. ichael's Church of England School, west to Exeter School and south to Wynstream Primary School.

Table 17: Exeter Wonford - Potential Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Exeter Wonford	5	10

3.3.7) Exeter Wonford – IZO Key Constraints and Mitigations

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

3.4) East Devon New Community

3.4.1) East Devon New Community – HNZ Summary

The East Devon New Community HNZ covers one of the shortlisted locations for a new community of up to 8,000 new dwellings approved by EDDC. For this HNZ, the location identified is below Exeter Airport, between the A30 and the A3052, covering the Hill Barton Business Park and the Farringdon area. There are nine existing buildings that could be potentially required to connect within the zone, as well as the planned new development. The key anchor load for this HNZ is the new community development, which is estimated to have 2,500 constructed residential properties completed by the year 2035.

3.4.2) East Devon New Community - Existing Heat Networks

There is one planned extension to an operational heat network in the HNZ, as described below and shown in Appendix 1, Map D.

Operational Heat Networks and Planned Expansions

Cranbrook Energy Network

Cranbrook heat network is located in East Devon to the east of Exeter, serving a mix of domestic and non-domestic buildings as well as the Skypark development, with a current heat demand of 23GWh/yr. Both of these networks operate by agreement between E.ON, DCC, EDDC and ECC.

An expansion to the Cranbrook Heat Network is expected to connect an additional 4,500 homes and 24,500m² of commercial space. The network will extend to the Hill Barton Business Park via an interconnector pipe to supply heat from an EfW plant, currently under development.

The planned extension to the Cranbrook and Skypark heat network includes a heat transmission pipework being constructed running northwards from Hill Barton Business Park up to the Cranbrook and Skypark Network, heat will also be distributed across to the Monkerton Energy Network

3.4.3) East Devon New Community – Initial Zone Opportunities

A single IZO was identified in East Devon New Community zone. Potential routing[23] for the IZO is shown in Figure 12 and summary statistics provided in Table 18.

[23] Routes can be expected to change as a better understanding of local constraints is developed through design.

Table 18: East Devon New Community - Summary Statistics for Initial Zone Opportunity[24]

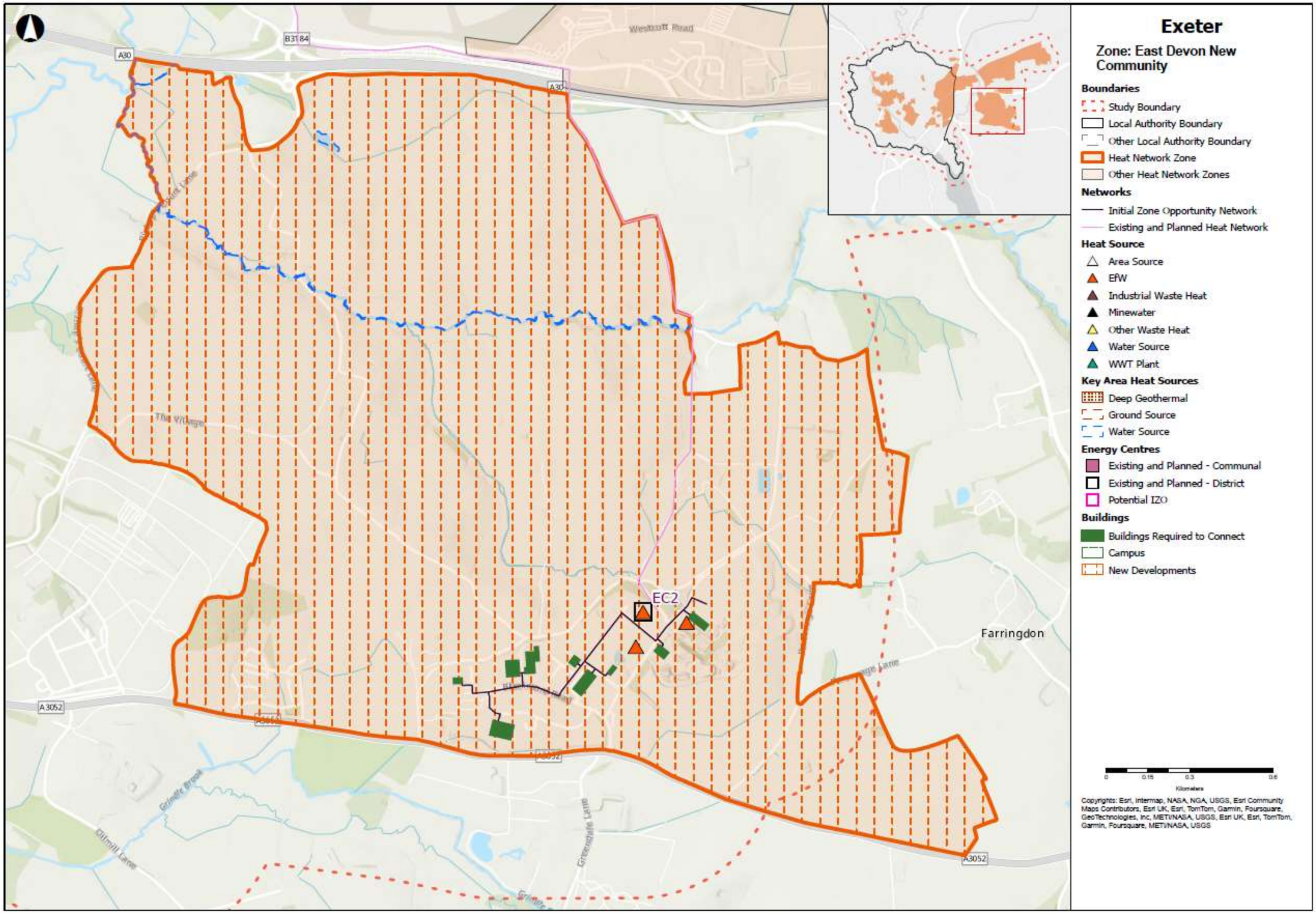
CapEx	Heat	Network	CO_2e savings	Linear Heat Density	Heat Sources
~£20m	~15GWh/yr	~6km	>2ktCO_{2e}/yr	3MWh/m	EfW

The close proximity to the shortlisted locations for the new East Devon new community presents an opportunity for a new town of residential and retail properties to be connected immediately to a heat network. A total of nine existing buildings and one future development could potentially be required to connect to this IZO.

This IZO has also been identified due to the location of the Hill Barton Business Park, where a new large EfW plant is currently under development. This provides close proximity to a low carbon heat source for the planned community in East Devon and is currently planned to serve the planned interconnected Cranbrook, Skypark and Monkerton heat networks.

[24] Please see Appendix 3 – Glossary, “Specific definitions” of the main report for definitions related to this table.

