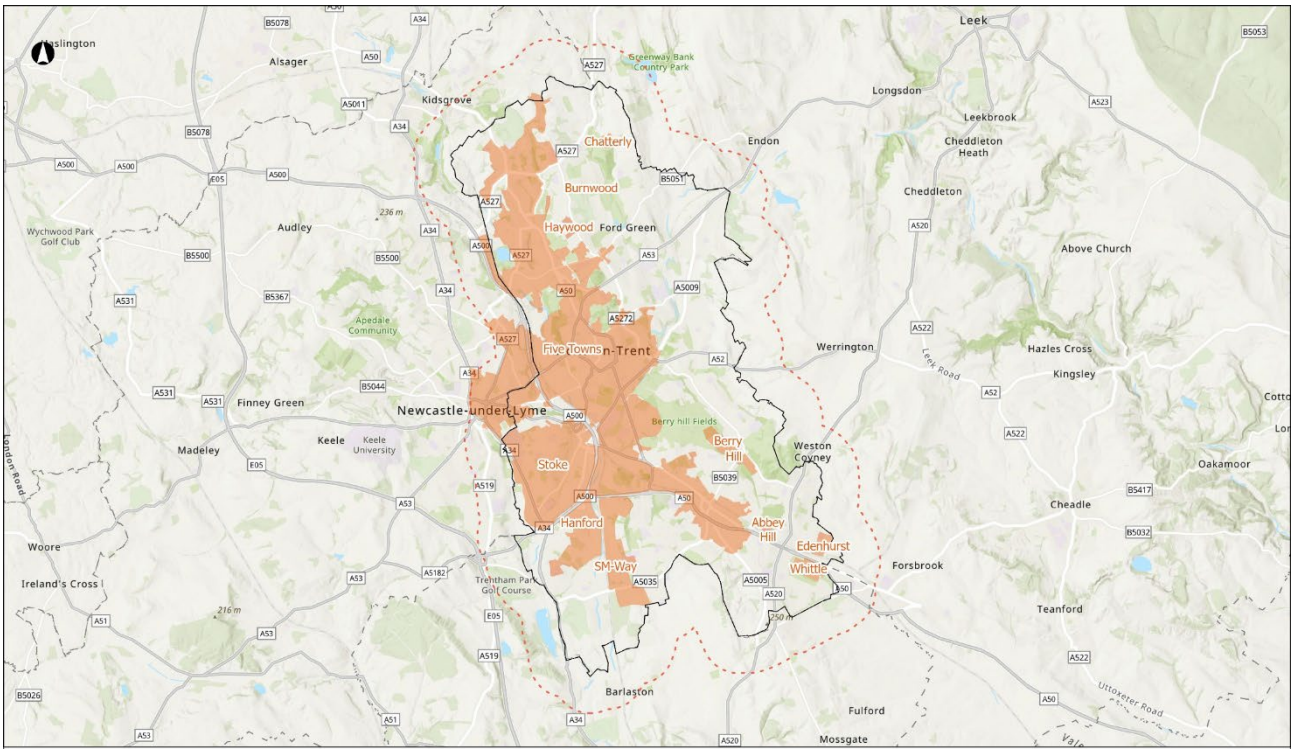
Department for Energy Security & Net Zero

Stoke-on-Trent

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

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

Contents

Executive Summary

About Stoke-on-Trent: Stoke-on-Trent is located in Staffordshire, West Midlands. It includes six distinct towns with a population of about 257,000. Known as, The Potteries, it has a rich ceramics industry heritage.

Local Energy Policy: Stoke-on-Trent City Council declared a Climate Emergency in 2019, aiming for net zero by 2050. The Corporate Strategy focuses on economic growth, education, health, housing, transport, and sustainability.

Existing heat networks: The city has been developing a heat network programme for over a decade, including a four-phase plan covering the University Quarter, Stoke Town, Festival Park, and Hanley.

Zones identified: 11 potential heat network zones were identified in Stoke-on-Trent, with a total annual heat demand of approximately 1,050GWh/yr for all buildings potentially required to connect within these zones.

Strategic heat network zones: Four strategic heat network zones have been identified with a total annual heat demand of approximately 1,000GWh/yr for all buildings potentially required to connect within these zones.

Key heat demands: The total annual heat demand for buildings connected to the initial zone opportunities is approximately 725GWh/yr. Key buildings include Royal Stoke University Hospital and Spode Works.

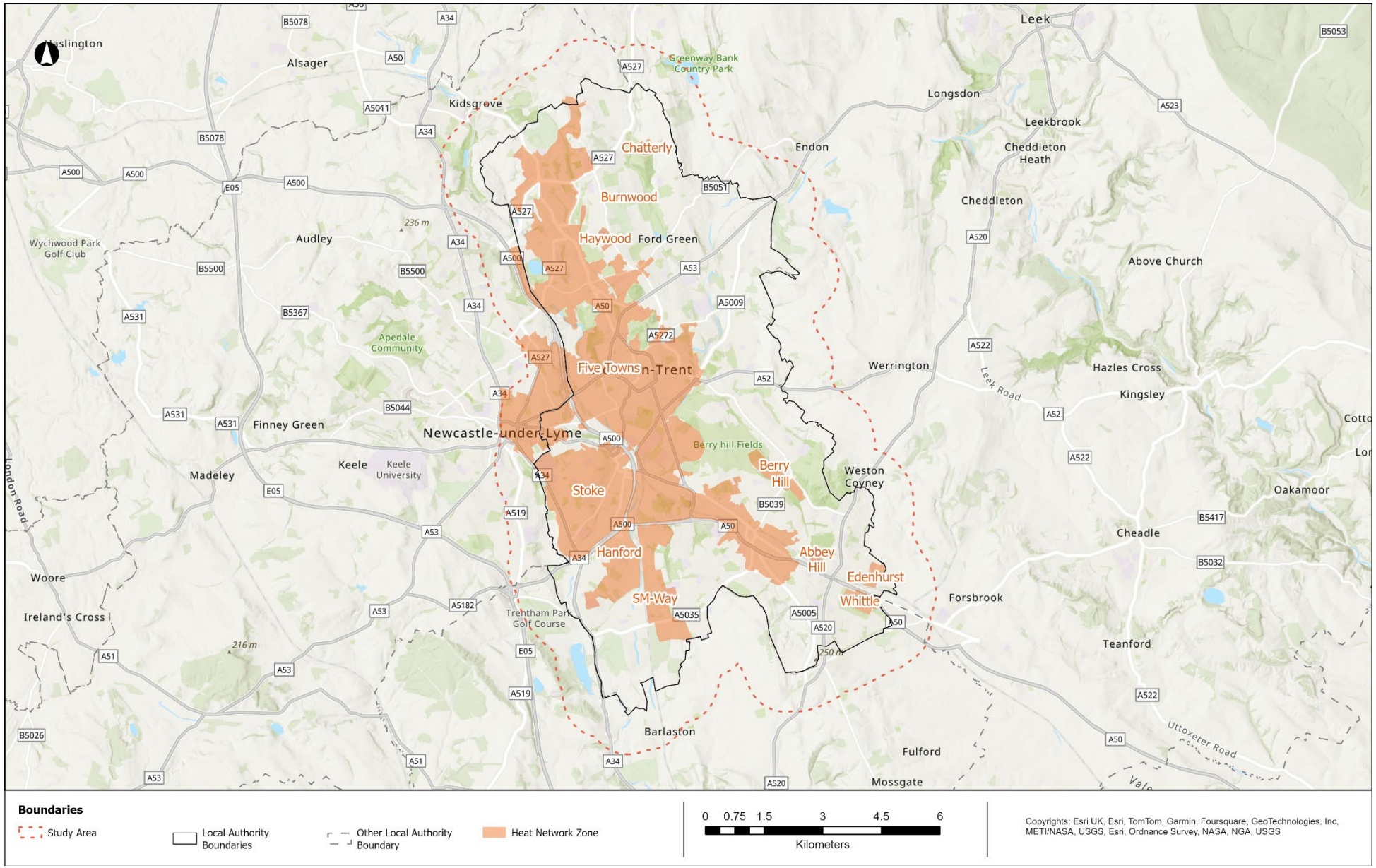
Key heat sources: Potential heat sources include deep geothermal energy, waste heat from the ceramics industry, energy from waste, and water source heat pumps.

Estimated CapEx: The estimated capital expenditure for the full rollout of heat networks within identified zones is up to £1.2bn, of which the initial zone opportunities amount to approximately £825m.

Other heat network zones: Smaller heat network zones have been identified in Whittle, Berryhill, Haywood, Abbey Hill, Burnwood, Chatterley, and Edenhurst which could be served by large-scale heat pumps.

Carbon savings: The initial zone opportunities identified could deliver carbon savings of 125ktCO_{2e} annually.

Figure 1: Overview of Heat Network Zones in Stoke-on-Trent



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 demand in the UK 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 Stoke-on-Trent 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.

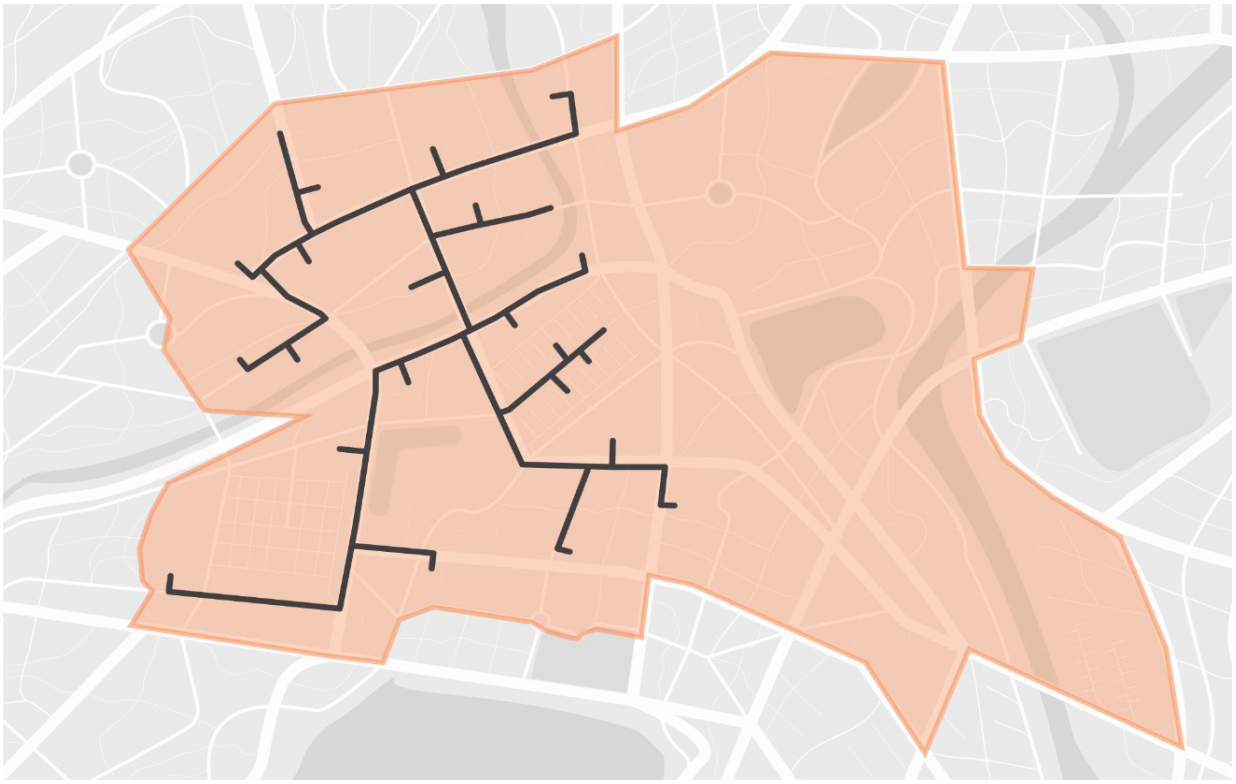
[1] More information can be found in the Heat Network Zoning Methodology Statements (Appendix 3, 4 & 5)

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 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.

Advanced Zoning Programme

The Advanced Zoning Programme (AZP) is working with 19 areas to support the construction of new zone scale heat networks as quickly as possible following the launch of heat network zoning in 2025. Amongst the programmes aims are to accelerate the delivery and construction of heat network zones; develop best practice guidance; provide project development support services; and promoting market transformation ready for the national rollout of Heat Network Zoning policy.

The programme builds upon lessons learnt from the Pilot programme and these outputs. In October 2024, DESNZ announced that ground-breaking heat network schemes in Leeds, Plymouth, Bristol, Stockport, Sheffield, and two more in London will receive prioritised support to advance to construction by the end of 2026.

AZP uses the latest zoning methodology (i.e. developed after the Pilot programme) and has undertaken further detailed development work with local stakeholders to further improve confidence and accuracy. The programme may also have applied local strategic and commercial considerations and therefore the opportunities may differ slightly from those presented here, using a national standardised approach. Where there is overlap, AZP studies should be considered more appropriate for use than the outputs from this Pilot programme.

2) Stoke-on-Trent Heat Networks Context

2.1) Stoke-on-Trent City Overview

The city of Stoke-on-Trent is situated within the county of Staffordshire, in the West Midlands region of England. It is a unitary local authority, covering 93km² and six towns - Tunstall, Burslem, Hanley, Stoke-upon-Trent, Fenton, and Longton, with a population of about 257,000.

Known as "The Potteries", the ceramics industry is central to Stoke-on-Trent's economic, social, and cultural identity. Its strategic location, enhanced by a network of canals and transport links, bolsters its prominence in ceramics and other modern industries.

Committed to environmental and economic progress, Stoke-on-Trent City Council (SoTCC) declared a Climate Emergency in 2019 and aims to be Net Zero by 2050. Its Corporate Strategy outlines six priorities: economic growth, education, health, housing, transport, and sustainability to ensure a resilient future[3]. The Stoke-on-Trent & Staffordshire City Deal furthers these goals, enhancing infrastructure and supporting business to drive regional growth[4]. Stoke-on-Trent's transition from a ceramics-centric to a diversified economy highlights its adaptability and commitment to sustainable development[5].

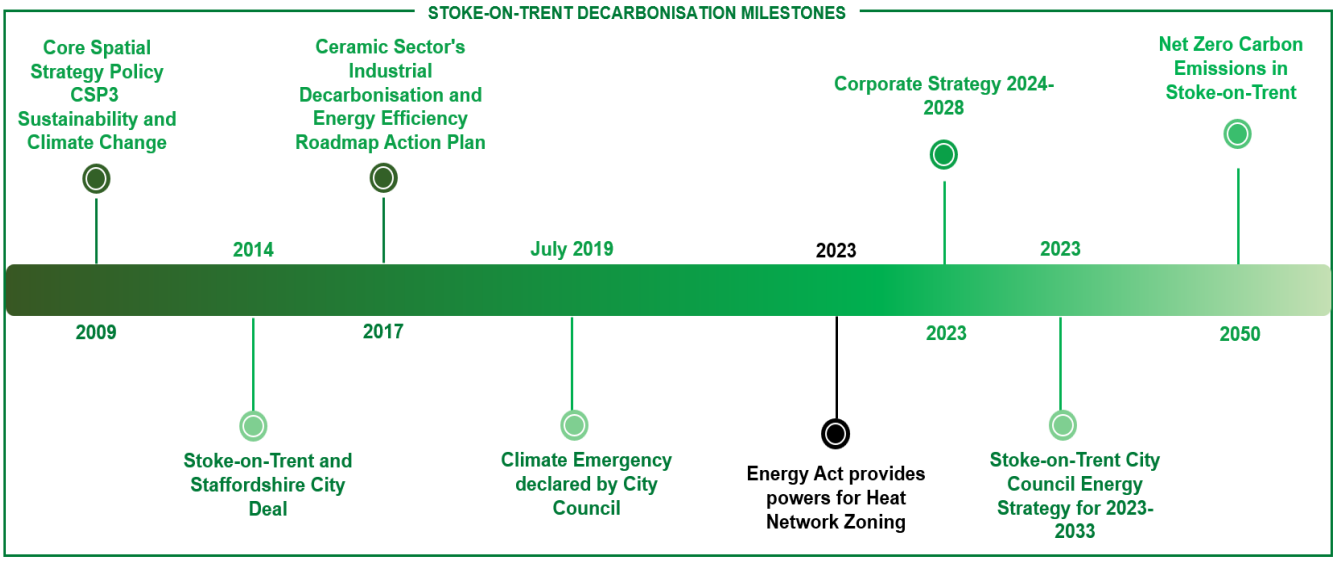
Stoke-on-Trent has one of the most economically deprived populations in the UK. It is ranked second highest for fuel poverty out of 151 local authorities (LA) in the UK based on 2019 data, with 21.8% of households in fuel poverty - compared to 13.4% in the whole of England. There are approximately 32,000 social houses of which approximately 17,000 are owned by the local authority. Social housing in Stoke-on-Trent comprises 22% of the total housing stock, which is slightly above the national average.

