

Darlington

Heat Network Zoning

Zone Opportunity Report



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Executive Summary



About Darlington: Darlington is a historic market and industrial town in the Borough of Darlington, County Durham, North-East England, with a population of ~108,000.



Local Energy Policy: Darlington Borough Council declared a climate emergency in 2019, aiming for Net Zero by 2040. The Local Plan mandates heat networks for major developments.



Existing heat networks: There are no existing district heat networks in Darlington, but there is a small communal network at Darlington College.



Zones identified: A total of 14 potential heat network zones have been identified in Darlington. The total annual heat demand of for all buildings potentially required to connect within these zones is 275GWh/yr.



Strategic heat network zones: One strategic heat network zone has been identified in Darlington Centre with an overall heat demand of 83GWh/yr for all buildings potentially required to connect.



Key heat demands: The initial zone opportunity has an annual heat demand of 81GWh/yr. Key anchor loads include Darlington Memorial Hospital, the Cornmill Centre and the Dolphin Centre.



Key heat sources: The main potential heat sources identified for the Darlington Centre Zone are large scale ASHPs. Potential energy centres could be located near the Town Hall and Central Park.



Estimated CapEx: The high-level estimate of capital expenditure to network all buildings required to connect in all zones is approximately £325m, of which the initial zone opportunities amount to approximately £100m.



Other heat network zones: Other potential heat network zones identified include industrial areas, educational buildings, and new development sites such as East Darlington, Faverdale Industrial Site, and Skerningham.



Carbon savings: The initial zone opportunity in Darlington Centre is estimated to save 15ktCO_{2e}/yr.

Figure 1: Overview of Heat Network Zones in Darlington



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. Our 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 Darlington and is intended to showcase potential heat network zones in the town. The report indicates the heat network investment opportunity at a town 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 methodology¹. 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 <u>December 2023 consultation on Heat Network Zoning</u> 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 potentially be required to connect² 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.





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) Darlington Heat Networks Context

2.1) Darlington Town Overview

Darlington is a historic market and industrial town in the county of Durham in North-East England. It is the largest town in County Durham. The town centre has historical and heritage buildings and is archaeologically significant. The River Skerne, a tributary of the River Tees, flows through the town. Darlington has a population of circa 108,000.

Darlington Borough Council (DBC) is a unitary local authority and is a constituent member of the Tees Valley Combined Authority. The Tees Valley secured a devolution deal in 2015 given the local area more control of some areas of government spending.

The borough's economy has shown strong performance in recent years, transitioning from its historical dependence on manufacturing to a more diversified and resilient base. Key sectors such as specialist engineering, the now dominant service sector (including business and professional services), and public sector employment (such as public administration, healthcare, and education) are the most significant employers³.

DBC is the largest provider of social homes in Darlington, owning more than 60% of the social housing in the borough (2020 statistics)⁴. DBC have a target to build around 100 new houses per year over the next ten years.

2.2) Darlington Net Zero Targets and Commitments

In July 2019, DBC declared a climate emergency and committed to reducing carbon emissions to Net Zero by 2050. In July 2020, the Council set out its Climate Change Strategy focusing on mitigating and adapting to climate change. This is structured around four core actions: reducing overall energy consumption; decreasing fossil fuel energy demand; contributing to a greener grid; and implementing carbon offsetting measures.

The Climate Change Strategy was followed by a Climate Change Emergency Action Plan in October 2021. In July 2023, a new motion was passed reaffirming the declaration of a climate emergency and bringing forward DBC's own Net Zero targets to 2040. Decentralised energy and heat networks play a pivotal role in DBC's decarbonisation aspirations; helping alleviate fuel poverty and providing an ongoing revenue stream to the Council.

Darlington Borough Council Local Plan³ was adopted February 2022. The plan stipulates that all major developments exceeding 300 homes must incorporate heat networks unless proven technically or financially unviable. This aligns with the overarching goal of minimising carbon

³ Darlington Local Plan 2016 – 2036 Adopted February 2023, Available at:

https://www.darlington.gov.uk/media/16694/local-plan-adopted-feb22v2.pdf

⁴ The Darlington Borough Council's Lead Officer for Sustainability and Climate Change shared the count and proportion of social landlords in Darlington.

emissions and promoting energy efficiency, in line with local, regional, and national carbon reduction targets.