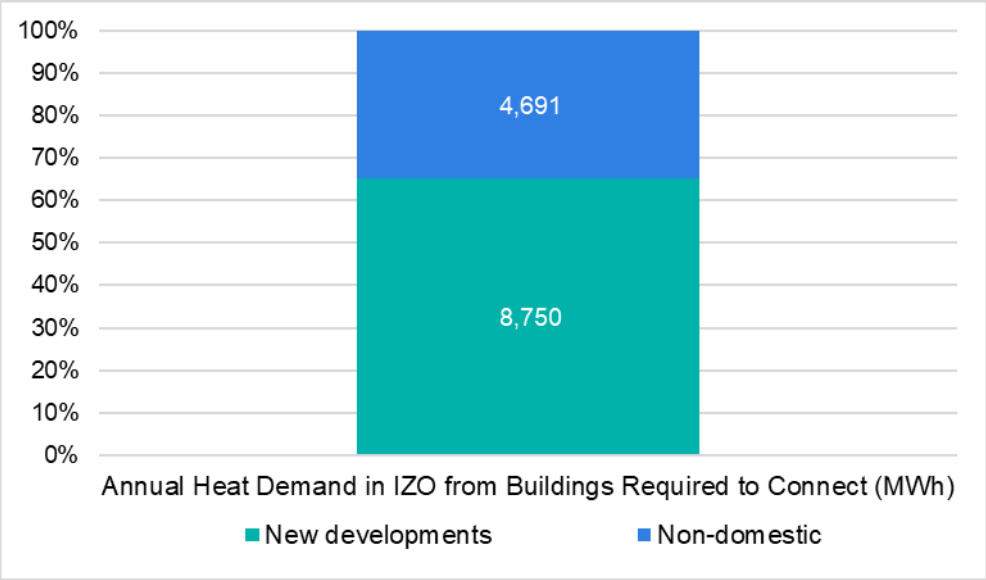
Figure 12: Initial Zone Opportunity in East Devon New Community HNZ



3.4.4) East Devon New Community – IZO Heat Demands

The IZO connects to nine existing buildings and an extensive future development site which is of strategic importance for this study area. The existing buildings are non-domestic industrial buildings around Hill Barton Business Park. The new development is a planned new community with up to 8,000 new dwellings planned, with an estimated 2,500 dwellings due to be completed by the year 2035 with an estimated heat demand almost 9GWh/yr. Figure 13 shows the breakdown of heat demand based on building types.

Figure 13: East Devon New Community - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



The majority of heat demand connected to East Devon New Community IZO is from new development, making up 65% of the heat demand, with industrial buildings making up the remaining 35%. Further details of the key heat demands for buildings potentially required to connect are provided in Table 19.

Table 19: East Devon New Community - Key Heat Demands Required to Connect in the IZO[25]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
East Devon New Community	New development	2,500	8,750	Pilot methodology
Unit 7 – Warehouse (Gardener Distribution)	Non-domestic	1	950	Benchmark (NZM)
Unit 4 – Warehouse (STILL Materials Handling)	Non-domestic	1	950	Benchmark (NZM)
ASD warehouse	Non-domestic	1	850	Benchmark (NZM)
Distribution warehouse (Kandytoys, John Lewis)	Non-domestic	1	650	Benchmark (NZM)
Brooke Energy	Non-domestic	1	500	Benchmark (NZM)
UK Remediation	Non-domestic	1	300	Benchmark (NZM)
DHL warehouse	Non-domestic	1	250	Benchmark (NZM)
Clyst Court warehouse (Devon Joinery)	Non-domestic	1	150	Benchmark (NZM)
Vehicle repair autoworks (Stuarts)	Non-domestic	1	150	Benchmark (NZM)

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

3.4.5) East Devon New Community – IZO Heat Sources

The Hill Barton EfW plant is planned to have a 24MW capacity when built, which will also serve the Monkerton and Cranbrook existing networks. It has been identified as a potential low-carbon heat source for the East Devon New Community IZO, as well as the Sowton Industrial Estate IZO, discussed in Section 3.2.3, above.

Table 21 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 12, in Section 3.4.3 above and on Map C in Appendix 1, matching by reference number. There are two additional EfW facilities at the Hill Barton Industrial Estate, though only one of these has been suggested as a potential heat source in Table 20. For these to be considered, a feasibility study would need to be conducted to determine if heat offtake would be possible, and the total capacity.

Table 20: East Devon New Community - Key Heat Source Opportunities for the IZO

Heat source type	Full capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
Hill Barton EfW	24,000	105 ºC	EC2

Table 21: East Devon New Community - Potential IZO Energy Centre Locations

EC Ref #	Site type	Size (m^2)	Ownership	Heat Source
EC2	Planned Energy Centre	3,000	Exeter Energy Network	Hill Barton EfW

3.4.6) East Devon New Community - IZO Heat Distribution

Table 22 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 IZO route identified distributes heat from Hill Barton EfW plant across the Hill Barton Business Park as well as distributing it across the planned new community development. A provisional network route for the East Devon New Community development is not available currently.

Table 22: East Devon New Community - Potential Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
East Devon New Community	6	7

3.4.7) East Devon New Community – IZO Key Constraints and Mitigations

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

3.5) Exeter University Streatham

3.5.1) Exeter University Streatham – HNZ Summary

The Exeter University Streatham HNZ covers an area north of Exeter City Centre, including Exeter St David's station and the area north, across University of Exeter Streatham campus. There are 54 buildings and one planned new development that could potentially be required to connect within the zone, with the majority of buildings and heat demand in the zone being educational or public sector buildings.

3.5.2) Exeter University Streatham - Existing Heat Networks

There is one planned heat network in late-stage development in Exeter University Streatham HNZ, described below and shown in Appendix 1, Map D.

Planned Heat Networks – Late stage

Exeter Energy Network

See Section 3.1.2 for more information on the Exeter Energy Network and the alignment with the potential zones identified in this report.

3.5.3) Exeter University Streatham – Initial Zone Opportunities

A single IZO was identified in Exeter University Streatham zone. Potential routing[26] for the IZO is shown in Figure 14 and summary statistics provided in Table 23.

Table 23: Exeter University Streatham - Summary Statistics for Initial Zone Opportunity[27]