2.2) Stoke-on-Trent Net Zero Targets and Commitments

On 4 July 2019, SoTCC announced a Climate Emergency, marking a significant commitment to environmental issues[6]. SoTCC aims to achieve net zero in Stoke-on-Trent by 2050, in line with the UK Government's national target. Figure 3 summarises the key dates in the Council's plans for decarbonisation and demonstrates their progress towards this target.

[3] Stoke-on-Trent City Council. (2023). Corporate Strategy 2024-2028. [online] Stoke.gov.uk. Available at: https://www.stoke.gov.uk/info/20003/your_council_your_city/632/draft_corporate_strategy_2024-2028
[4] UK Government. (2014). Stoke-on-Trent and Staffordshire City Deal. [pdf] Available at: https://assets.publishing.service.gov.uk/media/5a7c55b6ed915d3d0e87bb12/Stoke-on-Trent_and_Staffordshire_City_Deal.pdf
[5] Stoke-on-Trent City Council. (2022). Levelling Up Prospectus. [pdf] Available at: https://www.stoke.gov.uk/download/downloads/id/1898/levelling_up_prospectus.pdf
[6] Stoke-on-Trent City Council. (2019). *City Council Meeting Summons*. [pdf] Available at: https://moderngov.stoke.gov.uk/mgConvert2PDF.aspx?ID=8431&T=10

Figure 3: Stoke-on-Trent Decarbonisation Milestones



The 2009 Core Spatial Strategy Policy for Stoke-on-Trent outlines the city's long-term development goals. It serves as a guiding framework for sustainable growth and urban planning initiatives within the area. Priority 4 focuses on transforming the city into a leader in green energy and environmental sustainability.

The 2014 Stoke-on-Trent and Staffordshire City Deal aims to launch the UK's first major low-carbon heat network tapping into local natural resources. It targets enhancing the advanced manufacturing and ceramics sectors, along with the budding energy and renewables industry, to fuel sustainable growth.

In 2017, the Department for Business, Energy & Industrial Strategy (BEIS) issued the Ceramic Sector Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan[7]. This plan proposes methods to decarbonise and enhance energy efficiency in the ceramic industry, aiming to boost its sustainability and market competitiveness. This includes measures such as 'waste' heat recovery, potentially enabling the sale of recovered heat to heat networks.

The Corporate Strategy for Stoke-on-Trent, 2024-2028, outlines objectives for economic development, education, health, urban regeneration, transport, and sustainability. It seeks to turn the city into a resilient, inclusive, and environmentally friendly community for the future. The recent SoTCC Energy Strategy for 2023-2033 presents a vision and action plan for the next decade. It focuses on reducing energy use and carbon emissions, aligning with a net zero target of 2050. This strategy offers a detailed plan for upcoming years to meet this target.

Heat networks are pivotal in Stoke-on-Trent's decarbonisation efforts, considered essential for cutting emissions, increasing energy security, and strengthening the city's economic resilience.

[7] Department for Business, Energy & Industrial Strategy. (2017). Ceramic Sector - Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan. [online] Available at: https://assets.publishing.service.gov.uk/media/5a81fedbe5274a2e87dc0981/ceramics-decarbonisation-action-plan.pdf

2.3) Delivering Heat Networks in Stoke-on-Trent

Stoke-on-Trent has been actively developing a heat network programme for more than a decade. The City Deal from 2014 includes a four-phase heat network plan, covering the University Quarter, Stoke Town, Festival Park, and Hanley, with an 18km pipework backbone aimed to deliver up to 45GWh/yr of low-carbon heat to connected properties. This project, developed by SSE, has already seen the first 5km phase of the pipeline installed around the city's University Quarter. Upon completion, the SSE heat network will extend to the Hanford Energy from Waste (EfW) facility. In January 2025, SSE has been named as Stoke-on-Trent City Council's strategic energy partner for heat networks. A comprehensive Memorandum of Understanding (MoU) signed for five years aims to drive forward Stoke-on-Trent's energy strategy, focusing on decarbonisation while fostering economic growth, job creation, and skills development in the green energy sector. Under the agreement, SSE Energy Solutions and Stoke-on-Trent City Council will collaborate on mapping out the city's wider path to net zero, which could potentially encompass a range of initiatives beyond heat networks. For more information, please see Sections 3.1.2 and 3.2.2.

A variety of heat sources including deep geothermal energy, heat from the Hanford EfW, and waste heat from ceramic manufacturers are all considered. SoTCC's long-term plan to exploit deep geothermal heat has included collaboration with European experts to devise effective strategies for accessing and utilising heat. SoTCC has also partnered with commercial and public organisations such as GT Energy and the Coal Authority to conduct detailed heat source feasibility studies. Long established relationships with the ceramics industry also enhance opportunities to develop heat supply via heat recovery.

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

2.4) Stoke-on-Trent Heat Network Zones

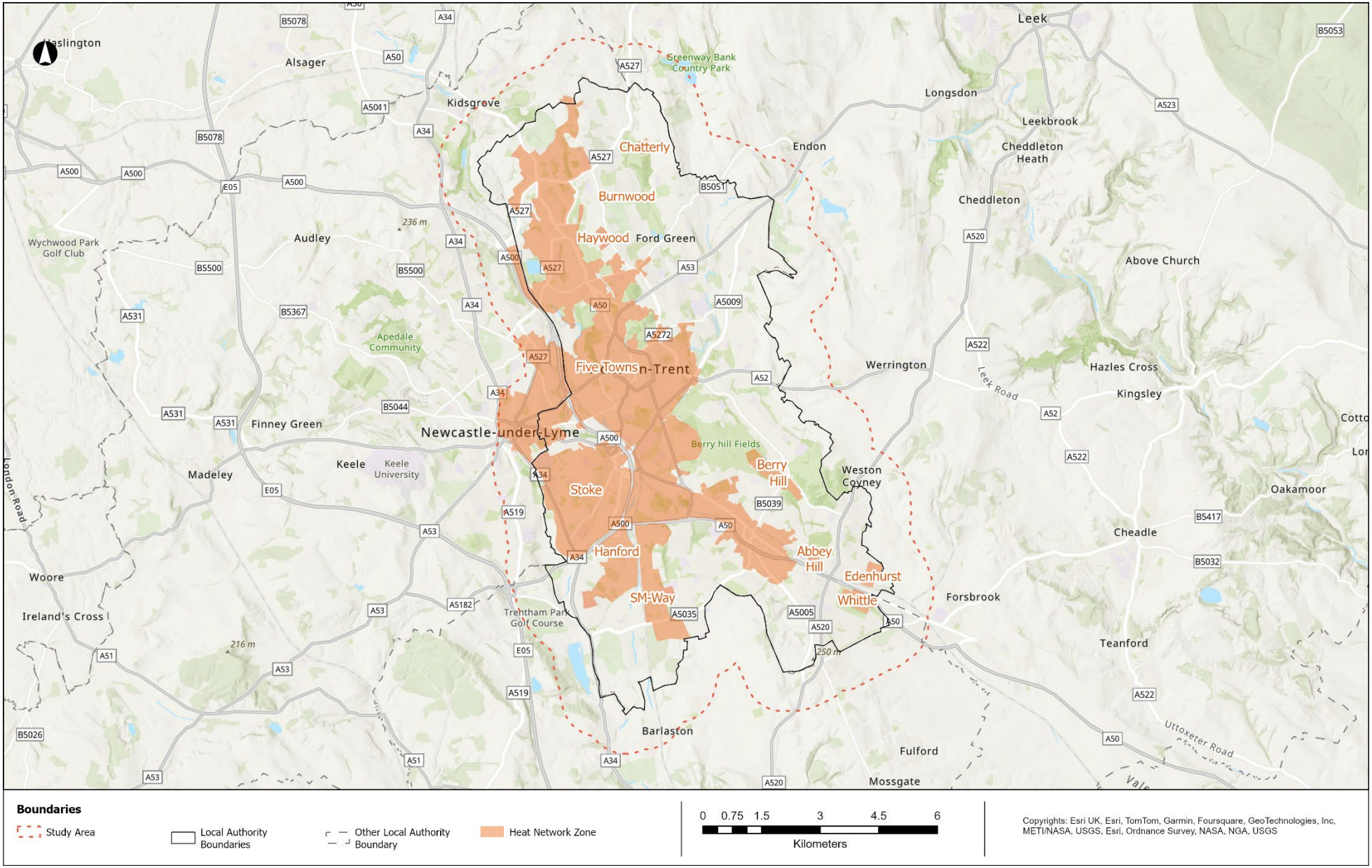
Within Stoke-on-Trent, 11 potential HNZs have been identified, with four considered Strategic HNZs. Figure 4 shows the study area boundary as well as the boundaries of all HNZs identified within Stoke-on-Trent. The HNZs have been allocated a meaningful name agreed as relevant from a local perspective and these are all shown on the map.

Please see Appendix 1 for the following maps which provide 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 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.
- G: Coal Mine Water Map - shows area where coal mine water may be a possible heat source.

Figure 4: Heat Network Zones Identified within the Stoke-on-Trent Study Area



3) Strategic Heat Network Zones

Strategic HNZs in Stoke-on-Trent

This section examines the strategic HNZs and IZOs identified within them. This covers the key heat demands, heat sources, energy centre locations and potential constraints. 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: Annual Heat Demand for Buildings in All Zones, Strategic Zones and IZOs

Scope	Annual heat demand (GWh/yr)
All buildings within zones[8]	1,050
All buildings within strategic zones	1,000
All buildings connected to the IZOs	725

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 1.1 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.

Four Strategic HNZs were identified in Stoke-on-Trent. Figure 5 illustrates their size, alongside the key potential heat sources and the proportion of buildings that may be required to connect.

Five Towns is the largest potential zone identified by heat demand and area, located to the north of the city centre, encompassing the towns of Tunstall, Burslem, Hanley, Fenton, and Longton. It is estimated to have a heat demand of over 750GWh/yr from buildings potentially required to connect. This heat demand could be supplied principally by industrial waste heat and geothermal heat sources. For more information, please refer to Section 3.1.

Stoke is the second largest potential zone identified by heat demand and area, situated southwest of the local authority area and encompassing Stoke city centre. It has a heat demand of 130GWh/yr from buildings potentially required to connect. This includes demand

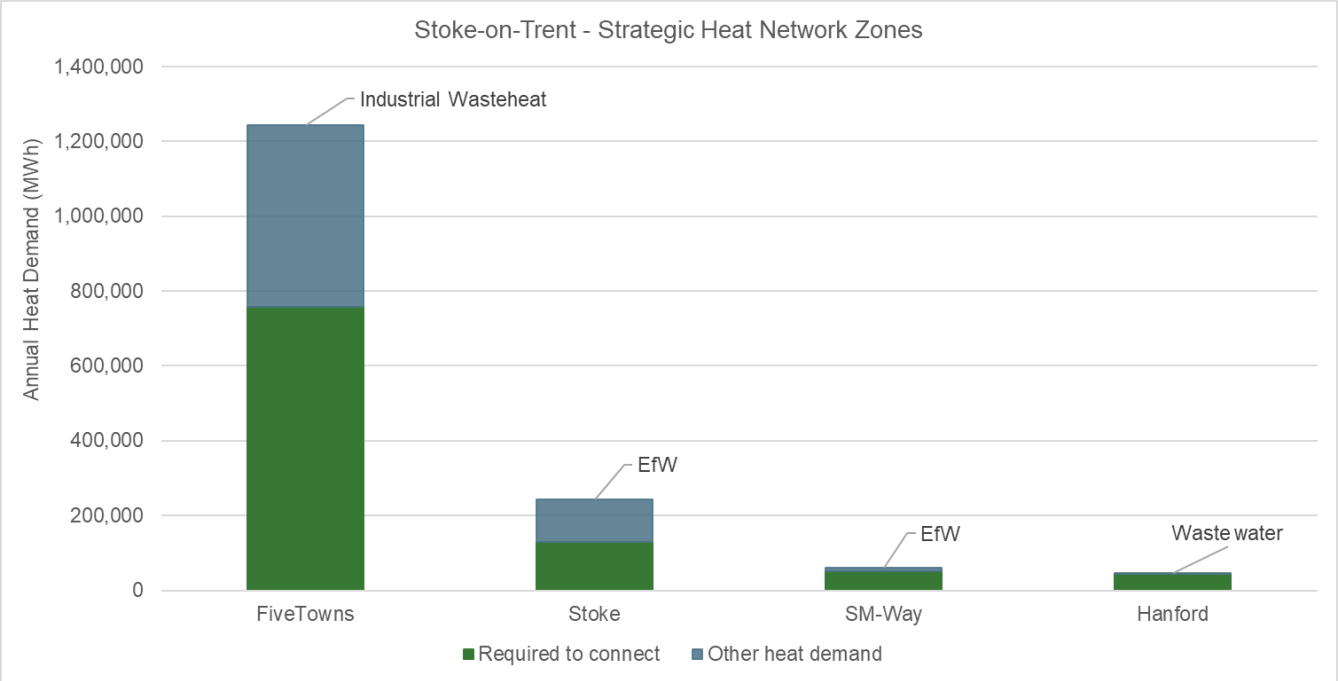
[8] Row 1 is an estimate of heat demand across buildings potentially required to connect in all zones identified. Row 2 is as per row 1, but only within strategic zones. Row 3 includes buildings connected to the IZOs described and largely comprise of buildings potentially required to connect. Figures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

from industrial sites along the River Trent's western bank, educational institutions like colleges and universities, and key public buildings such as council facilities. Potential low-carbon heat sources include the Hanford EfW and the Portmeirion ceramics manufacturer. For more information, please refer to Section 3.2.

Hanford HNZ primarily includes planned new developments, situated to the south of the local authority area, extending from Queensway in the west, to the railway line in the east. The estimated heat demand is about 45GWh/yr from buildings potentially required to connect. Within the zone lies the Hanford EfW facility. The inclusion of new developments is a crucial factor for the zone's viability. For further information, please see Section 3.3.

SM-Way HNZ, situated to the south, has substantial non-domestic and planned new development heat loads, totalling an estimated required heat demand of 50GWh/yr. The Strongford Sewage Treatment Works (STW) has been identified as a low-carbon heat source. For additional details, please refer to Section 3.4.

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



3.1) Stoke-on-Trent – Five Towns

3.1.1) Five Towns – HNZ Summary

Five Towns is Stoke-on-Trent's largest zone by both area and heat demand, as shown in Figure 4. It is located north of the city centre, spanning the A50 and covering the towns of Tunstall, Burslem, Hanley, Fenton, and Longton.