Figure 3 below, summarises key dates in DBC's plans for decarbonisation and demonstrates their progress towards decarbonisation targets announced.



Figure 3: Darlington Decarbonisation Milestones

2.3) Delivering Heat Networks in Darlington

There are no existing district heat networks in Darlington. However, there is a small communal heat network with a combined heat and power (CHP) system which connects five buildings owned by Darlington College. The energy centre currently has capped off connections and is considered as a key potential connection for a future wider low carbon heat network.

A heat mapping and masterplanning study for Darlington, commissioned by DESNZ in 2019, identified four potential clusters potentially suitable for heat networks in Darlington: Town Centre, Central Park, Greater Faverdale, Stressholme and Snipe Lane. A detailed feasibility study was completed in the 2021 which further examined the potential for heat networks in the Town Centre and Central Park new development area^{5,6}. Section 3.1.2 contains further information about these studies.

SSE Energy Solutions (SSE) has recently been working with Darlington Borough Council (DBC) to develop a heat network in the town. The heat network would potentially connect local government buildings, Darlington Memorial Hospital, government property and commercial buildings within the Town Centre.

⁵ Buro Happold, 2021, Work Package 1: Detailed review and update of heat mapping and masterplanning study.

⁶ Buro Happold, 2021, Work Package 2: Darlington heat network Feasibility.

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

2.4) Darlington Heat Network Zones

A total of 14 potential HNZs have been identified in Darlington, with one considered a Strategic HNZ. Figure 4 below shows the study area boundary as well as the boundaries of all HNZs identified within Darlington. 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: Darlington 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: Key Constraints Map Shows key topographical constraints identified.
- E: 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 Darlington Study Area



3) Strategic Heat Network Zones

Strategic HNZs in Darlington

This section examines the strategic HNZ and IZOs identified within it. 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 below presents a high-level estimate of the scale of opportunities across Darlington. Please refer to Appendix 4 for more detail.

Scope	Annual heat demand (GWh/yr)
All buildings within zones ⁷	275
All buildings within strategic zones	83
All buildings connected to the IZOs	81

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

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 strategic zone is summarised below. Figure 5 illustrates its size, alongside the key potential heat source and the proportion of buildings that may potentially be required to connect.

Darlington Centre is a large potential HNZ covering Darlington town centre, the Memorial Hospital in the north-west and the Central Park area (next to the railway line) to the east. Key heat demands include the Memorial Hospital, Darlington College, Teesside University Darlington Campus and Central Park commercial development.

⁷ 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.





3.1) Darlington Centre

3.1.1) Darlington Centre – HNZ Summary

The Darlington Centre heat network zone covers the town centre and extends eastwards to capture Central Park area and westwards to Darlington Memorial Hospital. Key strengths of this zone are the density of heat, the quantity of buildings potentially required to connect, and the building typologies, which includes a large proportion of publicly owned buildings. The expected scale and timelines for new developments also create a favourable opportunity for implementing heat networks. Central Park is a 30-hectare redevelopment site and has been identified as a "Key Enterprise Zone" by Tees Valley Combined Authority.

Among the zones identified within Darlington, Darlington Centre HNZ has the largest heat loads and the highest number of buildings potentially required to connect, of almost 200. The zone encompasses a wide range of building typologies including leisure centres, hospital and clinics, commercial retail and offices, educational campuses, residential alongside the new development sites mentioned above. Key heat demands include Memorial Hospital, Cornmill shopping Centre, Dolphin Leisure Centre, Darlington College, Teesside University Darlington Campus and Central Park commercial development.

The main potential heat sources identified for this zone are large scale air source heat pumps (ASHPs). Potential energy centre locations have been identified adjacent to the Town Hall on DBC owned land and adjacent to the primary substation in Central Park.