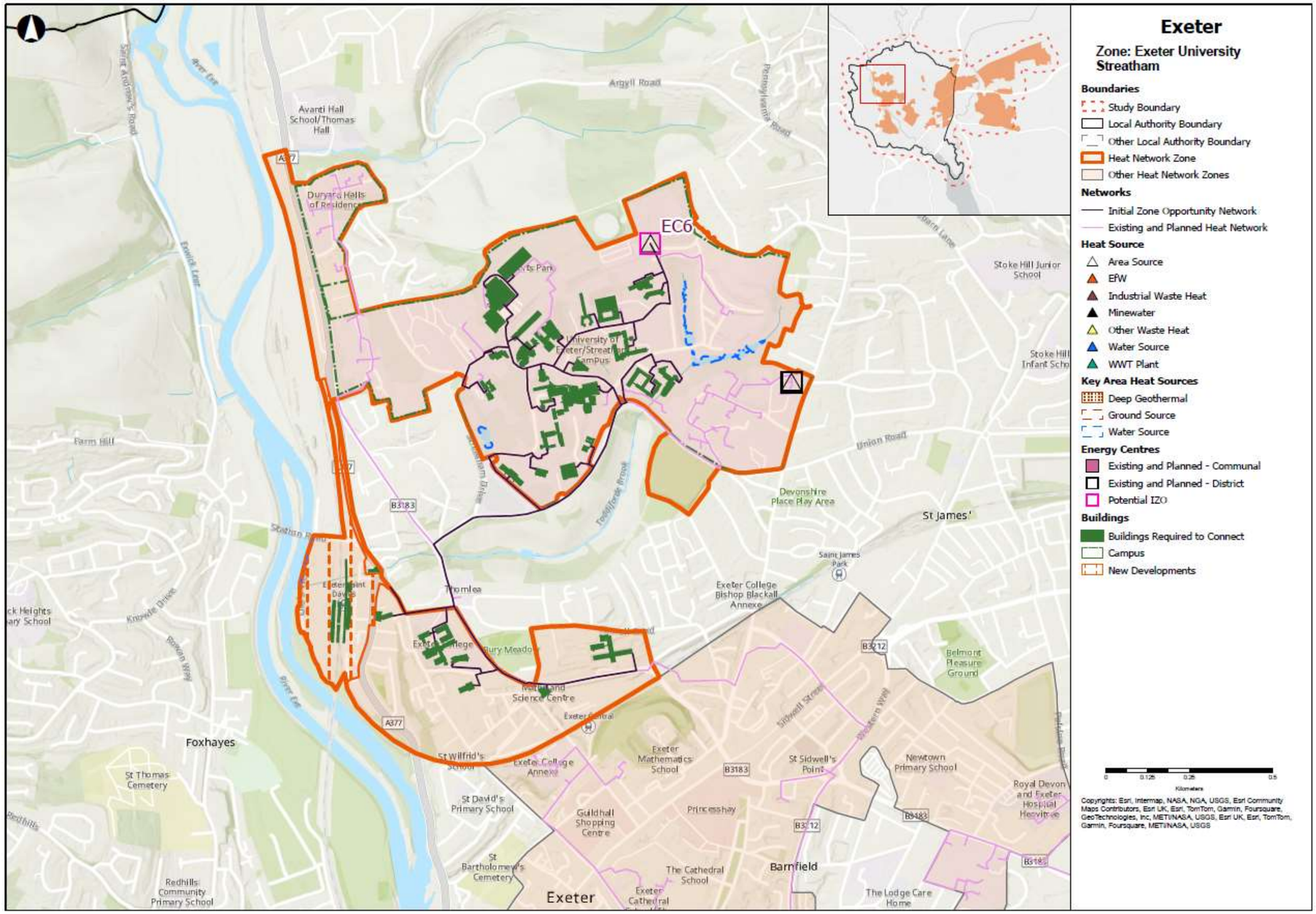
CapEx	Heat	Network	CO_2e savings	Linear Heat Density	Heat Sources
~£30m	~30GWh/yr	>7km	>4ktCO_{2e}/yr	4.1MWh/m	ASHP

The IZO was chosen based on the high heat demand and density, and because it is within close proximity to Exeter city centre with potential to connect heat networks and expand in the future. A total of 43 existing buildings and one future development could potentially be required to connect to this IZO. Key anchor loads include HMP Exeter, University of Exeter Streatham Campus buildings and the Liveable Exeter Red Cow Village planned new development.

The IZO aligns with a detailed feasibility study undertaken in 2013 as part of the ECC Local Plan and the subsequent Exeter City Heat Network strategy completed in 2018. It also aligns with the proposed Exeter Energy Network as described earlier.

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

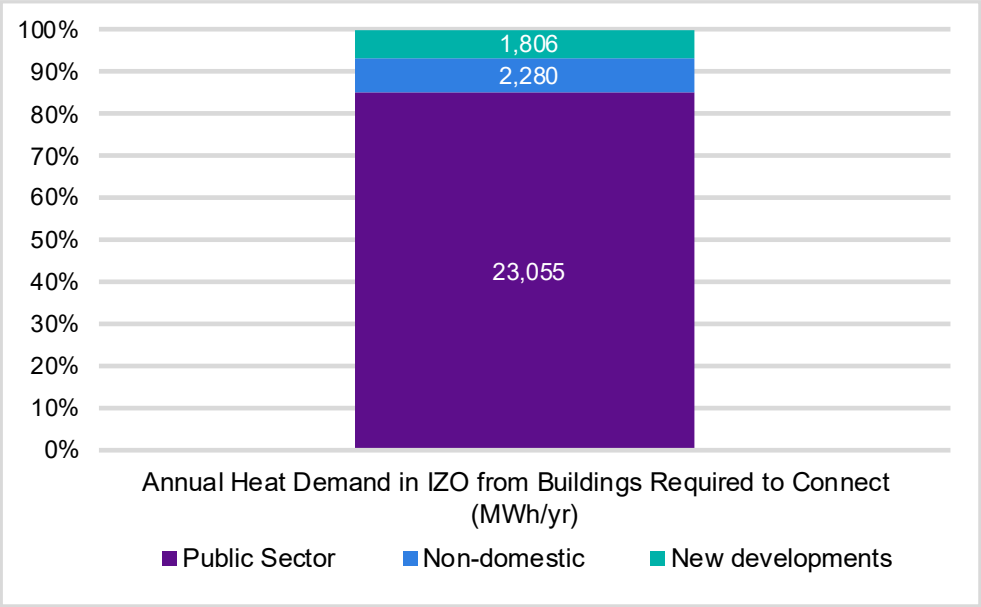
Figure 14: Initial Zone Opportunity in Exeter University Streatham HNZ



3.5.4) Exeter University Streatham – IZO Heat Demands

The IZO connects to 43 existing buildings and one new development site which could potentially be required to connect to the heat network. Key heat demands include HMP Exeter, the University of Exeter Streatham campus and the Liveable Exeter Red Cow Village new development site. Figure 15 shows the breakdown of heat demand based on building types.

Figure 15: Exeter University Streatham - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



The majority of heat demand connected is from public sector buildings, making up around 85% of the heat demand. Non-domestic buildings make up around 8% and new developments 7%. Main building categories are education (schools & higher education) and public sector buildings which account for approximately 19GWh and 6GWh of annual heat demand respectively.

Further details of the key heat demands for buildings potentially required to connect are provided in Table 24. Seven of the top ten highest heat demands are public sector educational buildings, mostly within the University of Exeter Streatham campus. The new development has been assumed to be one single bulk connection point. Liveable Exeter Red Cow Village new development is planned to be a mix of domestic, retail and office buildings with a total estimated annual demand of 1.8GWh/yr.

Table 24: Exeter University Streatham - Key Heat Demands Required to Connect in the IZO[28]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
HMP Exeter	Public sector	1	4,850	DEC
UoE Rashid Building Library	Public sector	1	2,950	DEC
UoE Sports Hall	Public sector	1	2,100	DEC
Exeter College	Public sector	5	1,850	DEC
Liveable Exeter Red Cow Village	New development	1	1,800	Pilot methodology
UoE Amory Building	Public sector	1	1,750	DEC
UoE Living Systems Institute	Public sector	2	1,700	DEC
UoE Harrison building	Public sector	2	1,500	DEC
Exeter St David's station	Non-domestic	5	1,250	Benchmark (NZM)
UoE Tennis Centre	Public sector	1	850	Benchmark (NZM)

3.5.5) Exeter University Streatham – IZO Heat Sources

There is strong potential for ASHPs to supply low carbon heat to the IZO. ASHPs are a location-agnostic technology and potential available land has been identified to house a new energy centre and large-scale ASHPs.