Approximately 1,500 buildings are potentially required to connect in the zone, encompassing a mix of non-domestic, residential, public-sector buildings, and new developments, with a total heat demand of about 750GWh/yr. Key low carbon heat sources which could supply the zone include geothermal heat, industrial waste heat from an EfW and the ceramics industry, and water source heat pumps (WSHPs) recovering heat from waste water treatment works (WWTW) or mine water.

Potential infrastructure constraints include the principal Manchester to London rail route, the Trent and Mersey Canal, the River Trent, and the A5271. Potential mitigations are explored in Section 3.1.7.

3.1.2) Five Towns - Existing Heat Networks

Existing and planned heat networks within Five Towns HNZ are described below and shown in Appendix 1: Map D. Early stage proposed HNs are described below but not shown on this map as their viability has yet to be established.

Existing Heat Networks

UniQ Network

In Stoke-on-Trent, the UniQ network was installed in 2016 based on a 20MW sewer source heat pump (combined with a 10MW gas-CHP as a peak- and back-up supply). The network and sources are not operational yet.

Planned Heat Networks

SSE Heat network expansion into the Stoke and Five Towns HNZs

The SSE heat network is currently operational in the Shelton area but has a three-phase expansion plan which overlaps with the Five Towns, Hanford and Stoke HNZs. The planned extension (Phase 1) overlaps with the Five Towns and Stoke HNZs will supply approximately 27GWh/yr. The main heat sources will be heat recovered from a WWTW and deep geothermal heat in the Etruria Valley.

Proposed Heat Networks

The following heat network development schemes are in early HN development stages of master-planning and feasibility. Hence, they are not shown on Map D as no confirmed plans on network routing have been established.

SSE Heat network

In addition to the Phase 1 planned extension described above, a further two phases of heat network development are in early-stage planning, overlapping with the Five Towns, Hanford, and Stoke HNZs. These are envisaged to meet additional heating and cooling demands of 38GWh/yr and 6GWh/yr for Phases 2 and 3, respectively. These expansions will enable the SSE heat network to connect to key heat demands including the Royal Stoke University Hospital, Waterworld, and the Sixth Form College.

Advanced Zoning Programme:

Since 2024 Stoke has been a participant city in the DESNZ Advanced Zoning Programme (AZP). Initial work under AZP defined a study area smaller than the strategic HNZ originally identified under the Pilot Programme, after reviewing new information, including updated data from the National Zoning Model. The AZP study area has also been expanded beyond the Stoke administrative boundary, into Newcastle-Under-Lyme.

A subsequent Zone Outline Business Case (ZOBC) was developed for expansion from an already planned heat network, led by SSE. In January 2025, SSE was named as the City's strategic energy partner for heat networks. The SSE scheme is currently completing commercialisation and is anticipated to achieve financial close shortly. Further zone scale expansions are assumed to utilise the same primary low carbon supply source: a planned replacement Energy Recovery Facility (ERF), the 'new Hanford ERF', which is anticipated to offer up to 60MWth supply capacity. Information contained within the ZOBC will contain a more up-to-date accurate representation of planned heat networks in the area.

3.1.3) Five Towns - Initial Zone Opportunities

Two discrete IZOs were identified in the Five Towns zone. Potential routing[9] is shown in Figure 6 and Figure 7, and summary statistics are provided in Table 2.

Table 2: Five Towns - Summary Statistics for Initial Zone Opportunities[10]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~ £575m	~500GWh/yr	~75km	>85ktCO_{2e}/yr	7.3MWh/m	Deep geothermal, waste heat and WSHPs

Five Towns North IZO covers the area north of Grange and Sneyd Park. Two heat demand clusters have been identified in this area: the Burslem cluster and the Tunstall cluster. In total, these clusters represent a heat demand of around 225GWh/yr. To fulfil this demand multiple

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

heat sources are required. Residual heat from the ceramics industry such as Johnson Tiles, Middleport Ceramics, and Steelite Ceramics, potentially could provide approximately 10 MWp each. SoTCC has conducted a study at one of the major ceramic tableware manufacturers. It concluded that heat recovered from the site could be used as a source of heat for district heating. The network has a length of approximately 40km and an estimated CapEx of around £300m.

Five Towns South IZO encompasses the city centre and the Fenton industrial estate, forming two primary clusters of the heat network. Along with new developments, the heat demand is about 275GWh/yr. Deep geothermal heat has been identified as the preferred heat source. The network length is approximately 35km and an overall estimated CapEx of around £275m.

Figure 6: Initial Zone Opportunities in Five Towns HNZ – Five Towns North IZO

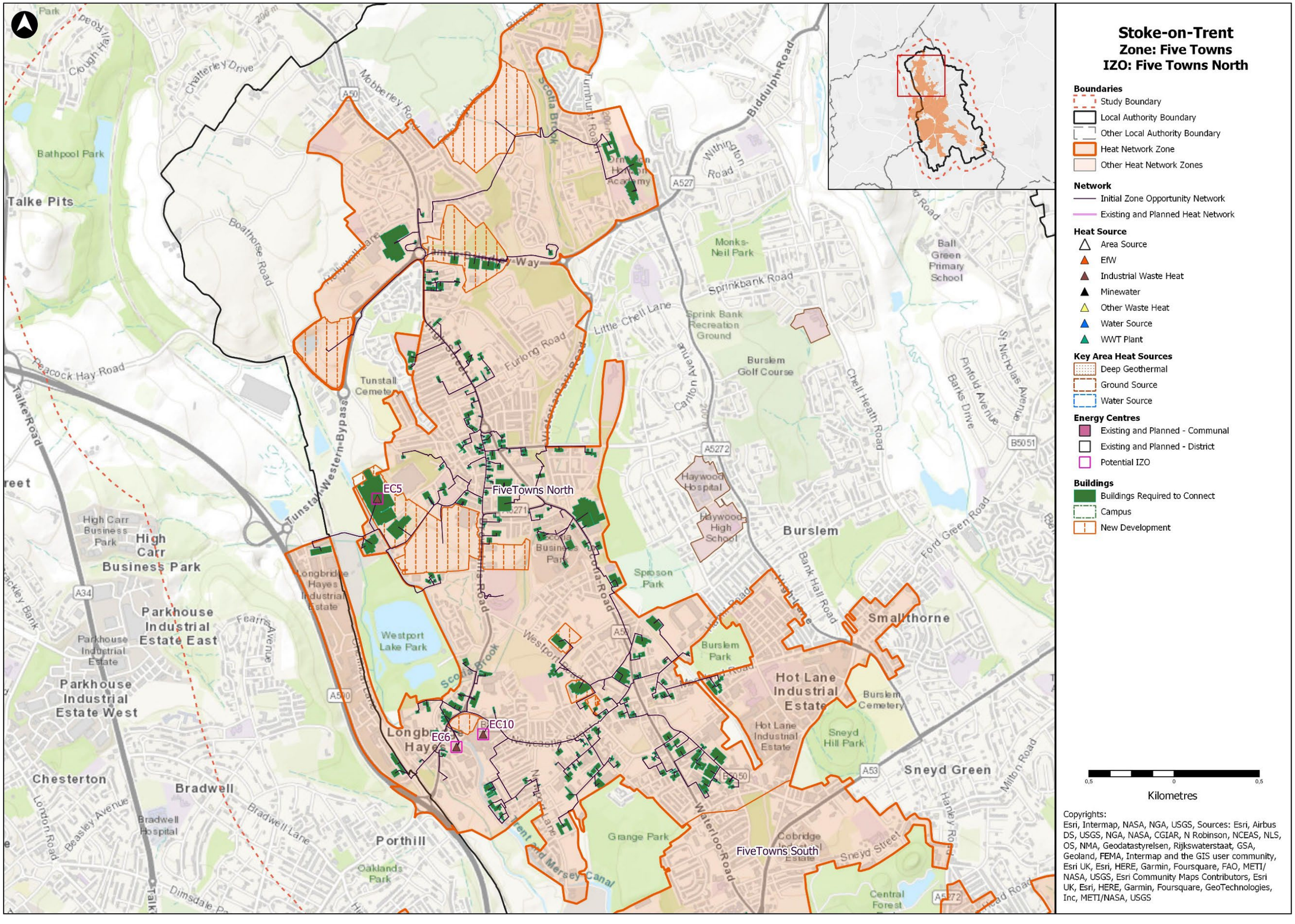
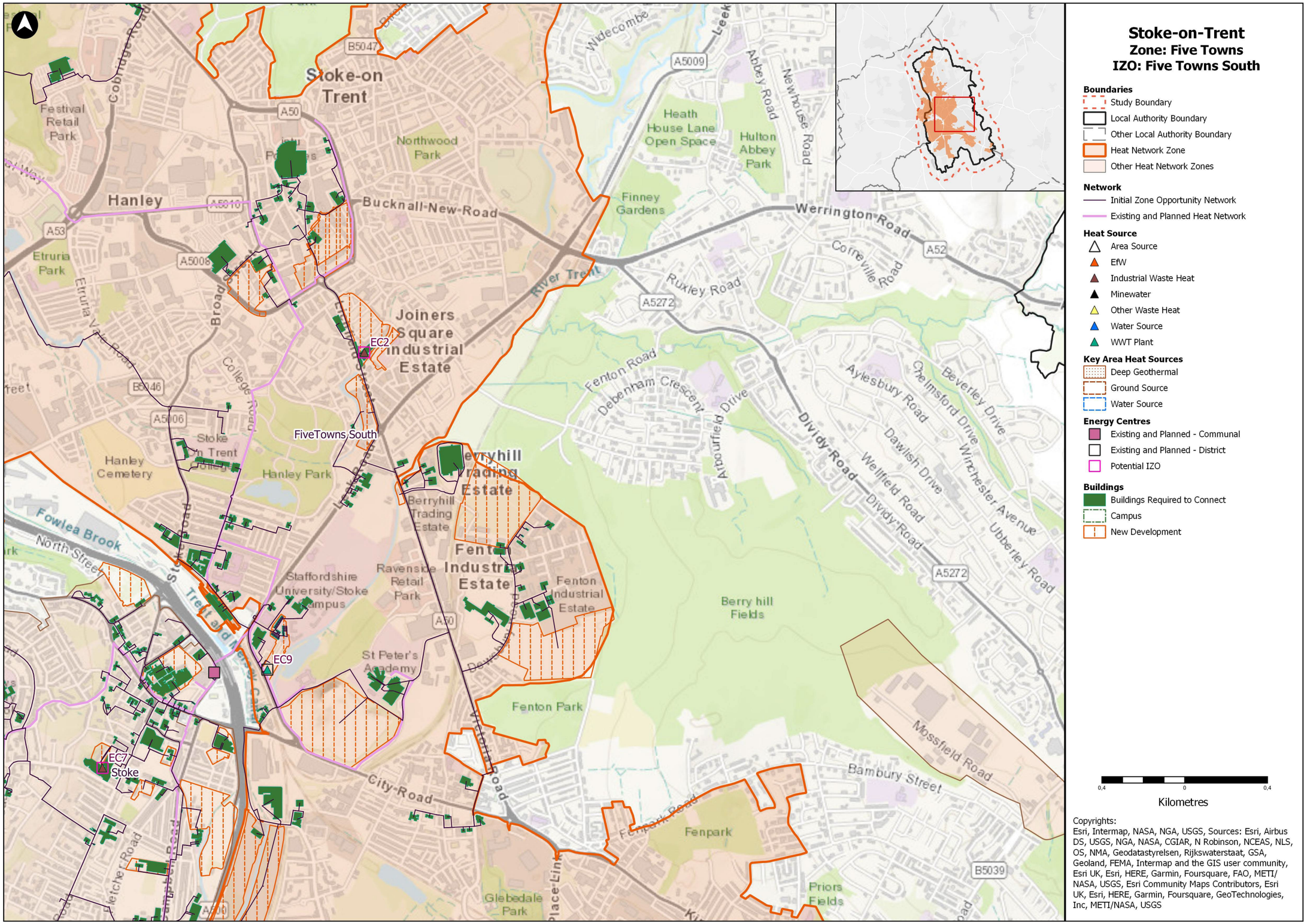


Figure 7: Initial Zone Opportunities in Five Towns HNZ – Five Towns South IZO



3.1.4) Five Towns – IZO Heat Demands

The heat demands identified 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.

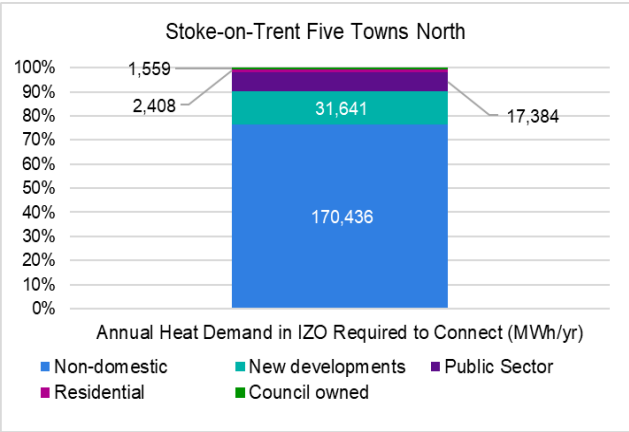
Where there are different values between datasets, the methodology prioritised the use of the early prototype version of the National Zoning Model, for consistency. This has led to an overestimation of some commercial and light industrial heat demands presented in this report. Large anchor loads that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

Five Towns has the largest heat demand of all the HNZs identified within Stoke-on-Trent, predominantly compromised of non-domestic heat loads. A breakdown of the categorisation of heat demand connected to the two IZOs can be found in Figure 8. Further details of the key buildings potentially required to connect are provided in Table 3. The largest of the public building heat loads identified is The University of Staffordshire.

Over 70% of the heat demand connected to the **Five Towns North IZO** are buildings within the non-domestic loads category, including industrial buildings. More than 10% of the heat demand comes from new development areas.

Over 60% the heat demand connected to the **Five Towns South IZO** are buildings within the non-domestic loads category. More than 10% of the heat demand comes from residential heat loads which may be required to connect as they have communal heating systems.