3.1.2) Darlington Centre - Existing Heat Networks

There are no known operational district heat networks in Darlington. Early stage proposed heat networks are described below.

Proposed Heat Networks

In 2019, Buro Happold was commissioned by DESNZ to carry out a heat mapping and masterplanning study for Darlington. The study reviewed publicly available data on existing and proposed commercial and residential buildings. Four potential heat network clusters were identified within Darlington: Town Centre, Central Park, Greater Faverdale, Stressholme and Snipe Lane. The study recommended prioritising further investigation into the Town Centre and Central Park clusters for the development of a district heat network in Darlington. This recommendation was based on the potential economic viability of these two networks ⁸.

This recommendation was taken up in 2021 via a detailed feasibility study for the Town Centre and Central Park new development area that was commissioned by DESNZ Heat Networks Delivery Unit (HNDU)^{9,10}. The project reviewed and updated the 2019 masterplanning study with improved data sources and low carbon technology options. Stakeholders contributing to this study included the Memorial Hospital, Teesside University, Darlington College, Centre for

⁸ Buro Happold, 2019, Darlington Heat Mapping and Energy Masterplanning

⁹ Buro Happold, 2021, Work Package 1: Detailed review and update of heat mapping and masterplanning study

¹⁰ Buro Happold, 2021, Work Package 2: Darlington heat network Feasibility

Process Innovation, and the Church of England. The study also sought input from the Distribution Network Operator regarding headroom capacities at substations and future development plans.

Town Centre Network

The proposed Town Centre network has a phased delivery and could provide approximately 10GWh of heat annually to publicly and privately owned buildings. The proposed energy centre is located adjacent to the Town Hall, owned by DBC, and would consist of a 1.2MW from an ASHP with thermal storage and gas back-up heat supply.

As mentioned in Section 2.3, DBC has been working with SSE to further to develop a heat network in the town connecting some of the properties listed in this report (e.g. Darlington Memorial Hospital). The scale and nature of that network may be different from that presented in this report as more detailed local work is undertaken.

Central Park Network

The proposed Central Park network has a phased delivery and is estimated to deliver approximately 6GWh of heat annually to private developments within Central Park, covering both existing buildings and future new build. The proposed energy centre is adjacent to the Darlington Central primary substation and would consist of a 1.7MW ASHP backed up by thermal storage and gas boiler.

3.1.3) Darlington Centre - Initial Zone Opportunities

A single IZO was identified in the Darlington Centre zone. Potential routing¹¹ is shown in Figure 6 and summary statistics provided in Table 2.

CapEx	Heat	Network	CO₂₀ savings	LHD	Heat Sources
>£100m	>75GWh/yr	15km	15ktCO _{2e} /yr	5.7MWh/m	ASHP

Table 2: Darlington Centre - Summary Statistics for Initial Zone Opportunities¹²

The identified IZO covers the whole of the zone, connecting almost all (about 98%) of buildings potentially required to connect. It also aligns with the previous studies, described in the previous section, which identified Darlington Town Centre and Central Park as having considerable potential for heat networks.

¹¹ Routes can be expected to change as a better understanding of local constraints is developed through design.

¹² Please see Appendix 3 – Glossary, "Specific definitions" of the main report for definitions related to this table.

Figure 6: Initial Zone Opportunities in Darlington Centre HNZ



Darlington

Darlington Centre

Other Local Authority Boundary Other Heat Network Zones

— Initial Zone Opportunity Network — Existing and Planned Heat Network

Existing and Planned - Communal Existing and Planned - District

Kilometres

3.1.4) Darlington Centre – 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.

The total heat demand of all buildings in the zone is estimated at circa 150GWh/yr. The IZO connects to almost all buildings potentially required to connect, with a heat demand of circa 75GWh/yr. A breakdown of the building categories potentially required to connect is shown in Figure 7.

Figure 7: Darlington Centre - Categorisation of heat demand for buildings potentially required to connect in the IZO

Darlington Memorial Hospital, along with other public sector buildings such as schools and leisure centres, form about 20% of the heat demand of buildings potentially required to connect, whilst local authority owned buildings contribute to more than 10%. A considerable portion is made up by other non-domestic buildings, including offices and retail outlets. New developments by contrast only represent a small proportion of the heat demand.