Table 25 and Table 26 summarise the key heat sources and potential energy centre locations identified for this IZO. These are shown in Figure 14 in Section 3.5.3 above and on Map C in Appendix 1, matching by reference number.

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

Table 25: Exeter University Streatham - Key Heat Source Opportunities for the IZO

Heat source type	Supplied capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
ASHP – location agnostic	6,800	5-15 ºC	EC6

Table 26: Exeter University Streatham - Potential IZO Energy Centre Locations

EC Ref #	Site type	Size (m^2)	Ownership	Heat Source
EC6	Land	7,100m^2	University of Exeter	ASHP

3.5.6) Exeter University Streatham - IZO Heat Distribution

Table 27 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.

At this stage the IZO route identified distributes heat from the energy centre located at a north point of the Streatham campus. Heat is distributed across the campus and further south-west, to Exeter t David's station and Exeter College. It is distributed further west from there to HMP Exeter, adjacent to the Exeter City Centre HNZ, separated by a rail track.

Table 27: Exeter University Streatham - Potential Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Exeter University Streatham	7	15

3.5.7) Exeter University Streatham – IZO Key Constraints and Mitigations

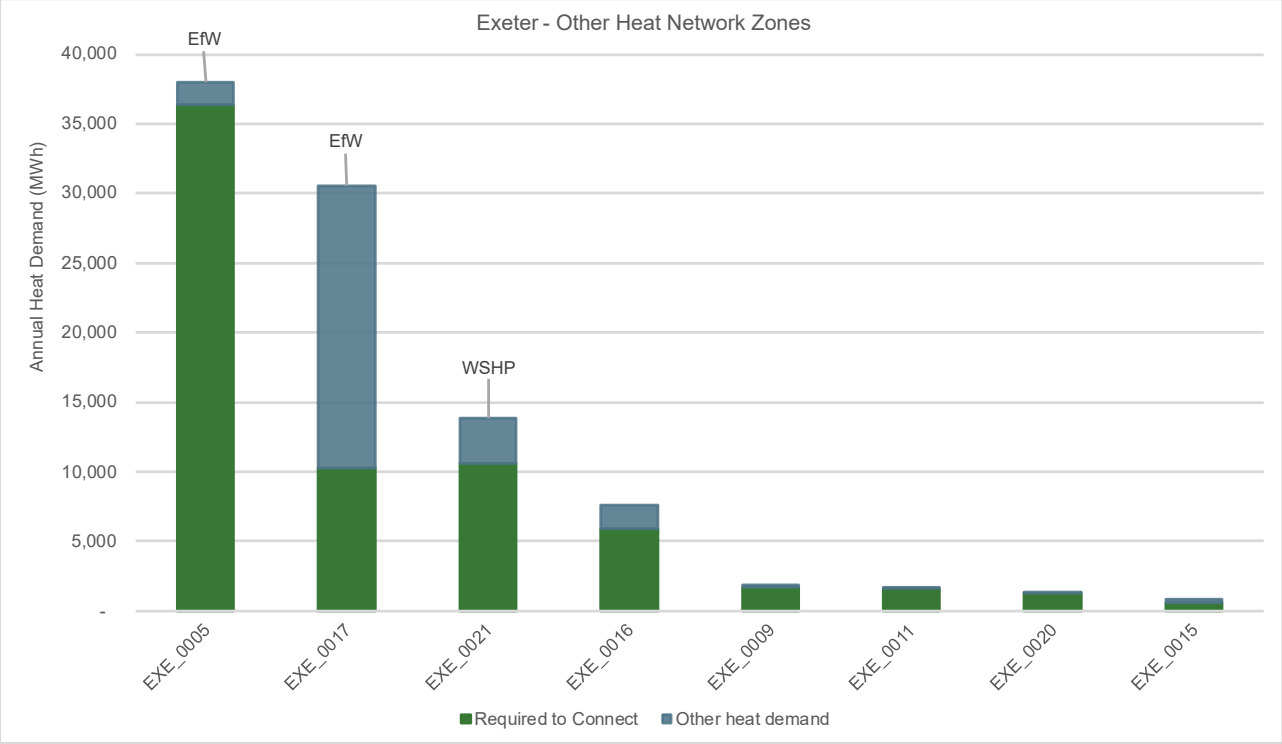
There are no major constraints identified for the proposed IZO network route.

4) Other Heat Network Zones

This section describes the 'Other' potential heat network zones that were identified in Exeter. 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 16 illustrates the total annual heat demand, and the proportion of which is associated with buildings that may potentially 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 16: Total Heat Demand and Proportion Required to Connect in Other HNZs



Marsh Barton Industrial Estate (EXE_0005): This HNZ is situated in Exeter along the western bank of the River Exe, south-west of the city centre. Marsh Barton is a Regeneration Opportunity Area identified by Policy H3 of the Exeter Plan (Regulation 19 draft) December 2024. It is a strategic opportunity for future regeneration of an existing area of brownfield land supported by the City Council. The Council will use existing and emerging Planning Policies to promote decentralised and low carbon energy networks as part of regeneration. Marsh Barton Includes the Energy from Waste Plant at Grace Road South which is an existing heat and power export opportunity The heat demand of this zone is likely to change significantly from what has been modelled in this study.

Cranbrook (EXE_0017): This HNZ is situated in East Devon. The area is mixed residential and commercial, with new developments planned and under-construction currently. The zone hosts the Cranbrook Heat Network. New developments within this zone are planned to be served by extensions to Cranbrook Heat Network. The Cranbrook HNZ has a significantly lower proportion of heat demand potentially required to connect than other zones. This is because the existing Cranbrook district heat network connects to a large amount of low-density residential housing due to local planning orders for new developments which would not necessarily be potentially required to connect under proposed Heat Network Zoning policy.

EXE_0021: is situated within Exeter to the west of Sowton Industrial Estate. This is a small zone containing retail and commercial sites.

EXE_0016: is situated in East Devon to the south of Cranbrook. This is a small zone containing Exeter Airport.

EXE_0009: is situated in Exeter north-east of the city centre. This is a small zone containing school sites.

EXE_0011: is situated in Exeter near the River Exe, south-east of the city centre and west of Wonford. This is a small zone containing only council office sites.

EXE_0020: is situated in Exeter west of the city centre across the River Exe. This is a small zone containing retail and commercial sites.

EXE_0015: is situated in Exeter north-east of the city centre, south of EXE_0009. This is a small zone containing school sites.