Figure 8: Five Towns - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZOs



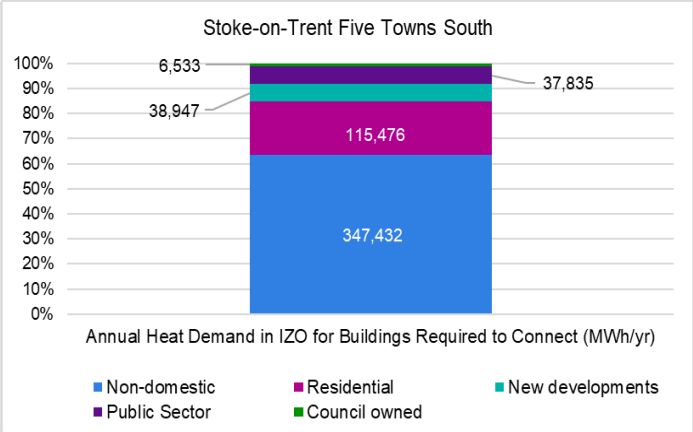


Table 3: Five Towns - Key Heat Demands Potentially Required to Connect in IZOs[11]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Five Towns North				
Johnson Tiles (Valley Works)	Non-domestic	1	12,400	Benchmark (NZM)
Quarry Cottage	New Development (Non-domestic)	Unknown	10,500	Pilot Methodology
Steelite International Ltd	Non-domestic	1	8,100	Benchmark (NZM)
Chatterley Valley (Area 1 & 2)	New Development (Non-domestic)	4	6,700	Benchmark (NZM)
Shell Warehouse (200 Scotia Rd)	Non-domestic	1	5,000	Benchmark (NZM)
Marlborough Works High Street	Non-domestic	1	4,900	Benchmark (NZM)
Wedgwood Works	Non-domestic	1	4,400	Benchmark (NZM)
Matalan Retail LTD.	Non-domestic	1	3,100	EPC
Dimensions Leisure Complex	Non-domestic	1	2,400	DEC
Asda Superstore Woodland Street	Non-domestic	1	1,700	Benchmark (NZM)
Five Towns South				
Hanley Indoor Market	Non-domestic	356	12,600	Benchmark (NZM)
Etruria Valley Phase 3a & 3b, Forge Lane Etruria	New Development (Non-domestic)	Unknown	11,300	Pilot Methodology
Fenton Quarry	New Development (Non-domestic)	Unknown	8,300	Pilot Methodology

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

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Land at Clough Street (Including CFS 12)	New Development (Non-domestic)	Unknown	7,700	Pilot Methodology
Berryhill Pottery	New Development (Non-domestic)	Unknown	6,300	Pilot Methodology
Fuchs Lubricants UK Plc	Non-domestic	1	4,700	Benchmark (NZM)
University of Staffordshire (Leek Rd Site)	Public Sector	4	5,300	DEC
University of Staffordshire (College Rd Site)	Public Sector	6	4,300	DEC
Brown McFarland LTD, Ladywell Works	Non-domestic	1	4,200	Benchmark (NZM)
Regent Works	Non-domestic	1	3,300	Benchmark (NZM)

3.1.5) Five Towns – IZO Heat Sources

Various low-carbon heat sources have been identified in the Five Towns zone. Waste heat from the Hanford EfW and ceramic industry can provide low-carbon heat for the heat network. In addition, deep geothermal wells could provide sources of heat to connect the substantial number of buildings potentially required to connect.

Table 4 and Table 5 in this section summarise the key heat sources and potential energy centre locations identified. These are also shown in the zone-level maps in Section 3.1.3 above and on the city-level Maps C and G in Appendix 1.

Table 4: Five Towns - Key Heat Source Opportunities for the IZOs

Heat source type	Supplied Capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
WSHP Mine water	10,000	>10 ºC	EC1

Heat source type	Supplied Capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
Waste Heat			
Hanford EfW	60,000	120 ºC[12]	EC4
Emma Bridgewater	10,000	>20 ºC	EC2
Wade Ceramics	10,000	>20 ºC	EC11
Middleport Ceramics	10,000	>20 ºC	EC6
Steelite Ceramics	10,000	>20 ºC	EC10
Johnson Tiles	10,000	>20 ºC	EC5
Deep geothermal			
Etruria Valley	42,000	95 ºC[13]	EC3

Table 5: Five Towns - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)[14]	Ownership	Heat Source
EC1	Industrial area	230	Chatterley Whitfield	WSHP - Mine water
EC2	Industrial area	150	SoTCC	Waste heat
EC3	Industrial area	1,260	Etruria Valley	Deep geothermal
EC4	Industrial	1500	MES Environmental Ltd	Waste heat
EC5	Industrial area	150	Johnson Tiles	Waste heat
EC6	Industrial area	150	Middleport	Waste heat
EC10	Industrial area	150	Steelite	Waste heat
EC11	Industrial area	150	Wade Ceramics	Waste heat

[12] The temperature at which existing energy centre plant supplies heat to heat offtakers
[13] The temperature at which existing energy centre plant supplies heat to heat offtakers
[14] The assumptions used for determining the energy centre size have been based on the following: Boiler Plant: 10-15 m² per MW, CHP Plant: 15-25 m² per MW, Biomass Plant: 20-30 m² per MW, Heat Recovery from the Ceramic Industry: 12-18 m² per MW, Geothermal Plant: 25-35 m² per MW, Mine Water: 18-28 m² per MW, Waste Heat Recovery from Waste Water: 15-20 m² per MW. These assumptions account for space requirements for the boiler area, heat pump, CHP area, fuel storage, buffer tanks, and ancillary areas.

3.1.6) Five Towns – 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 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 6 shows the network statistics including the network length and associated cost. Please see Appendix 5 for related methodology statements and assumptions.

The waste heat sources identified to supply the **Five Towns North IZO** are distributed along the western part the zone. The heat is transported from the three waste heat sources along the A53, which serves as a backbone, connecting the entire network. In this area, among other heat loads, the Greenhead Works and Surestart Children's Centre are connected. The network then extends northward, connecting the Quarry Cottage New Development and other existing buildings.

The **Five Towns South IZO** originates from the heat sources found south of the city centre and west of the river Trent. From there one branch of the network stretches out to the city centre. Another branch is routed to the south connecting the Fenton Industrial area and key loads such as new development site Fenton Quarry. This branch also connects the university campus area including the student housing and extends to connect to the deep geothermal well in Etruria Valley.

Table 6: Five Towns - Indicative Heat Network Statistics for the IZOs

IZO Heat Network description	Network length (km)	Network cost (£m)
Five Towns	75	220

3.1.7) Five Towns – IZO Key Constraints and Mitigations

Five Towns North IZO:

[C14] Canal crossing: It will be crucial to find a crossing over the Trent and Mersey canal as there are heat loads and sources on both sides of the canal. It is assumed that the A5271 could be used for this purpose. Stakeholder engagement with the relevant highways agency and a detailed options analysis and feasibility study will be needed to determine the most cost-effective crossing point.

[C10, C11] Railway crossing: To serve the Queensway industrial estate heat loads, it is assumed that the network could cross the railway line at the Longport station. Stakeholder engagement with Network Rail and a detailed options analysis and feasibility study will be needed to determine the most beneficial crossing point.

Five Towns South IZO:

[C2] Railway crossing: Within Hyde Park Industrial estate, it is that a crossing over the Crewe to Derby local railway route will use Whieldon Road Bridge. Stakeholder engagement with Network Rail and the relevant highways agency would be required, and a detailed feasibility study would be needed to establish the availability of space on the bridge sufficient to carry the HN pipework.

[C3] Canal crossing: The IZO intersects with major infrastructure around the Seven Arches viaduct, Trent and Mersey Canal, River Trent and major roads including the A52. Stakeholder engagement with the Canals and Rivers Trust and the relevant highways agency would be required, and further detailed feasibility work would be required to assess optimal crossing routes.

3.2) Stoke-on-Trent - Stoke

3.2.1) Stoke – HNZ Summary

Stoke is the second-largest heat network zone identified in the study boundary in terms of area and heat demand. The zone is located to the west of the study boundary and primarily covers Stoke town, as shown in Figure 4.

The area has a significant non-domestic and public sector heat demand, which could be supplied by waste heat sources including EfW and other industrial sources. Potential constraints include the A500 (Queensway), and the River Trent. Potential mitigations are explored in Section 3.2.7.

3.2.2) Stoke - Existing Heat Networks

The planned SSE heat network runs through this zone. This network is described in Section 3.1.2 above and so not repeated here.

3.2.3) Stoke – Initial Zone Opportunity

A single IZO was identified in the HNZ. Potential routing[15] is shown in Figure 9 and summary statistics provided in Table 7.

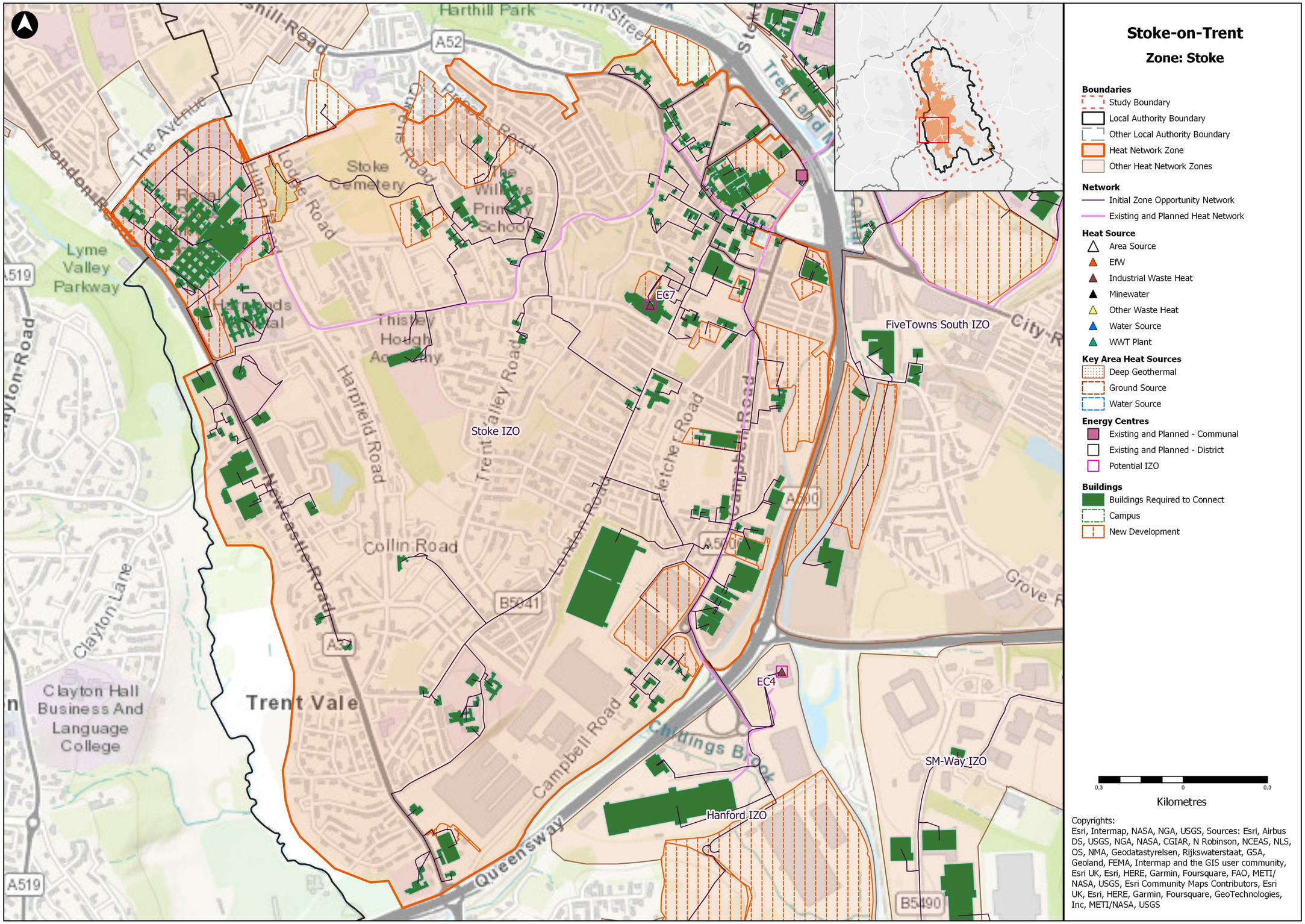
Table 7: Stoke - Summary Statistics for Initial Zone Opportunities[16]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£175m	>125GWh/yr	>30km	~25ktCO_{2e}/yr	4.2MWh/m	EfW

The area includes a substantial public and non-domestic heat demand of over 125GWh/yr. This includes, industrial sites located on the western side of the River Trent, as well as colleges, universities, and council buildings. The Hanford EfW plant, with a capacity of 60MW, along with the Portmeirion ceramics manufacturer, which can potentially contribute 10MW of waste heat, have the potential to supply all the buildings potentially required to connect in the zone. The network length is approximately 30km with an overall estimated CapEx of around £175m.

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

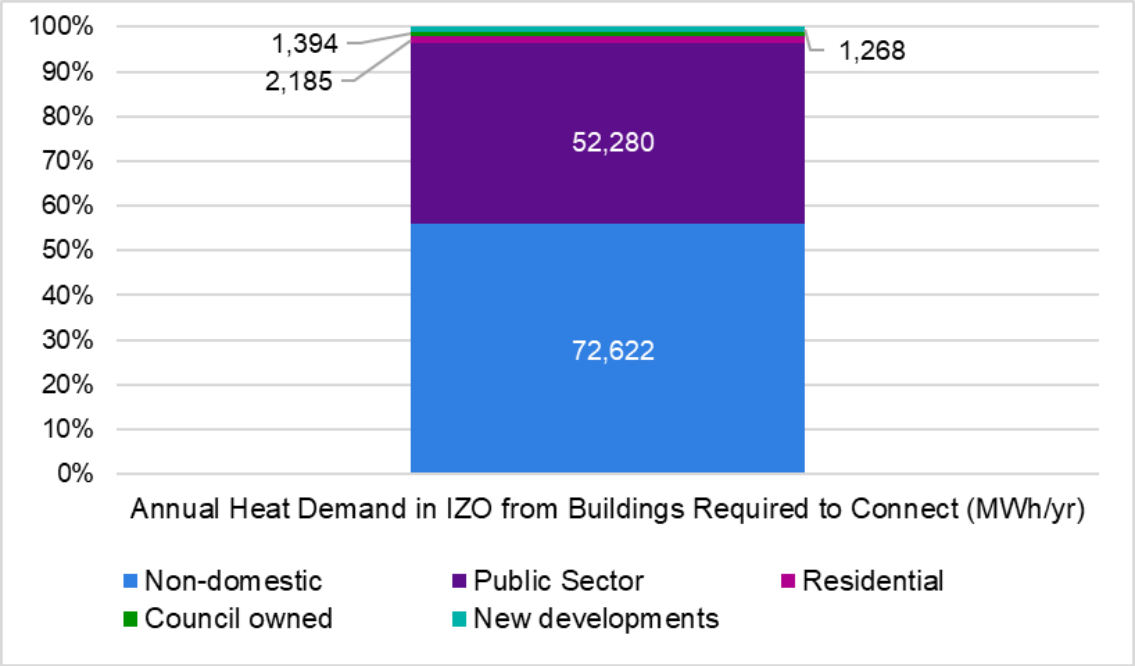
Figure 9: Initial Zone Opportunity in Stoke HNZ



3.2.4) Stoke – IZO Heat Demands

The estimated annual heat demand is over 125GWh/yr. A breakdown of the categorisation of heat demand can be found in Figure 10. Non-domestic and public sector heat loads dominate the heat demand connected, accounting for 95% of the total load. The remainder of the demand is from council-owned buildings, new developments, and residential buildings with communal heating systems.

Figure 10: Stoke - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



Further details of the key heat demand for buildings potentially required to connect are provided in Table 8. The largest heat demand identified is the Royal Stoke University Hospital. Other key heat demands include the Spode Works shopping centre, Harplands Hospital and commercial and industrial buildings.

Table 8: Stoke - Key Heat Demands Potentially Required to Connect in the IZO[17]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Royal Stoke University Hospital	Public Sector	68	54,500	ERIC
Spode Works	Council-owned	92	4,900	Benchmark (NZM)
Manor Bakeries LTD	Non-domestic	2	4,200	Benchmark (NZM)
Portmeirion Group UK LTD	Non-domestic	1	4,100	Benchmark (NZM)
Dunelm Distribution Warehouse	Non-domestic	1	3,200	EPC
Harplands Hospital	Public Sector	1	3,100	ERIC
Sainsburys Limited	Non-domestic	1	2,000	Benchmark (NZM)
Meighs Castings Limited	Non-domestic	1	1,400	Benchmark (NZM)
MClub Spa and Fitness	Non-domestic	1	1,300	Benchmark (NZM)
Tesco Superstore	Non-domestic	1	1,200	Benchmark (NZM)

3.2.5) Stoke – IZO Heat Sources

The primary heat source identified is the Hanford EfW facility, with a capacity of 60MW. Additional waste heat can be sourced from the Portmeirion ceramics manufacturer which is assumed to have a capacity of 10MW.

Table 9 and Table 10 summarise the key heat sources and potential energy centre locations identified. These are also shown in the zone-level map in Figure 9 in Section 3.2.3 above and on the city-level Map C in Appendix 1.