Further details of the key heat demands for buildings potentially required to connect are provided Table 3.

Table 3: Darlington Centre - Key Heat Demands for Buildings Potentially Required to Connect in the IZO¹³

Building name	Building category	Number of connections	Annual heat demand (MWh)	Data source
Darlington Memorial Hospital NHS Trust	Public sector	6	13,000	ERIC
Cornmill Centre	Cornmill Centre	1	6,000	Benchmark (NZM)
Dolphin Centre	Local Authority	1	5,400	'Metered'
Sainsbury's Supermarket	Non-domestic	1	3,000	Benchmark (NZM)
Darlington College and Sport Centre	Public Sector	2	1,900	'Metered'
Central Park commercial development	New developments	15	1,900	Pilot Methodology
Crown Street Retail	Non-domestic	1	1,600	Benchmark (NZM)
Feethams Leisure Centre	Non-domestic	1	1,400	Benchmark (NZM)
Wilko	Non-domestic	1	3,100	Benchmark (NZM)
Town Hall	Local Authority	2	1,300	'Metered'

Darlington Memorial Hospital NHS Trust is the largest heat load identified. The hospital currently hosts a dedicated energy centre equipped with a gas fired combined heat and power (CHP) plant, which contributes to onsite heat and power demands.

The Dolphin Centre, situated in the centre of the Darlington, is a DBC- run swimming pool and sport complex. It is one of the most substantial energy users. Darlington College is in Central Park and consists of five main buildings and a sports centre. The College operates a small gas fired CHP communal network for these buildings. Central Park commercial development is a new planned development expected to site commercial buildings including offices and a hotel

¹³ Please refer to Appendix 3 for definitions related to building categories in this table.

with the plan to be completed by 2030. Other notable heat loads in the town centre include the Cornmill Shopping Centre, Feethams Leisure Centre, Town Hall, Crown Street Library and Hippodrome Theatre.

3.1.5) Darlington Centre – IZO Heat Sources

The main potential heat sources identified to supply the IZO are large-scale ASHPs. Two potential energy centre locations (E1 and E2) have been identified from previous feasibility studies. The first location (E1) is on land owned by DBC, adjacent to Darlington Town Hall. However, since the modelling work for this study was completed, the Council has had further discussions with relevant parties and determined that the parcel of land is unlikely to be suitable. Therefore, alternative options will need to be considered. The second energy centre location (E2) is on land next to the 33/11kV Darlington Central substation which is near the Central Park new development area. This energy centre has been sized based on the heat capacity from buildings potentially required to connect (i.e. Darlington College, Teesside University, National Horizon Centre) and the new development site in the Central Park area.

There is also potential for a water source heat pump (WSHP) to supply the IZO in the town centre due to its proximity to the River Skerne. More detailed studies are required to understand the feasibility and assess the practical limitations of installing equipment for processes such as water abstraction. Other potential waste heat sources include Sainsbury's supermarket located on Victoria Road, and heat recovery from the Darlington Central electricity substations. These are not considered main heat sources due to uncertainty around their proven capacities.

Table 4 and Table 5 in this section summarise the key heat sources and potential energy centre locations. These are also shown in the zone-level map Figure 6 in Section 3.1.3 and on Map C in Appendix 1.

Two potential energy centre locations (E1 and E2) have been identified from previous feasibility studies. The first location (E1) is on land owned by DBC, adjacent to Darlington Town Hall. However, since the modelling work for this study was completed, the Council has had further discussions with relevant parties and determined that the parcel of land is unlikely to be suitable. Therefore, alternative options will need to be considered. The second energy centre location (E2) is on land next to the 33/11kV Darlington Central substation which is near the Central Park new development area. This energy centre has been sized based on the heat capacity from buildings potentially required to connect (i.e. Darlington College, Teesside University, National Horizon Centre) and the new development site in the Central Park area.