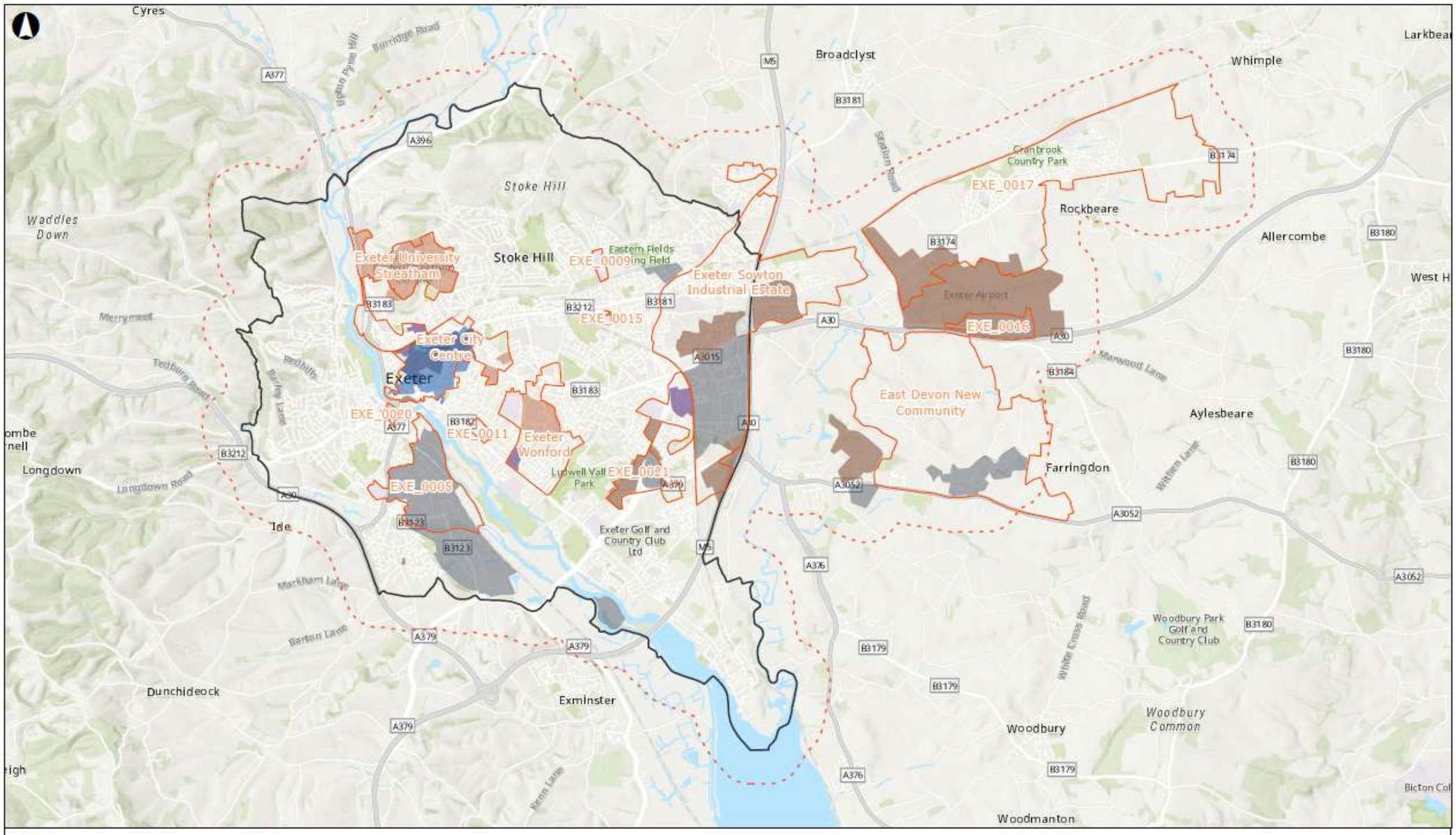
Appendix 1: Maps and Legends

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. Exeter Typology



B. Key Heat Demands

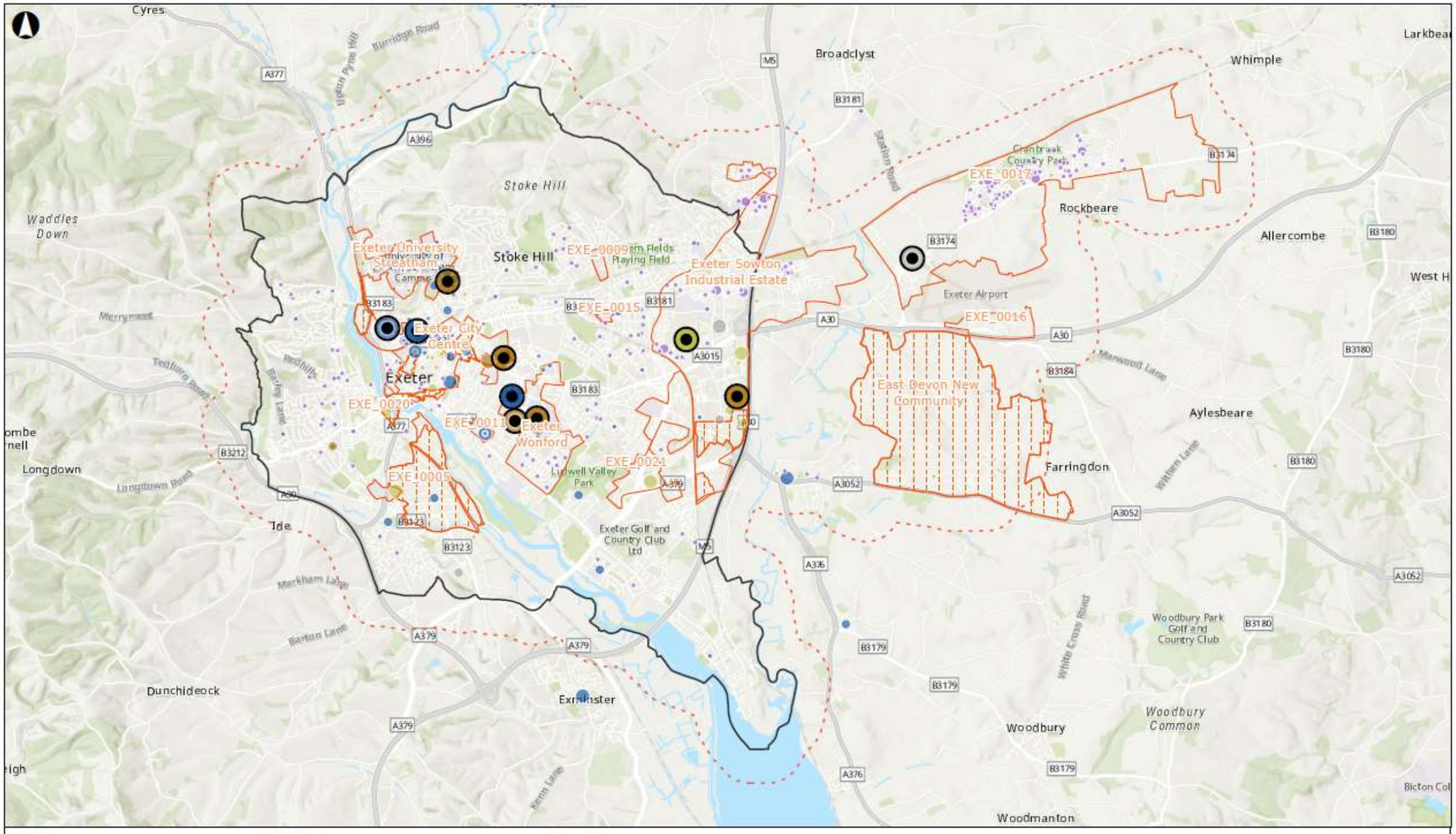
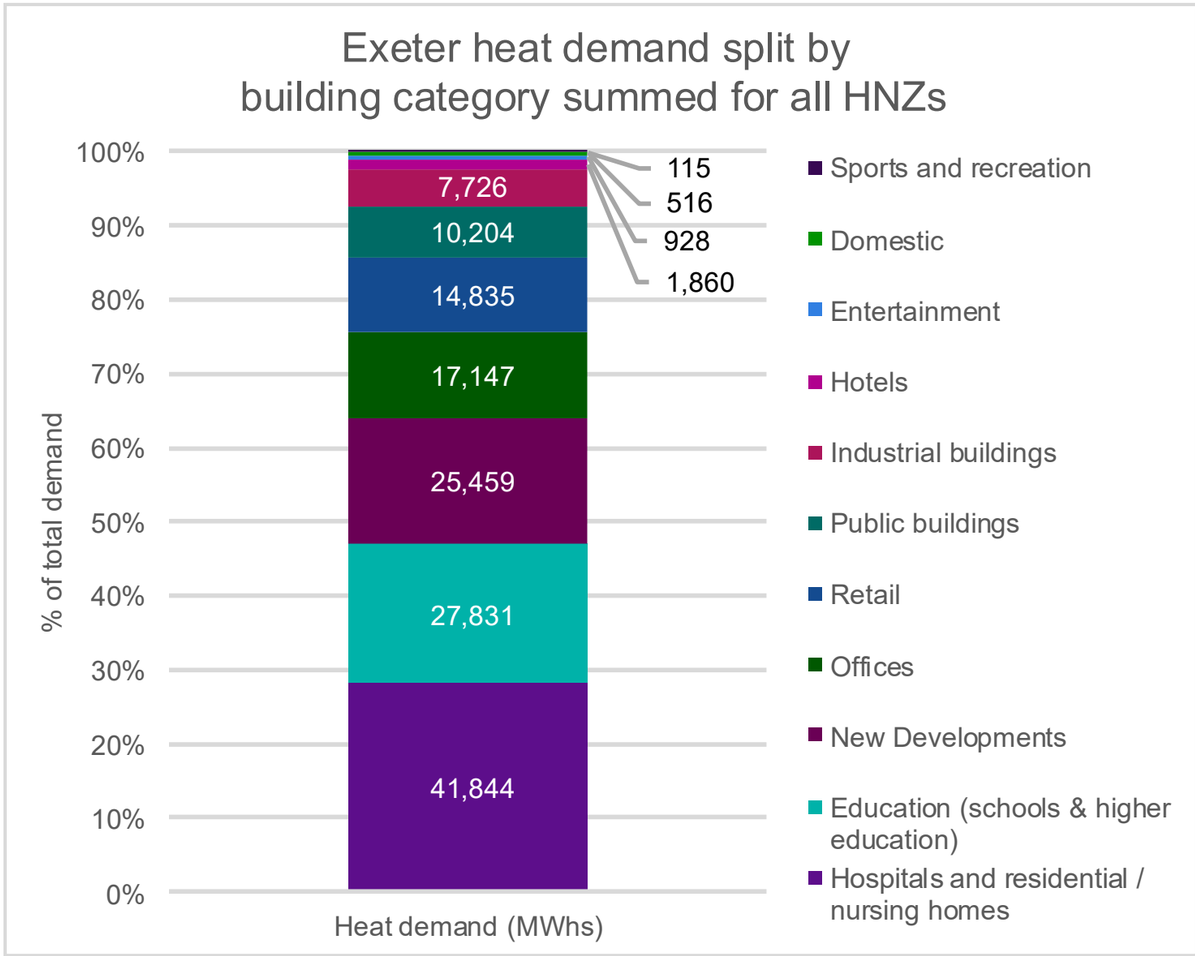