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

Table 9: Stoke - Key Heat Source Opportunities for the IZO

Heat source type	Full opportunity capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
Waste Heat Hanford EfW Portmeirion Ceramics	 60,000 10,000	 120 ºC[18] >20 ºC	 EC4 EC7

Table 10: Stoke - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)	Ownership	Heat Source
EC4	Industrial	1500	MES Environmental Ltd	Waste heat
EC7	Industrial	150	Portmeirion	Waste heat

3.2.6) Stoke – IZO Heat Distribution

A significant portion of the distribution network may run through suburban and urban areas of Stoke. It is expected to distribute heat from the proposed energy centres to the east of the zone. The network then connects to the Spode Works site, after which it forks to the south and northwest. In the south, the network connects to heat loads such as Dunelm distribution warehouse. In the north-west, it connects loads including the Royal Stoke University Hospital and Harplands Hospital.

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.

Table 11: Stoke - Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Stoke	30	75

3.2.7) Stoke – IZO Key Constraints and Mitigations

[C5] River crossing: The network would need to cross the A500 Queensway road, a major dual-carriageway, and the River Trent. The A5006 bridge crosses both the road and the river and is assumed as the crossing point. A detailed feasibility assessment to establish if the

[18] The temperature at which existing energy centre plant supplies heat to heat offtakers

bridge is suitable to carry pipework or wider options assessment for suitable alternative crossing points would be required.

[C15] Road crossing: The network is assumed to cross the A34 using an existing bridge. A detailed feasibility assessment to establish if the bridge is suitable to carry pipework or wider options assessment for suitable alternative crossing points would be required. Stakeholder engagement with the relevant highways authority would be required for both constraints, considering possible risks and impacts on road traffic through the city.

3.3) Stoke-on-Trent - Hanford

3.3.1) Hanford – HNZ Summary

The Hanford Strategic HNZ is located to the south of the city, stretching between the A500 to the west and the railway line to the east, as shown in Figure 4.

3.3.2) Hanford - Existing Heat Networks

The planned SSE heat network may extend into this HNZ in the future. This network is described in Section 3.1.2 above and so not repeated here.

3.3.3) Hanford – Initial Zone Opportunity

A single IZO was identified in the HNZ. Potential routing[19] is shown in Figure 11 and summary statistics provided in Table 12.

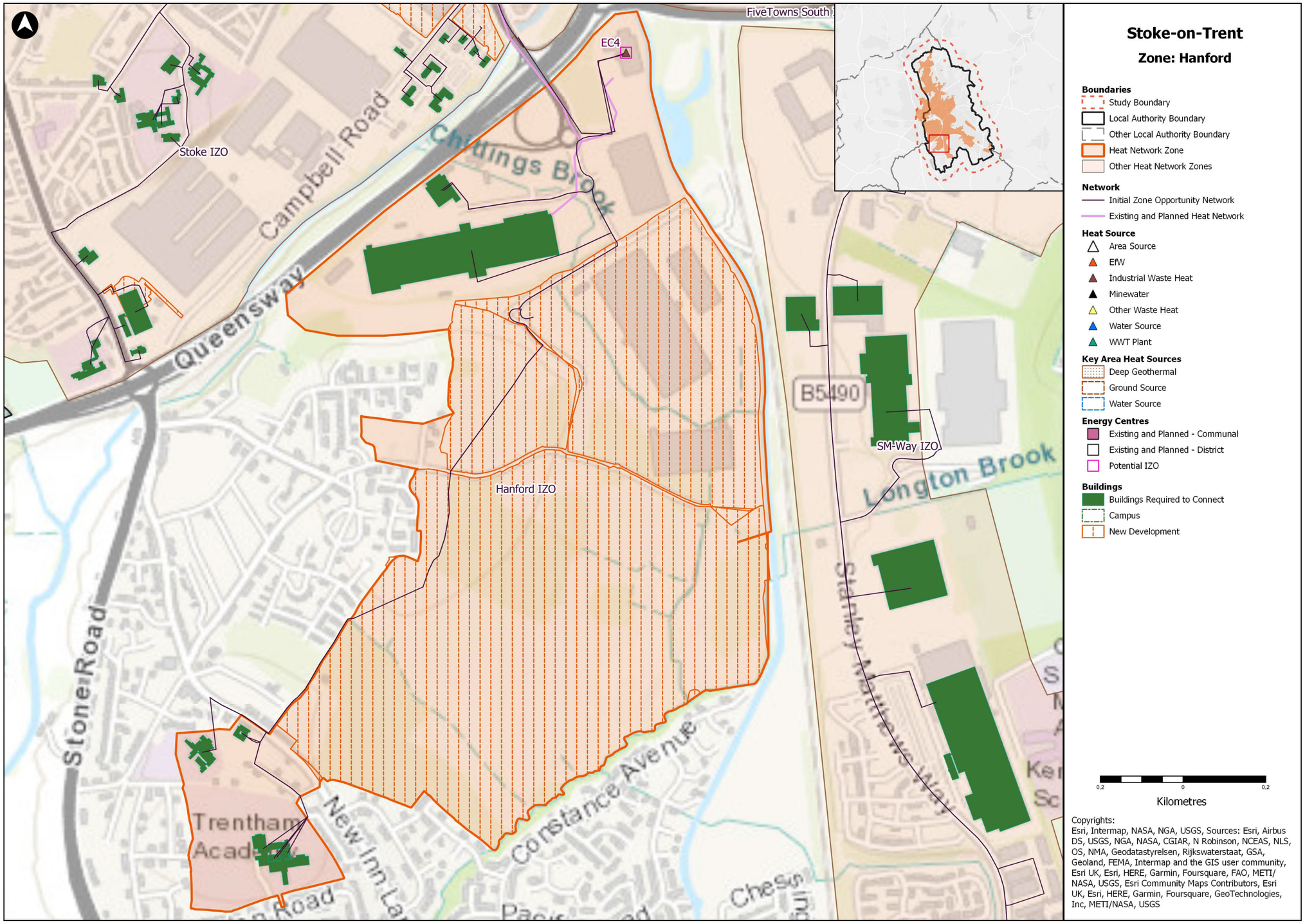
Table 12: Hanford - Summary Statistics for Initial Zone Opportunities[20]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£75m	~50GWh/yr	>30km	~10ktCO_{2e}/yr	1.4 MWh/m	EfW

The IZO connects to eleven existing buildings which have been identified as potentially required to connect, however, the majority of heat demand connected arises from two planned new commercial developments. Further work which considers more detailed information that arises as these developments progress would be required to improve confidence in the metrics provided above. The Hanford EfW located within the zone could provide low carbon heat, with a capacity of 60MW. The network is approximately 30km in length with an estimated CapEx of around £75m.

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

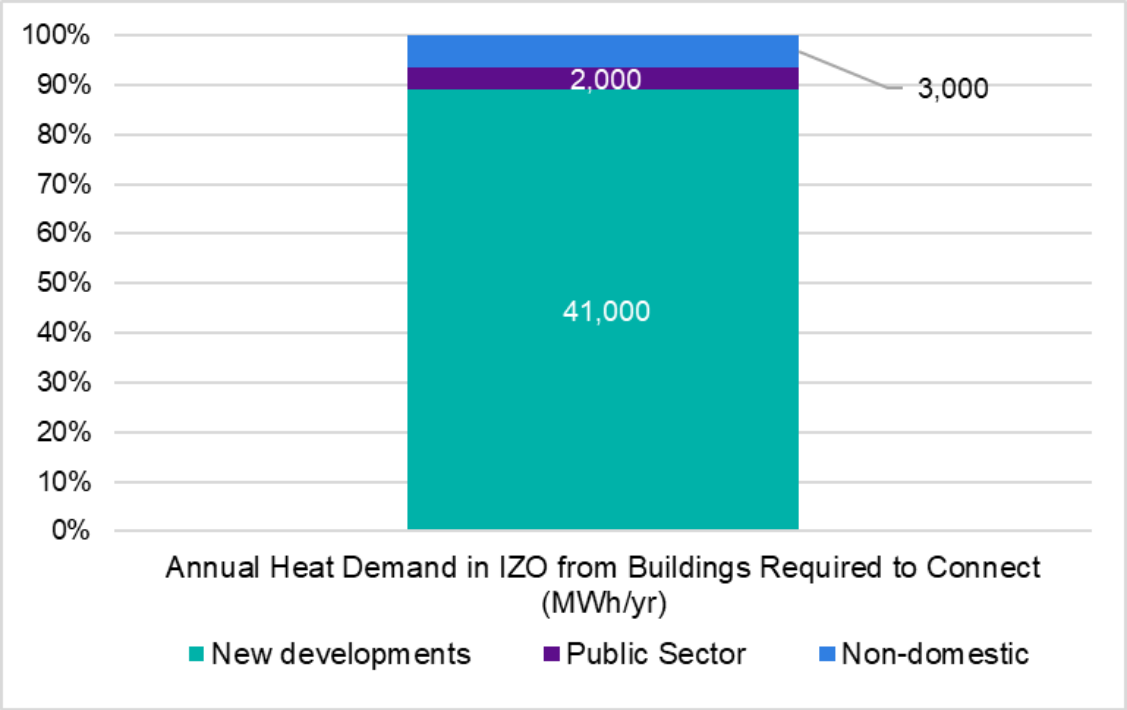
Figure 11: Initial Zone Opportunity in Hanford HNZ



3.3.4) Hanford – IZO Heat Demands

The estimated annual heat demand for the IZO is approximately 50GWh/yr. New developments constitute 90% of the total heat load connected to the IZO, as depicted in Figure 12. Existing non-domestic and public sector loads make up the remaining portion of the connected heat load.

Figure 12: Hanford - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO



Further details of the key heat demand for buildings potentially required to connect are provided in Table 13 below. The largest two loads are new developments with a combined estimated heat demand of 41GWh/yr. The southern section of the development area has been included in the 'Hanford and Trentham Neighbourhood Area' designated in 2018. A key reason for the designation was to give local influence over development rights in order to protect social spaces and environmental value. The potential for the IZO may therefore be lower[21]. Other key loads include the Trentham Academy, the Priory CofE Primary School and commercial buildings.

[21] See this for further information: https://www.stoke.gov.uk/directory_record/333388/hanford_and_trentham

Table 13: Hanford - Key Heat Demands Potentially Required to Connect in the IZO[22]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Wilson Rd, Hanford	New Development (Non-Domestic)	Unknown.	29,000	Pilot Methodology
Sideway/ Radial Park	New Development (Non-Domestic)	Unknown	12,000	Pilot Methodology
Trentham Academy	Public Sector	1	1,600	DEC
Sainsburys Power Europe Sideway	Non-domestic	1	2,000	Benchmark (NZM)
Knights BMW	Non-domestic	1	1,000	Benchmark (NZM)
Priory C Of E Primary School	Public Sector	1	400	DEC

3.3.5) Hanford – IZO Heat Sources

The Hanford EfW facility is located within this zone and is expected to serve as the primary low carbon heat source. With a 60MWp heat output and a temperature of 120°C, it presents a promising heat source.

Table 14 and Table 15 summarise the key heat sources and potential energy centre locations identified. These are also shown in the zone-level map in Figure 11 in Section 3.3.3 above and on the city-level Map C in Appendix 1.

Table 14: Hanford - Key Heat Source Opportunities for the IZO

Heat source type	Full opportunity capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
Waste Heat - Hanford EfW	60,000	120ºC[23]	EC4

[22] Please refer to Appendix 3 for definitions related to building categories in this table.
[23] The temperature at which existing energy centre plant supplies heat to heat offtakers

Table 15: Hanford - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)[24]	Ownership	Heat Source
EC4	Industrial	1,500	MES Environmental Ltd	Waste heat

3.3.6) Hanford – IZO Heat Distribution

The proposed network route originates from the Hanford EfW and could primarily supply new developments to the south of the zone. The layout for these new developments is not yet determined, but an indicative route has been identified. Further south, the IZO connects the Priory C Of E Primary School, Trentham Academy and Trentham High School.

Table 16 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.

Table 16: Hanford - Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Hanford	30	40

3.3.7) Hanford – IZO Key Constraints and Mitigations

New development uncertainty: Since these developments account for 90% of the estimated heat demand, the viability would depend upon close stakeholder engagement with the Wilson Road and Sideway / Radial Park property developers and successful negotiation of appropriate connection fees.

[24] The assumptions used for determining the energy centre size have been based on the following:
Energy from Waste (EfW): 20-30 m² per MW. These assumptions account for space requirements for the boiler area, fuel storage, buffer tanks, and ancillary areas.

3.4) Stoke-on-Trent - SM-Way

3.4.1) SM-Way – HNZ Summary

The SM-Way Strategic HNZ is located to the south of the city, stretching between the A50 to the north and the A5035 towards the south, as illustrated in Figure 4. It is separated from the Hanford HNZ by the railway line which runs from Stafford to Manchester. The zone is characterised by significant heat demands from non-domestic buildings and new developments.

3.4.2) SM-Way - Existing Heat Networks

There are no existing, planned or proposed heat networks identified in the SM-Way HNZ.

3.4.3) SM-Way – Initial Zone Opportunity

A single IZO was identified in the HNZ. Potential routing is shown in Figure 13 and summary statistics provided in Table 17.

Table 17: SM-Way - Summary Statistics for Initial Zone Opportunities[25]

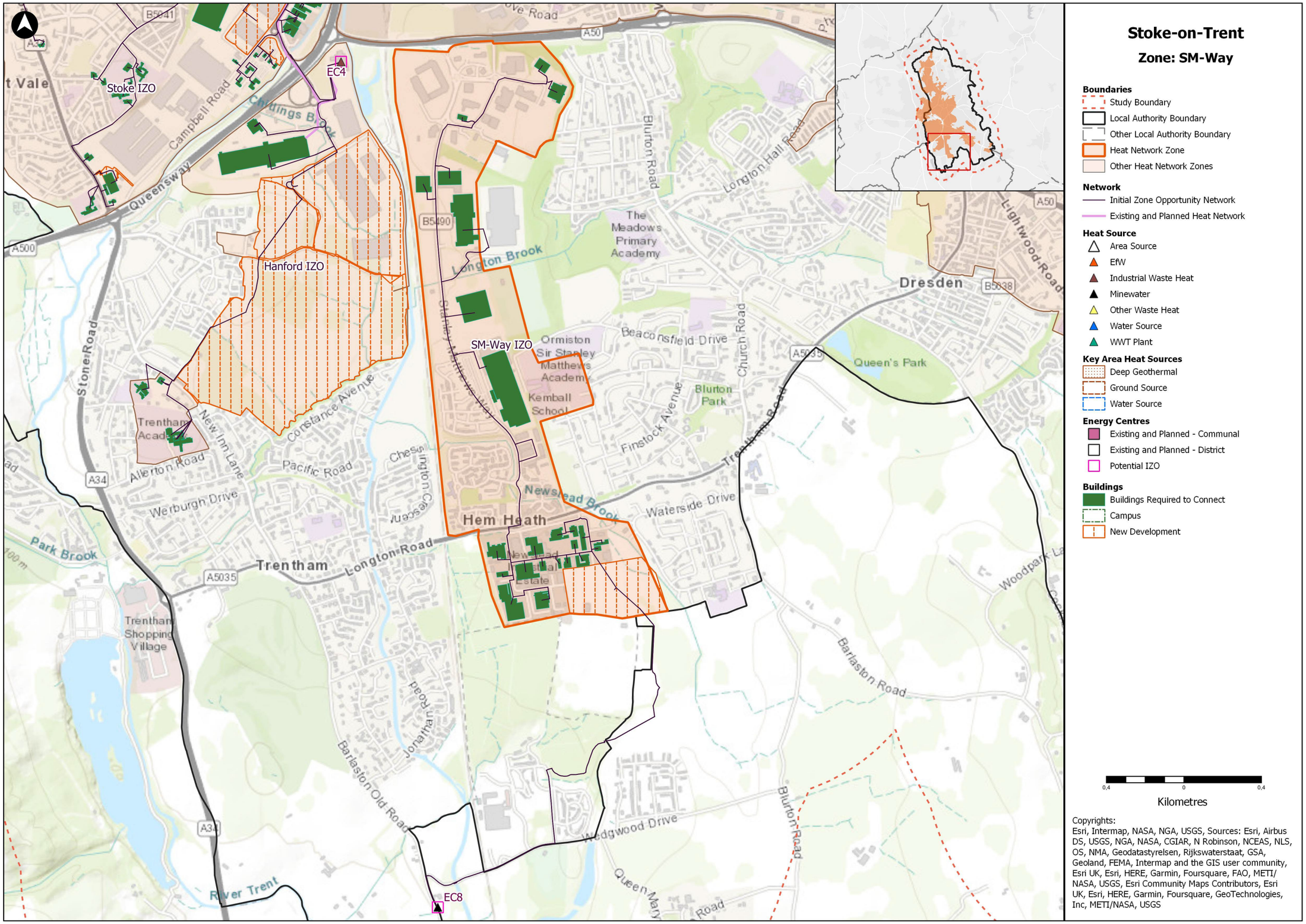
CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£50m	>50GWh/yr	14km	~10ktCO_{2e}/yr	3.7MWh/m	Strongford STW

The IZO contains major non-domestic heat loads, including significant industrial heat loads in the Trentham area, and in addition, several planned new developments. It connects 65 buildings that may potentially be required to connect with a total heat demand of approximately 50GWh/yr.