There is also potential for a water source heat pump (WSHP) to supply the IZO in the town centre due to its proximity to the River Skerne. More detailed studies are required to understand the feasibility and assess the practical limitations of installing equipment for processes such as water abstraction. Other potential waste heat sources include Sainsbury's supermarket located on Victoria Road, and heat recovery from the Darlington Central electricity substations. These are not considered main heat sources due to uncertainty around their proven capacities.

Heat source type	Capacity (kWp) ¹⁴	Temperature (°C)	Potential energy centre location
ASHP	18,500	8	E1
ASHP	2,000	8	E2

Table 4: Darlington Centre - Key Heat Source Opportunities for the IZO

Table 5: Darlington Centre - Potential IZO Energy Centre Locations

EC ref number	Site type	Size (m²)	Ownership	Heat source
E1	Land	1,000	DBC	ASHP
E2	Land	2,500	DBC	ASHP

3.1.6) Darlington 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 routing was developed solely around buildings which could potentially 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 proposed network route is shown in Figure 6. The proposed route largely follows the road network, extending north from the town centre along Northgate Road and turning west at Gladstone Street and Greenbank Road to connect to Darlington Memorial Hospital. The route also connects the town centre to Central Park, crossing the East Coast Main Line railway at Haughton Road. From Central Park there is opportunity to take advantage of "soft dig" conditions, where dig costs will potentially be lower due to the proximity of soft ground, particularly along John Williams Boulevard which is currently in construction and along the edges of the Central Park development plots.

¹⁴ The installed capacity of the ASHPs.

Table 6: Darlingtor	n Centre -	 Indicative 	Heat	Network	Statistics	for t	he l	ΖO

IZO description	Network length (km)	Network cost (£m)
Darlington Centre	15	55

3.1.7) Darlington Centre – IZO Key Constraints and Mitigations

[C1] Sites of archaeological significance and conservation areas: Darlington town centre is classified as a site of archaeological significance. This designation requires careful risk management and monitoring, particularly during pipe installation works. A comprehensive desk-based feasibility study by an archaeological consultant is required to ensure minimal disruptions to the project timeline.

[C2] River culvert crossing: Some buildings potentially required to connect are located on the east of River Skerne including the Hippodrome Theatre and Darlington Police Station. The proposed network crosses the River Skerne at St Cuthbert's Way, passing over the River Skerne as it enters a culvert. Further route proving and structural / spatial analysis of the roadway will be required to determine if a pipework route is feasible within the structure.

[C3] Railway crossing: The proposed heat network connects the town centre to the Central Park via Haughton Road, crossing the principal East Coast Main Line railway. A feasibility assessment of the railway crossing is required which should involve an assessment of the road structural integrity, compliance with regulations and safety concerns. Network Rail would be a relevant stakeholder to consult with.

[C4] Listed building connections: There are several listed buildings which are proposed network connections in the town centre including the Edward Pease Public Library and St Cuthbert's Church. Physical alteration works to the buildings to accommodate pipework and heat off take substations would need to be considered on a building-by-building basis along with the existing heating systems, which are understood to be included within the listed protection.

4) Other Heat Network Zones

This section describes the 'Other' potential heat network zones that were identified in Darlington. 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 8 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.

The modelling was based on the Council's housing trajectory and planned development data available at the time of the study. Since then, some planned developments have undergone some minor updates such as changes to scale or phasing. While these changes are relatively small, they should be note for completeness in any future analysis¹⁵.

¹⁵ Darlington Borough Council Authorities Monitoring Report (See: https://www.darlington.gov.uk/environmentand-planning/planning/planning-and-environmental-policy/other-statutory-documents/authorities-monitoringreport/)

DARL_002: is situated in east Darlington. The area has predominantly industrial and office buildings, the key anchor loads include Magnet Ltd, Cummins Engine Plant, Lingfield House and the Student Loans Company. An ASHP is likely the most suitable heat source for this zone. However, given the large amount of land availability, ground source heat pumps (GSHPs) may also be feasible.