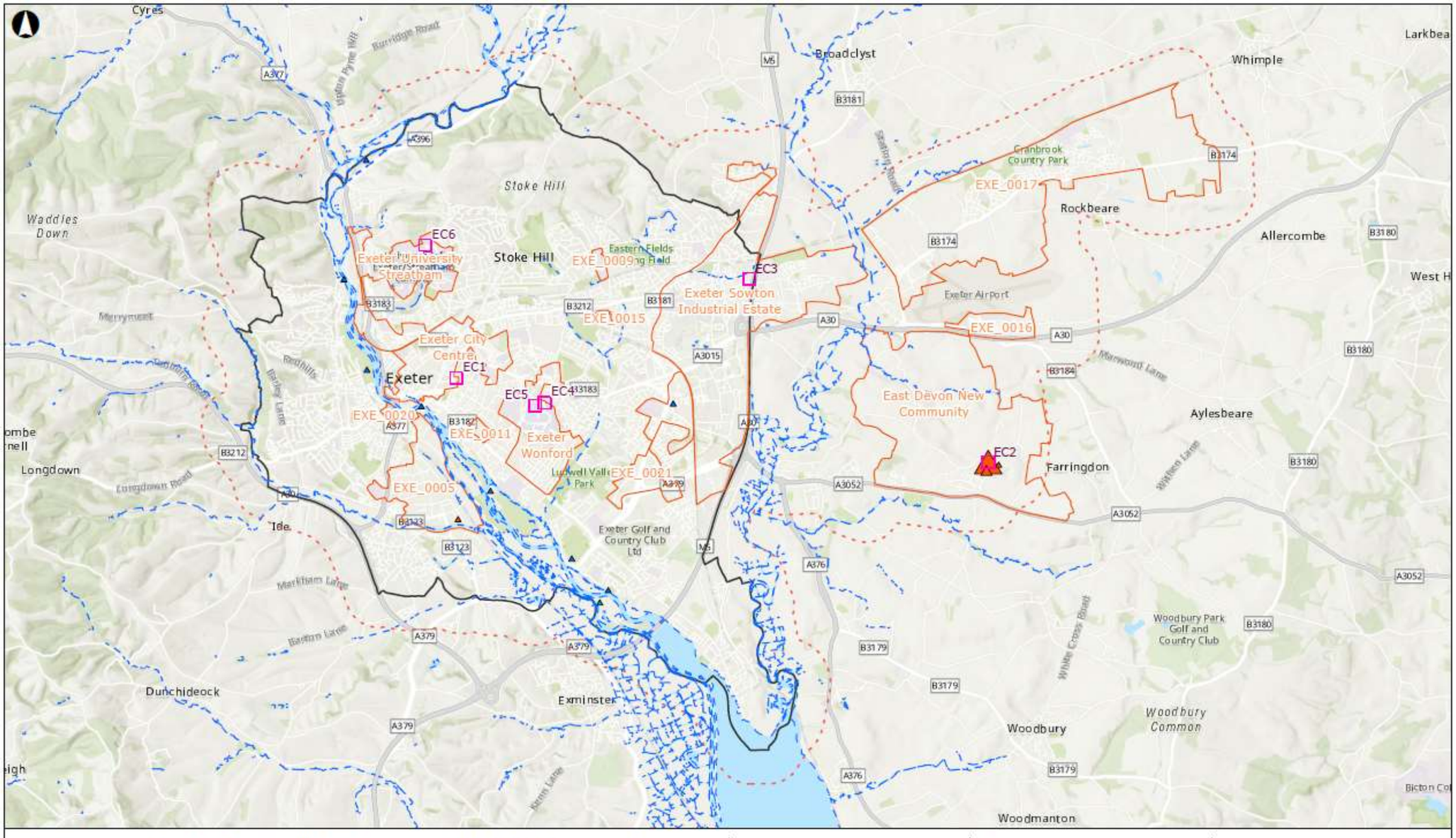
Table 28: Heat Demand split further by Building Categories across all Initial Zone Opportunities identified in Strategic HNZs in the Study Area