Strongford STW has been identified as the preferred low carbon heat source, with an estimated capacity in the region of 20MW. Although the STW is not immediately adjacent to the major heat loads, the proposed network route benefits from ‘soft dig’ ground which reduces construction costs. The network length is approximately 14km with an estimated CapEx of around £50m for the whole network.

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

Figure 13: Initial Zone Opportunity in SM-Way HNZ



3.4.4) SM-Way – IZO Heat Demands

The estimated annual heat demand is approximately 50GWh/yr. Around 80% of the heat demand connected comes from existing non-domestic heat loads, as seen in Figure 14. New developments and public sector buildings make up the remaining portion of the connected heat load. Further details of the key heat demand for buildings potentially required to connect are provided in Table 18.

Figure 14: SM-Way - Categorisation of Heat Demand for Buildings Potentially Required to Connect in the IZO

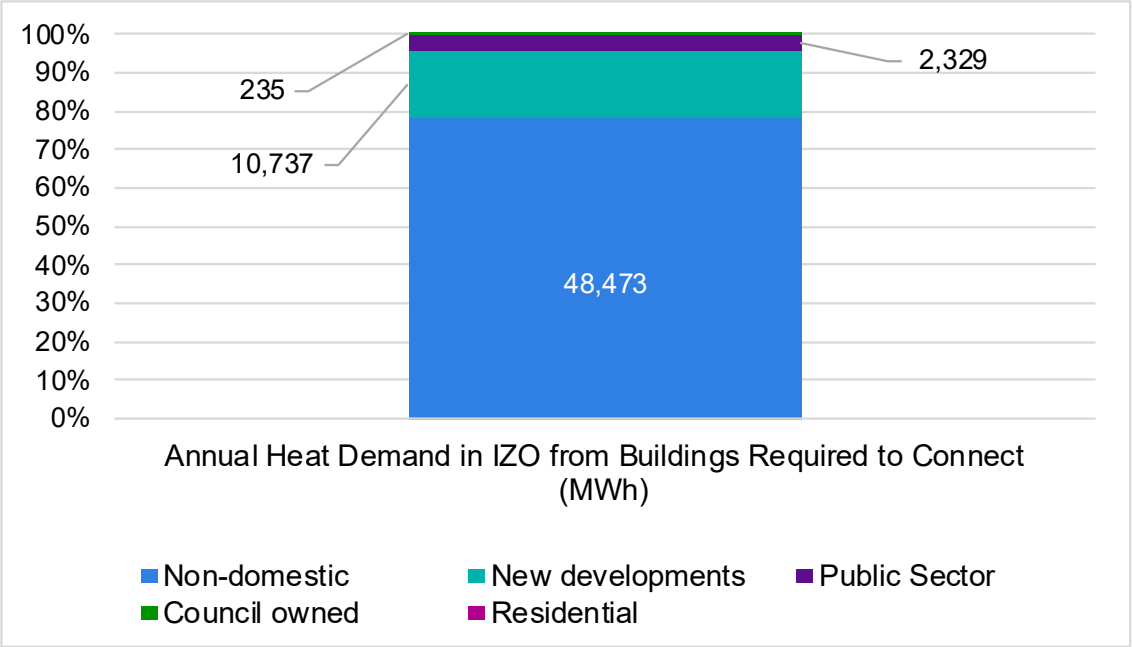


Table 18: SM-Way - Key Heat Demands Potentially Required to Connect in the IZO[26]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Newstead Trading Estate	New Development (Non-domestic)	Unknown	7,140	Pilot Methodology
Trentham Lakes North	New Development (Non-domestic)	Unknown	3,200	Pilot Methodology
Screwfix Direct Stanley Matthews Way	Non-domestic	1	4,000	Benchmark (NZM)

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

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Armitage Venesta Ltd	Non-domestic	2	4,000	Benchmark (NZM)
Autoneum GB Ltd	Non-domestic	1	3,500	Benchmark (NZM)
Pets At Home Stanley Matthews Way	Non-domestic	1	3,100	Benchmark (NZM)
Portmeirion Potteries	Non-domestic	1	3,000	Benchmark (NZM)
BFM Europe	Non-domestic	1	2,700	Benchmark (NZM)
Stairbox	Non-domestic	1	2,100	Benchmark (NZM)
Goodwin International Ltd	Non-domestic	1	2,000	Benchmark (NZM)

3.4.5) SM-Way – IZO Heat Sources

The primary heat source identified is the Strongford STW, which has an estimated capacity of 20MW. Table 19 and Table 20 summarise the key heat sources and potential energy centre locations identified. These are also shown in the zone-level map in Figure 13 in Section 3.4.3 above and on the city-level Map C in Appendix 1.

Table 19: SM-Way - Key Heat Source Opportunities for the IZO

Heat source type	Supplied Capacity (kWp)	Temperature (Degrees Centigrade)	Potential Energy Centre (Ref number)
WSHP - Strongford STW	20,000	15-20 ºC	EC8

Table 20: SM-Way - Potential IZO Energy Centre Locations

EC Ref number	Site type	Size (m^2)[27]	Ownership	Heat Source
EC8	Industrial	500	Severn Trent	WSHP - Strongford STW

[27] The assumptions used for determining the energy centre size have been based on the following:
Waste Heat Recovery from Waste Water: 15-20 m² per MW. These assumptions account for space requirements for the heat pump, peak boiler, fuel storage, buffer tanks, and ancillary areas.

3.4.6) SM-Way – IZO Heat Distribution

The heat network infrastructure is segmented into two parts: the primary section (3km) for transferring heat from the Strongford STW to the zone, and the secondary section (13km), which constitutes the distribution network within the zone to connect to the potential customers. This includes major heat loads such as Trentham Lakes North new development area, Screwfix and Autoneum. The CapEx for network construction remains relatively low due to the majority of construction being through 'soft dig' areas.

Table 21 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.

Table 21: SM-Way - Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
SM-Way	14	30

3.4.7) SM-Way – IZO Key Constraints and Mitigations

[C1] River and canal crossings: The network route involves crossing both the River Trent and the Trent and Mersey Canal and assumes that the Jonathan Road Bridge will be used for this purpose. A detailed feasibility study would be required to assess the bridge's suitability to carry the heat network and stakeholder engagement with the Canals and Rivers Trust and relevant highways agency will be required.

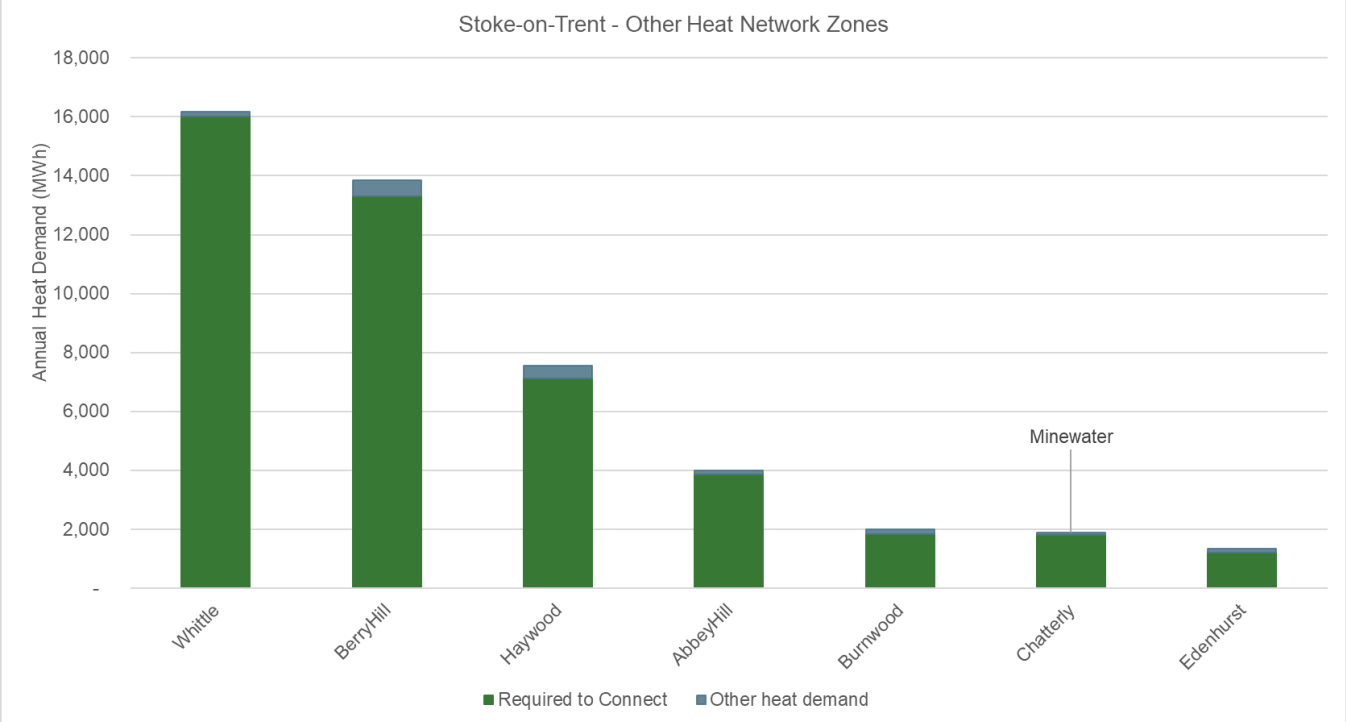
[C15] Railway crossings: The network will also need to cross the principal Manchester to London railway route, potentially using the Wedgwood Viaduct. Stakeholder engagement with Network Rail will be required to inform an options assessment and detailed feasibility assessment on the suitability of this and other potential crossing points.

4) Other Heat Network Zones

This section describes the 'Other' potential heat network zones that were identified in Stoke-on-Trent. 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 15 below 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 15: Total Heat Demand and Proportion Required to Connect in Other HNZs



Whittle: is situated in the southeast of Stoke-on-Trent. The area is dominated by buildings of commercial nature and those of new developments and contains loads such as B&Q Stoke-on-Trent, Tesco Superstore and NSI Mobile Water Solutions.

Berryhill: is situated in the east of Stoke-on-Trent. The area is dominated by buildings of commercial and industrial nature and those of new developments and contains loads such as Don-Bur Ltd, Cromartie Hobbycraft and Eden Holistic Pet Foods Ltd.

Haywood: is located in the northeast of Stoke-on-Trent. The area is characterised by its public and educational nature, containing key anchor loads such as Haywood Hospital and Haywood Academy.

Abbey Hill: is situated in the southeast of Stoke-on-Trent. The area contains educational institution buildings and new developments and includes buildings such as Abbey Hill School and College Stoke on Trent Longton Meir.

Burnwood: is situated in the southeast of Stoke-on-Trent. The area is dominated by educational buildings and contains loads such as Burnwood Community School.

Chatterley: is situated in the northeast of Stoke-on-Trent. The area is dominated by new developments. A notable aspect of this HNZ is the presence of Chatterley Whitfield Colliery as one of the potential extraction points for mine water, which might serve as a low-carbon heat source for a heat network.

Edenhurst: is situated in the southeast of Stoke-on-Trent. The area contains educational institutions and new developments and includes buildings such as Central Civil Supplies, Crescent Children Centre, and The Crescent Academy.