DARL_018: is situated directly north of the town centre and covers the Faverdale Industrial Estate. The area is dominated by industrial and office related buildings and contains key anchor loads such as Argos, Cepac Packaging Ltd, Subsea Innovation Ltd. An ASHP is likely the most suitable heat source for this zone.

DARL_017: is situated in the north west of the Darlington, adjacent to the Greater Faverdale development site. The area is a new development site. The development plan details, including number of houses and development timeline, are yet to be confirmed. In addition to ASHP, GSHPs may also be a feasible potential heat source, given the large amount of available land.

DARL_005: is situated in the northeast of Darlington. The area is dominated by educational buildings in the Education Village. This small zone also incorporates the nearby Grange Care Home and Whinfield Primary School. An ASHP is likely the most suitable heat source for this zone.

DARL_015: is situated in north-east Darlington. It covers the strategic development site of Skerningham. This area is a new development site which seeks to develop around 1,350 houses by 2036. The detailed timeline for the development is not known. In addition to ASHP, GSHPs may also be a feasible potential heat source, given the large amount of available land.

DARL_006: is situated in the west of the Darlington and north of Darlington Crematorium. The area is dominated by educational buildings and contains key anchor loads such as Carmel College, Abbey Junior School and Abbey County Infant School. The Darlington Crematorium has potential to supply heat to this zone.

DARL_007: is situated in the north-western area of the borough adjacent to West Park. The zone is centred around West Park Hospital. Other Anchor loads include West Park Academy, West Park Nursery and Aldi. An ASHP is likely the most suitable heat source for this zone.

DARL_014: is situated in north-west Darlington. It covers the Greater Faverdale strategic new development site, where there are plans to build 700 houses by 2036. The timeline for development is not known.

DARL_016: is situated in Snipe Lane development site in the south of Darlington. The zone covers the new development site and there are plans to develop up to 150 council houses. The construction programme and master planning are not yet confirmed.

DARL_008, DARL_009, DARL_011, DARL_020: are smaller HNZs primarily centred around one or two educational buildings.

Appendix 1: Maps and Legends

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

Legend / icon	Relevant map(s)	What this represents on the map	Comments on interpretation
013	Report maps	Study boundary	Extends 1km beyond Local Authority boundary to includ
	Report maps	Local Authority boundary	
613	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 t
Gates Hill	Report maps	Heat network zone name / reference number	'Strategic' zones are named; 'Other' zones are represen
	Report maps	Buildings potentially required to connect	Buildings that could be required to connect (as describe
E13	Report maps	Campuses	Multiple buildings owned and operated by the same orga
	Report maps	Initial Zone Opportunity concept network route	Conceptual heat network pipe routes between buildings
	Report maps	Existing and Planned Heat Networks	Known existing or planned heat network pipe routes as
	Report maps	Potential energy centre - IZO	Potential energy centre location for an IZO (see section
	Report maps	Existing/planned energy centre - Communal HNs	'Communal' energy centres are those operated within a
	Report maps	Existing/planned energy centre - District HNs	'District' energy centres supply multiple buildings across
Appendix 1: A – Typology map	-		
	Appendix 1: Map A	Dense City Centre	Locally recognised as the City or Town centre, where bu
	Appendix 1: Map A	City Centre Fringe	Around the City or Town Centre or at its outskirts, where
	Appendix 1: Map A	Mixed Use District	A variety of building typologies, with no single typology p
	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. Ur

le	cross	boundary	opportunities

that will still be in construction post-2025

nted by a reference number

ed in the HNZ Consultation 2023)

anisation (e.g. Universities, Hospitals)

that could be required to connect

provided by local stakeholders

3)

single building or across a campus

s multiple sites

uildings development is most dense

e both building density reduces

prevailing in the area

niversities, Hospitals)