Building category (based on CIBSE)	Number of buildings required to connect in this category	Annual heat demand of buildings required to connect across IZOs (MWh)
Domestic	3	500
Education (schools & higher education)	54	27,850
Entertainment	4	950
Hospitals and residential / nursing homes	28	41,850
Hotels	4	1,850
Industrial buildings	22	7,750
Offices	37	17,150
Public buildings	15	10,200
Retail	33	14,850
Sports and recreation	1	100
New Developments	2,505	25,450
Totals	**233**	**123,758**

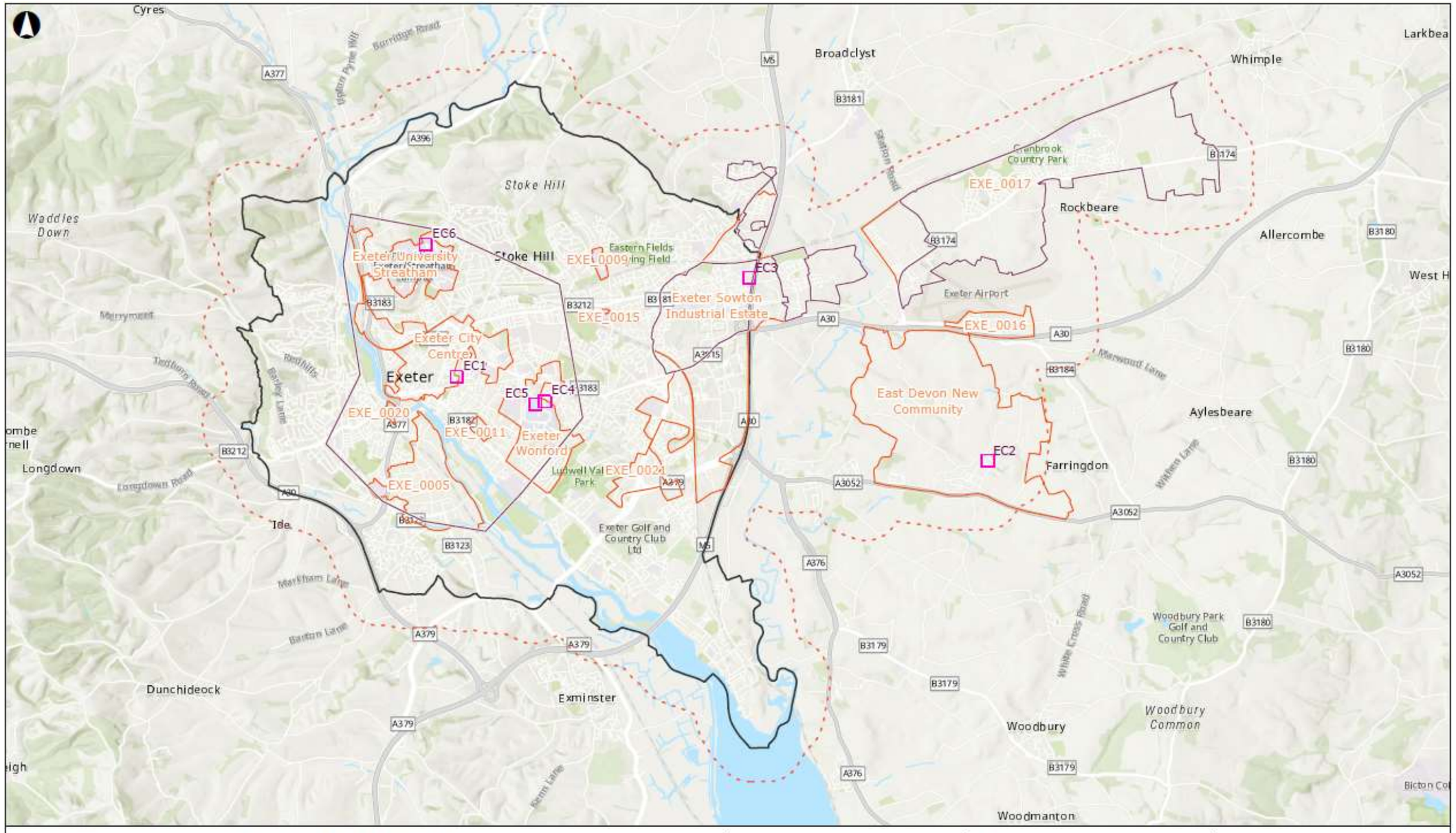


Note: In Exeter there are 5 Strategic HNZs with a total of 5 IZOs identified across them. The table and graph above summarise the heat demand for buildings potentially required to connect to these IZOs.

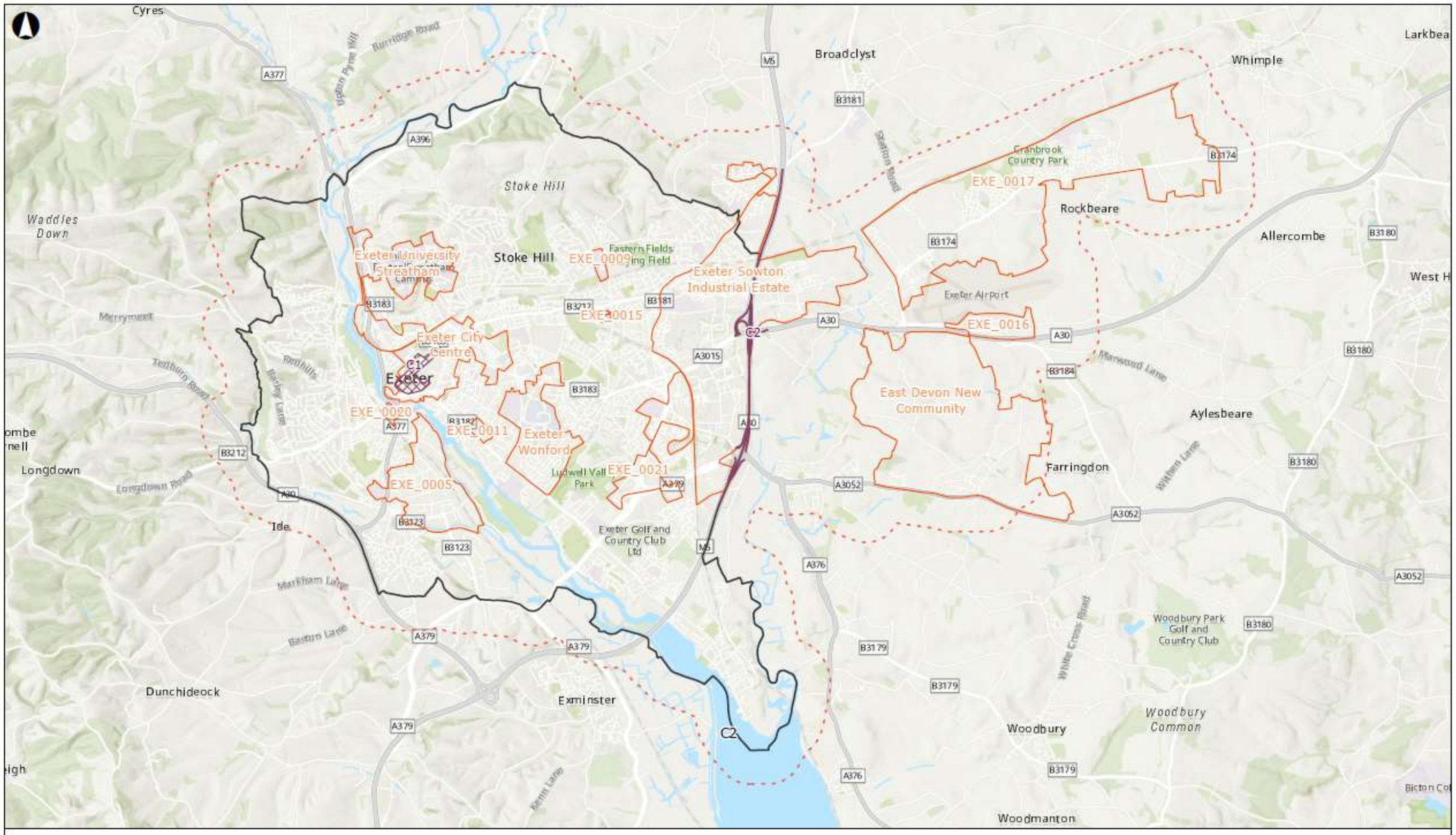
C. Key Heat Sources and Potential Energy Centres