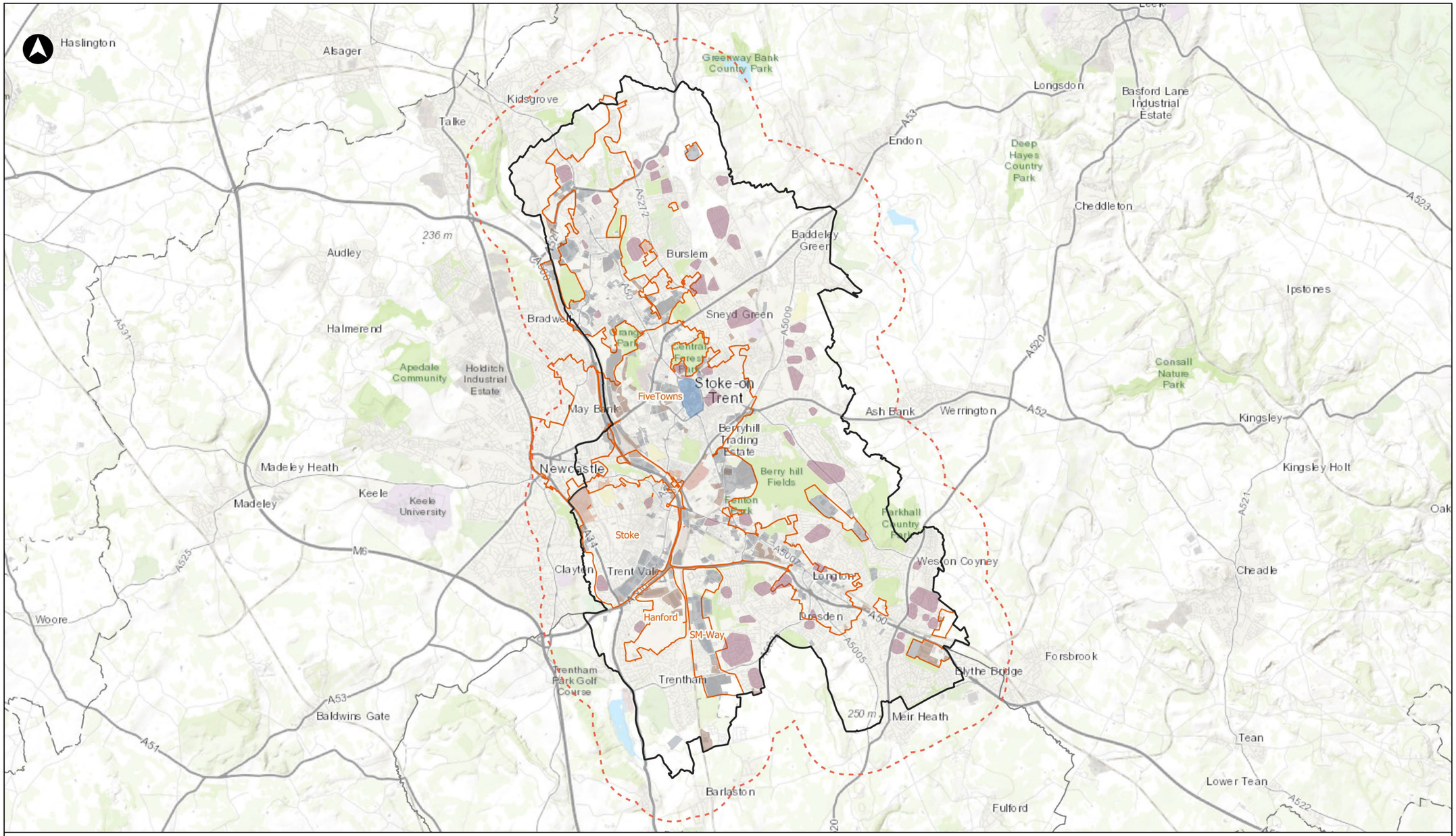
Appendix 1: Maps and Legends

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

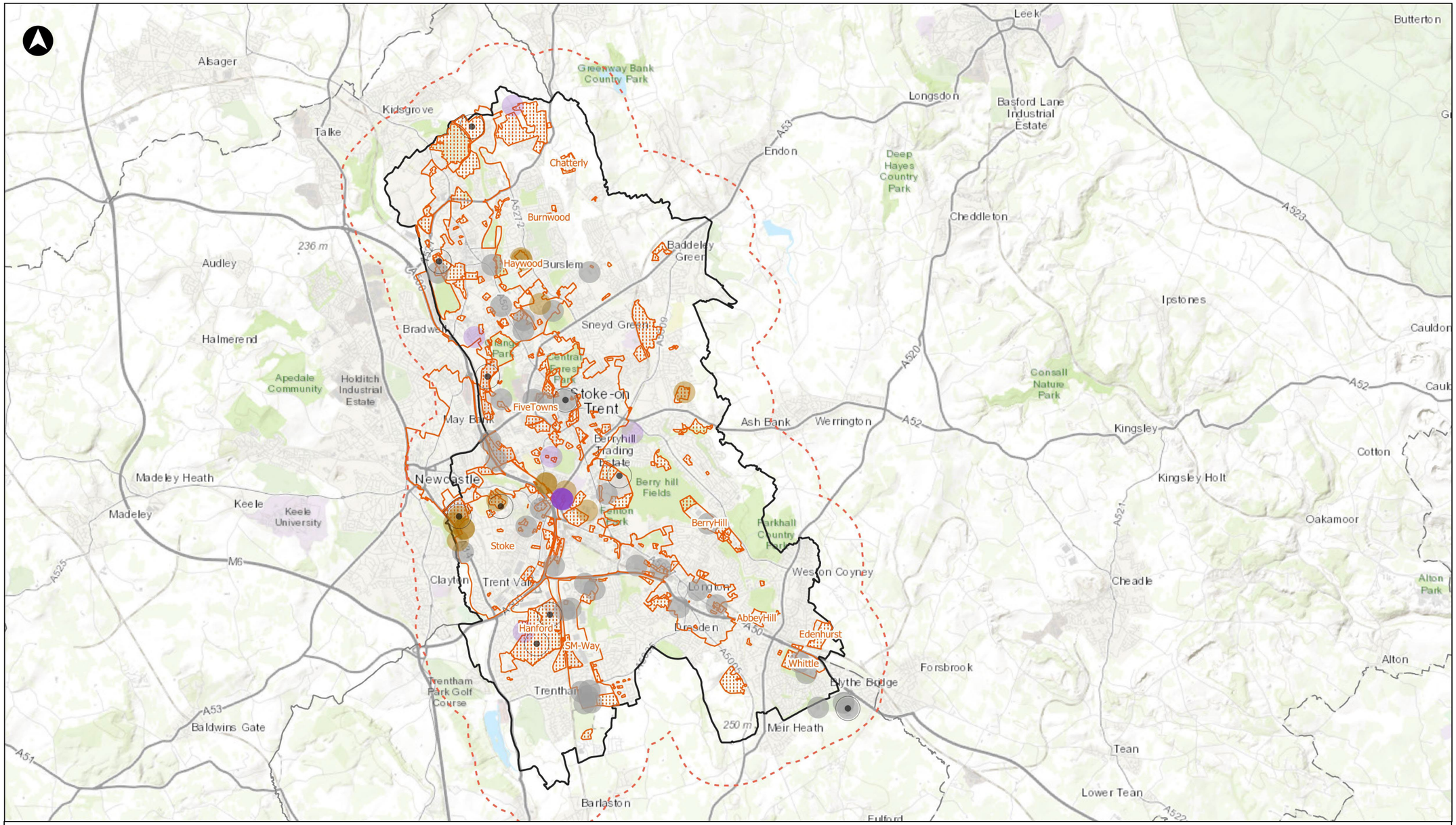
Legend / icon	Relevant map(s)	What this represents on the map	Comments on interpretation
	Report maps	Study boundary	Extends 1km beyond Local Authority boundary to include cross boundary opportunities
	Report maps	Local Authority boundary	
	Report maps	Other Local Authority boundary	
	Report maps	Heat 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. Stoke-on-Trent Typology Map



B. Key Heat Demands



Boundaries
- Study Boundary
- Local Authority Boundary
- Other Local Authority Boundary
- Heat Network Zones
- New Developments

Key Heat Demand
- Local authority loads
- Other public sector loads
- Residential with communal heating
- Non-domestic private buildings
- Industrial
- Top 10 heat demands

Heat Demand (MWh/Year)
- 100 - 200
- 200 - 400
- 400 - 600
- 600 - 1000

4 0 4
Kilometres
Scale: 1:80,000

Coordinate System: OSGB36 / British National Grid

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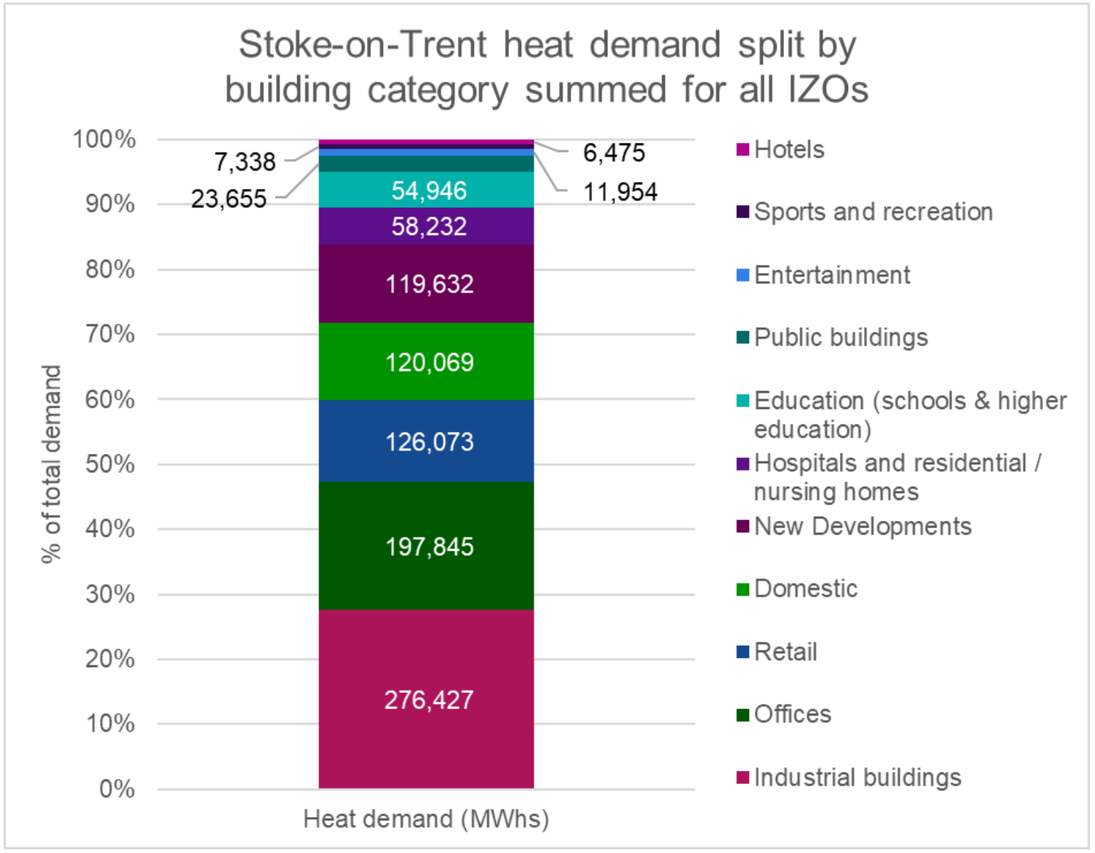
Map B

Key Heat Demand

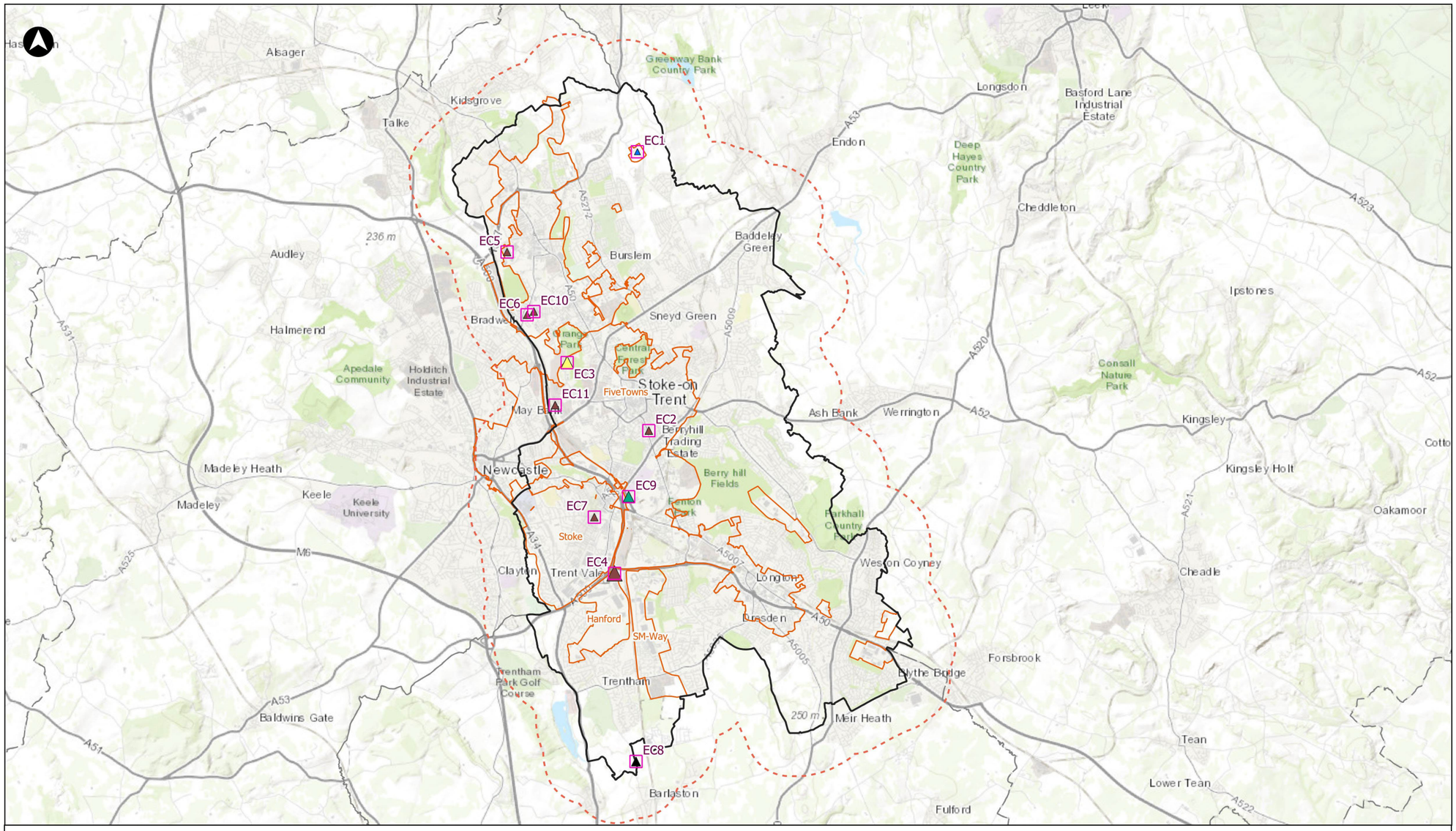
Table 22: Heat Demand split further by Building Categories across all Initial Zone Opportunities Identified in Strategic HNZs in the Study Area

Building category (based on CIBSE)	Number of Required to Connect Buildings in this category	Annual Heat Demand across Strategic HNZs (MWh)
Domestic	59	120,069
Education (schools & higher education)	87	54,946
Entertainment	20	11,954
Hospitals and residential / nursing homes	57	58,232
Hotels	11	6,475
Industrial buildings	471	276,427
Offices	435	197,845
Public buildings	86	23,655
Retail	288	126,073
Sports and recreation	21	7,338
New Developments	32	119,632
Totals	**1,567**	**1,002,647**



Note: In Stoke-on-Trent, there are four Strategic HNZs with a total of 5 IZOs identified across them. The table and graph above summarise the heat demand for buildings required to connect to the IZOs.