Heat Network Zoning Opportunity Report: Darlington

	Appendix 1: Map A	Commercial / business office	Public & private office space
	Appendix 1: Map A	Industrial areas	Primarily used for manufacturing, engineering, and ware
Appendix 1: B – Key heat deman	ds		
۲	Appendix 1: Map B	Top 10 Heat Demands	The largest (anchor) heat loads within the Pilot programm
	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
	Appendix 1: Map B	Residential with existing communal heating	Residential buildings with existing communal heating sys
	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, manufa
O 400 - 600	Appendix 1: Map B	Building heat demand (MWh/yr)	Circle size increases with size of heat demand
Appendix 1: C – Key Heat Source	es and Potential Energy	/ Centres	
	Appendix 1: Map C	EfW plant	Point heat sources have known or likely points of heat of
	Appendix 1: Map C	Industrial Waste Heat	Mine water and water source 'points' indicate potential at
	Appendix 1: Map C	Mine water	
\bigtriangleup	Appendix 1: Map C	Other Waste Heat	Other waste heat sources include sewers, electrical subs for more detail on heat source capacities, where known.
	Appendix 1: Map C	Water Source	
	Appendix 1: Map C	Waste Water Treatment	On Map C only, the heat waste symbol is sized according
	Appendix 1: Map C	Deep geothermal or mine water heat	Area heat sources differ from point-heat sources in that
C13	Appendix 1: Map C	Ground source	resource is not yet determined
C13	Appendix 1: Map C	Water source	
Appendix 1: D – Existing and pla	nned heat networks	1	1
\bigcirc	Appendix 1: Map D	Existing and planned heat networks	At this scale the route of an existing HN cannot be displa
Appendix 1: E – Physical constra	aints		
	Appendix 1: Map E	Key constraints	Key heat network routing constraints as described in sec

ehousing

me study area (see Section 3)

(e.g. hospital, universities, Govt. estates)

stems installed

Ifacturing, warehouses and distribution)

offtake/abstraction

abstraction points.

ostations and other sources of heat. See section 3

ng to its scale in GWh/yr

at the exact location for extracting heat from the

layed, so an area outline is used instead

ction 3

A.Darlington Typology Map

This document was prepared by on behalf of DESNZ in connection with the Heat Network Zoning Pilot Programme. It takes into account DESNZ' particular instructions and requirements and addresses priorities at the time of publication. This document is not intended for, and should not be relied on by, any third party and no responsibility is undertaken to any third party in relation to it.

B. Key Heat Demands

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Table 7: Heat demand split further by Building Categories across all Initial Zone Opportunities identified in Strategic HNZs in the Study Area

Building category	Number of Required to Connect Buildings in this category	Annual Required to Connect Heat Demand across strategic HNZs (MWh)
Domestic	2	356
Education (schools & higher education)	10	5,066
Entertainment	28	7,705
Hospitals and residential / nursing homes	11	11,229
Hotels	.0	-
Industrial buildings	14	2,876
Offices	39	10,312
Public buildings	12	4,510
Retail	66	28,176
Sports and recreation	10	8,541
New Developments	15	1,978
Totals	207	80,750

Note: In Darlington there are 14 HNZs identified with one IZO identified across them. The table and graph above summarise the heat demand for buildings potentially required to connect to this IZO.

Darlington heat demand split by

- Domestic
- ■New Developments
- Industrial buildings
- Public buildings
- Education (schools & higher education)
- Entertainment
- Sports and recreation
- Offices
- Hospitals and residential / nursing homes
- Retail

C. Key Heat Sources and Potential Energy Centres

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D. Physical Constraints

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E. Off-Gas Grid Areas in Darlington

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.

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 8: Pilot programme Standardised Information Resources

Table 9: Pilot Programme Study-Area-Specific Information Resources

Information resource	Description of resource
Buro Happold, 2019, Darlington Heat Mapping and Energy Masterplanning	Buro Happold carried out heat mapping and masterplanning study for Darlington. The study was commissioned by DESNZ under the DEEP framework.
Buro Happold, 2021, Work Package 1: Detailed review and update of heat mapping and masterplanning study	Buro Happold HNDU Study commissioned by DESNZ.
Buro Happold, 2021, Work Package 2: Darlington Heat Network Feasibility	Buro Happold HNDU Study commissioned by DESNZ.

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

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