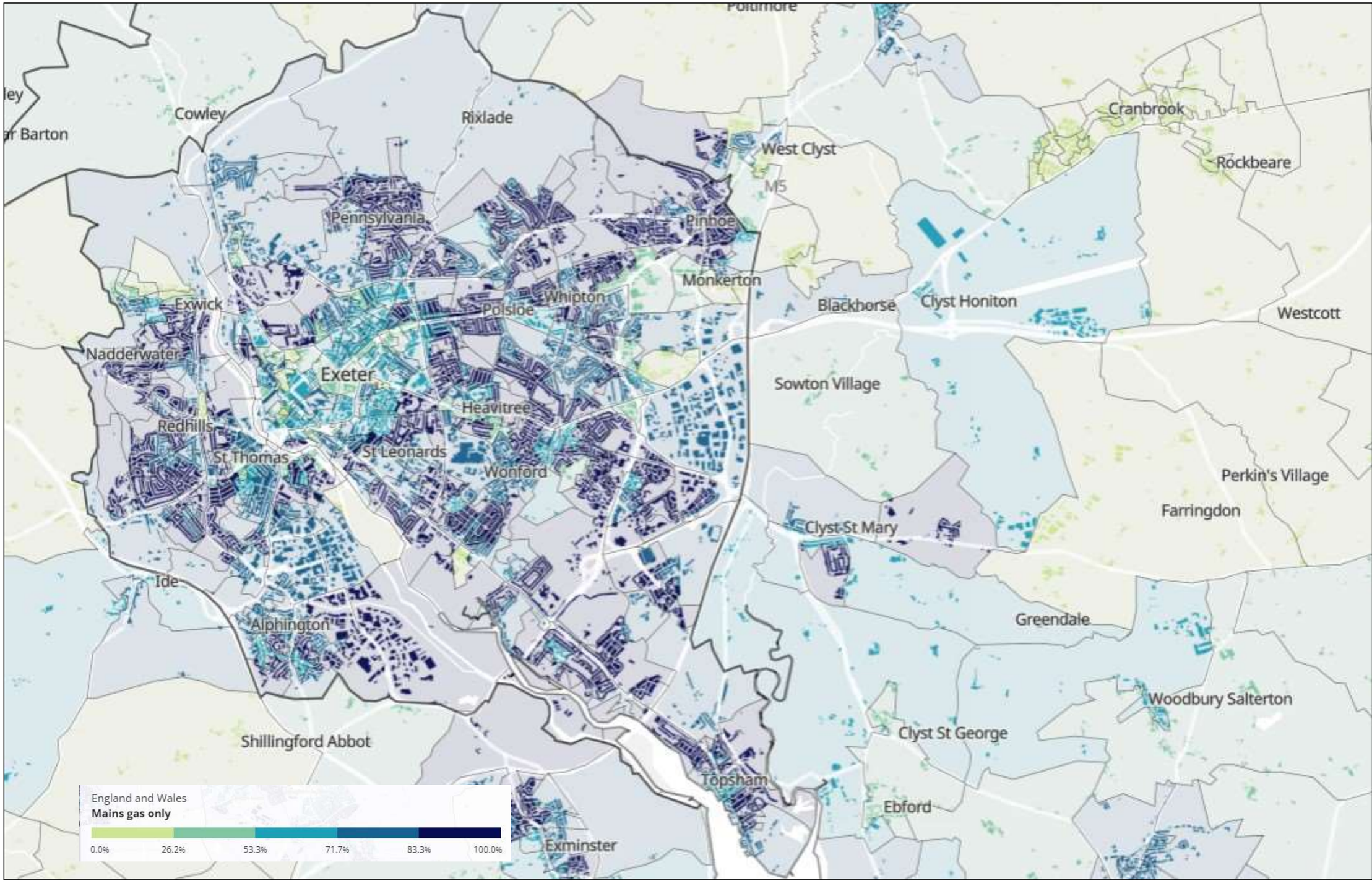
D. Existing and Planned Heat Networks



E. Physical Constraints



F. Off-Gas Grid Areas in Exeter



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 29: Pilot Programme Standardised Information Resources

Information resource	Description of resource
Stakeholder Directory	A directory listing key stakeholders identified and approached during the Pilot project, 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 30: Pilot Study-Area-Specific Information Resources

Information resource	Description of resource
JLL, Liveable Exeter Priority Sites – Transforming Housing Delivery, 2020	A preliminary viability and deliverability assessment of the Exeter City Futures (ECF) and Liveable Exeter's 'Vision' programme to develop 11,000 homes
WSP, ECC and ECF, Exeter City Heat Network Strategy, 2018	A study to inform future expansion and decarbonisation of the city's existing and proposed heat networks beyond Monkerton and Cranbrook
Royal Devon and Exeter (RD&E) – Combustion Plant Schedule, 2017	An M&E plant schedule for all RD&E sites across Exeter; Wonford, Heavitree and Mardon. Detailing location of plant rooms, capacity of equipment and areas served, as well as temperatures
Royal Devon and Exeter (RD&E) – site data - grid consumption, 2022	Excel documents with annual gas and electricity consumption for each hospital site from grid sources and on-site generation

Information resource	Description of resource
EDDC – Site details capacities and accommodation schedules, 2022	A document detailing the current development and future plans for domestic and non-domestic properties in East Devon, including Cranbrook and the Skypark development. Developer details, proposed development scale (no. properties), estimated electrical load required, accommodation schedule are included within
DCC – Devon Carbon Emissions by site with Tenure, 2022	Document detailing annual energy consumption by fuel type by year 2016-2021 for each Devon County Council operated site

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.