C. Key Heat Sources and Potential Energy Centres



Boundaries
- Study Boundary
- Local Authority Boundary
- Other Local Authority Boundary
- Heat Network Zones

Key Area Heat Sources
- Deep Geothermal
- Ground Source
- Water Source

Heat Source
- Area Source
- EfW
- Industrial Waste Heat
- Minewater
- Other Waste Heat
- Water Source
- WWT Plant

Capacity (GWh/year)
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8

Energy Centres
- Potential IZO

2 0 2
Kilometres
Scale 1:80,000
Coordinate System: OSGB36 / British National Grid

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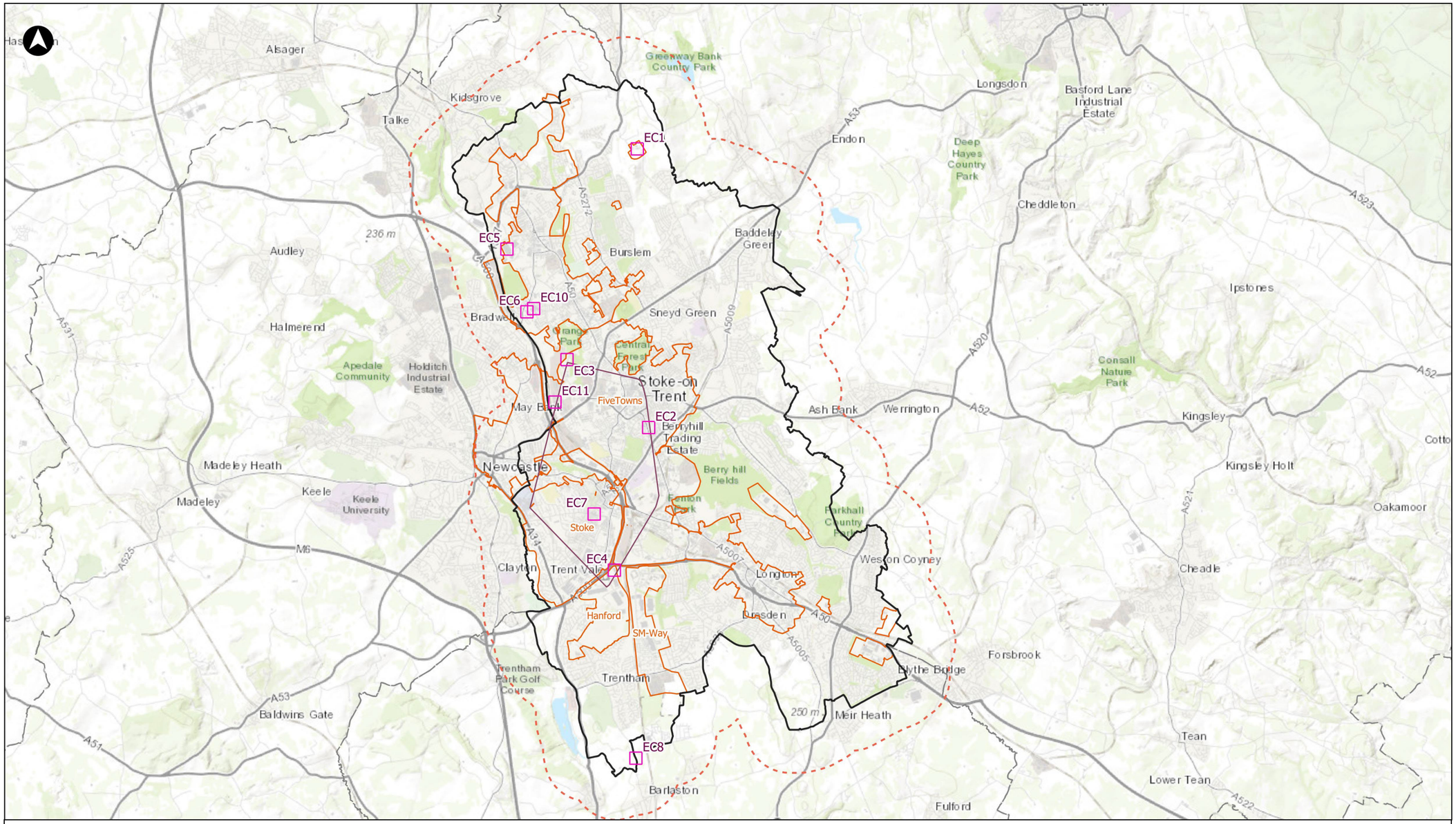
Map C

Key Heat Sources and Energy Centres

D. Existing and Planned Heat Networks



Boundaries
- Study Boundary
- Local Authority Boundary
- Other Local Authority Boundary
- Heat Network Zones

Existing and Planned Heat Networks

Energy Centres
- Potential IZO site

4 0 4
Kilometres
Scale 1:80,000
Coordinate System: OSGB36 / British National Grid

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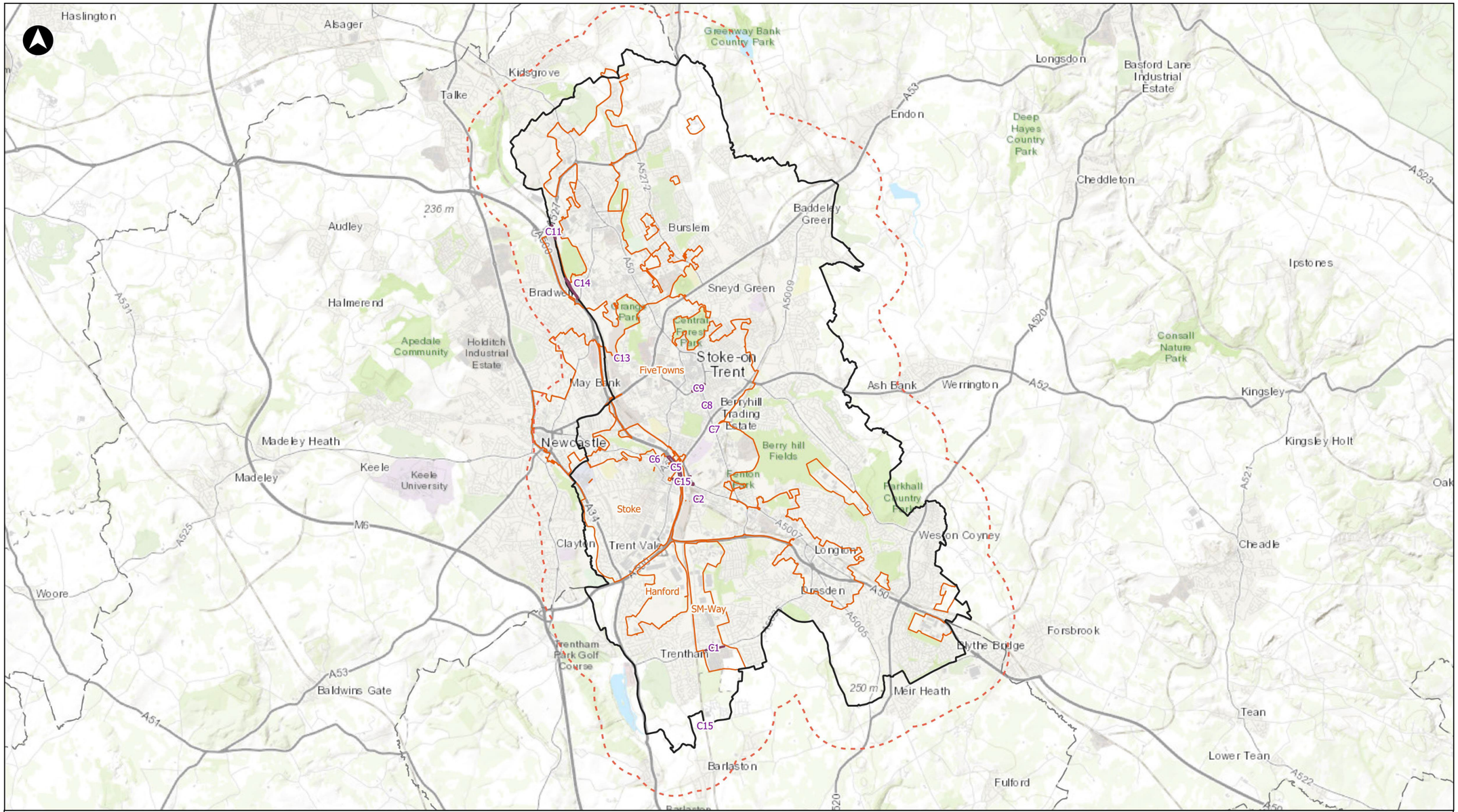
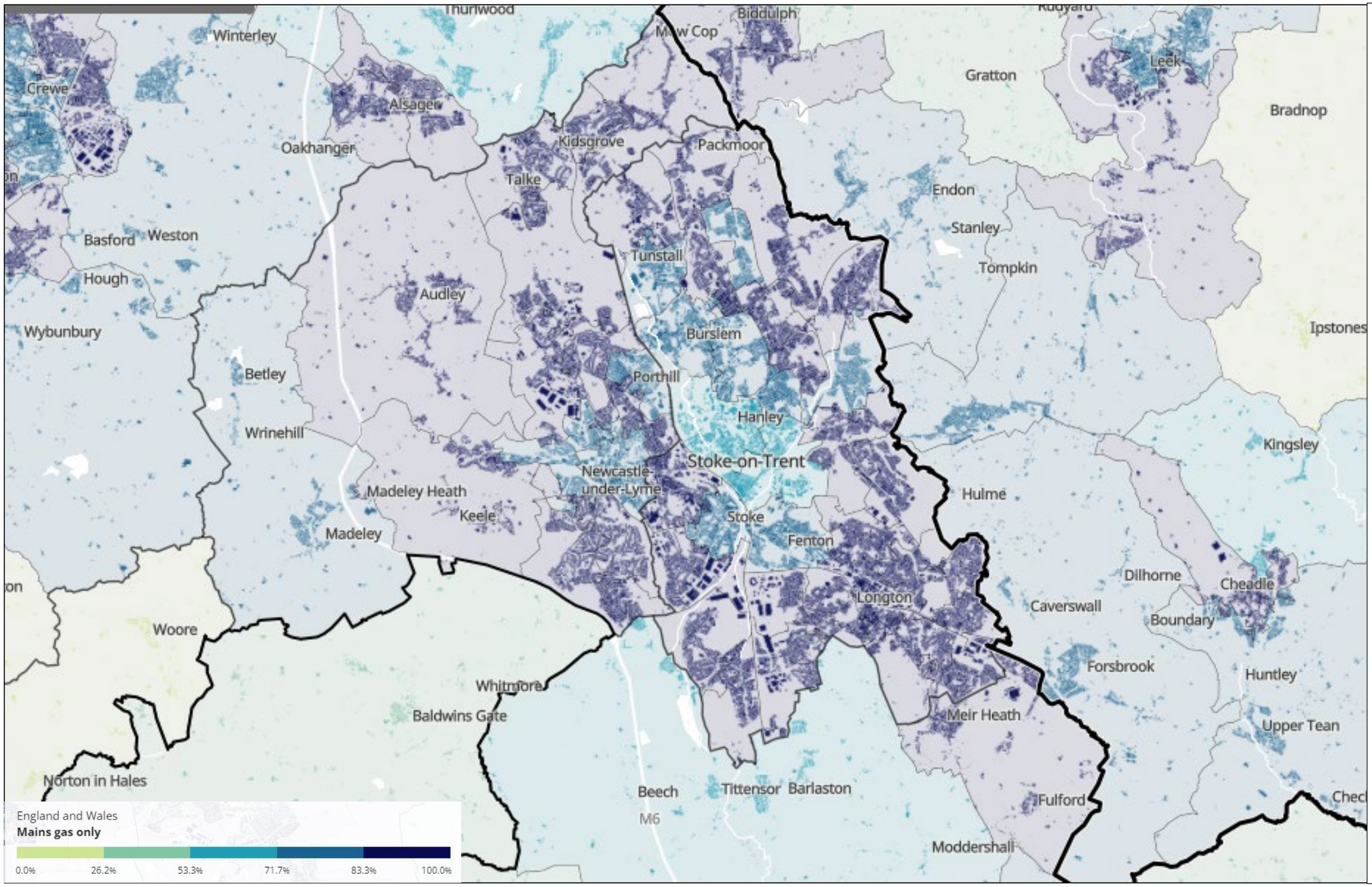
Map D

Existing and Planned Heat Networks

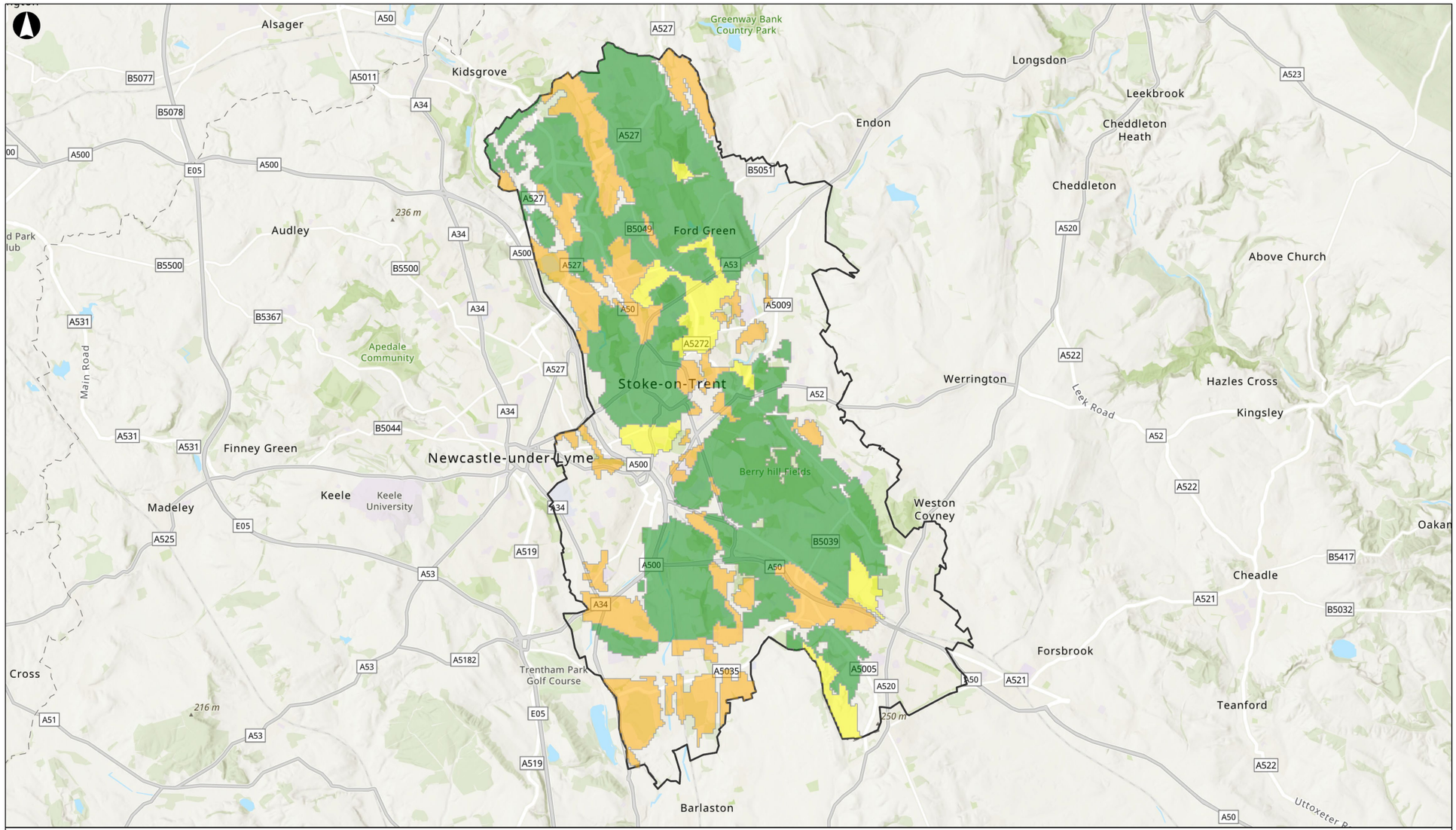
E. Physical Constraints



F. Off-Gas Grid Areas in Stoke-on-Trent



G. Coal Mine Water Map



Local Authority Boundary

Minewater Opportunity
- Challenging
- Possible
- Good

0 1 2 4
Kilometers

Scale: 1:81,000
Coordinate System: British National Grid

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Stoke

Coal Authority:
Mine water opportunity

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 23: 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 24: Pilot Programme Study-Area-Specific Information Resources

Information resource	Description of resource
Stoke-on-Trent New Development Sites	Planning applications for new development sites – 2020 and 2021
Mine Energy Study for SoT	Cauberg-Huygen report – March 2013 – Assessing potential for heat supply from former mine workings
Stoke-on-Trent District Heating Masterplanning Reports	Heat Network Masterplanning – January 2015 – Atkins – multiple maps and GIS files
Low Carbon District Heating Network in SoT	City Council presentation covering deep geothermal planning – April 2022
Geothermal Feasibility Study – GT Energy	Desktop study of deep geothermal heat supply opportunity – January 2015

Information resource	Description of resource
Ceramic Industrial Heat Recovery Study excerpts	Unidentified source
Mine Water Geothermal and Abandoned Mine Methane Potential	Feasibility study – Wardell Armstrong – July 2011
Heat Demand Mapping Report – for Heat Network	Heat Demand Mapping Report – January 2015 – Atkins – multiple maps and GIS files
SSE – Heat Network information and data	NDA signed enabling sharing of key data to assist study development
GT Energy	Information and high-level data supplied outlining technical and commercial opportunities of deep geothermal heat supply to heat network
Ceramics Factories – Burgess and Leigh, Emma Bridgewater, Portmeirion, Steelite and Vulcan Refractories	Site visits and data acquisition to improve opportunity framing of heat recovery from ceramics industry
Aspire Housing Association	Datasets for social housing supplied

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

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