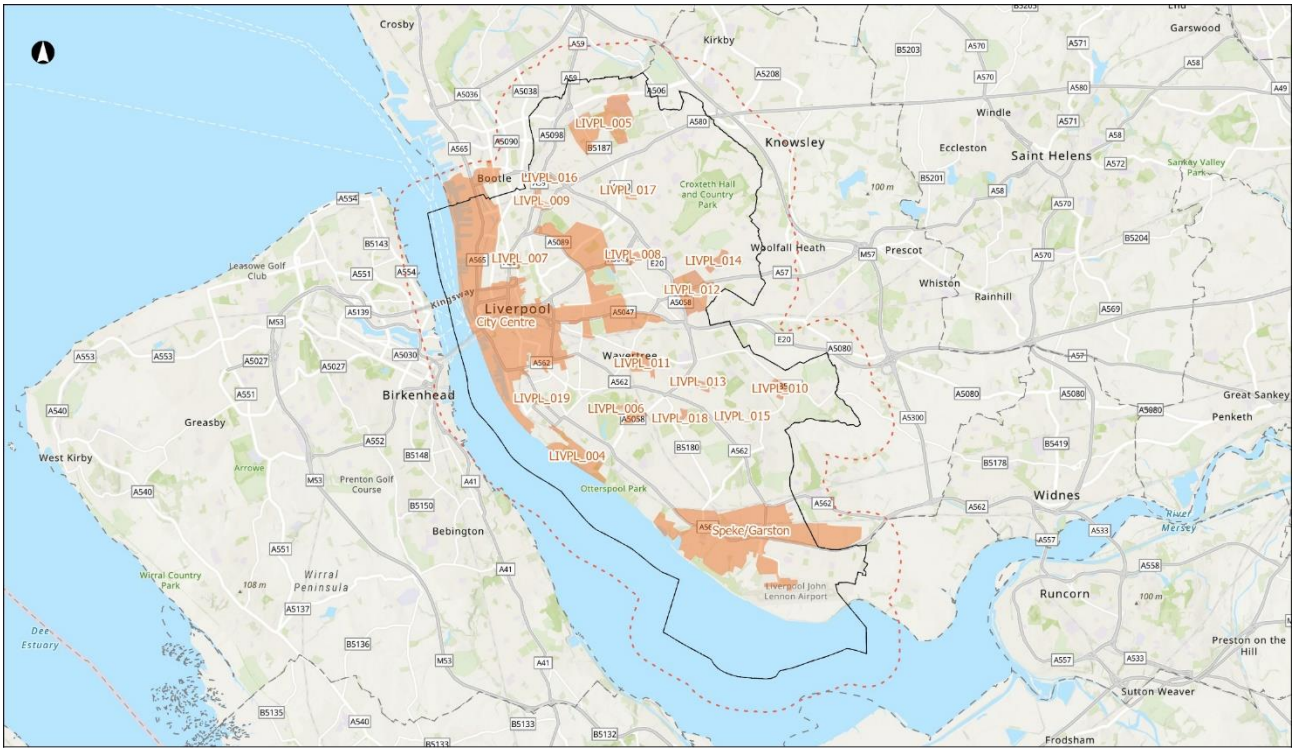
Department for Energy Security & Net Zero

Liverpool

Heat Network Zoning

Zone Opportunity Report



February 2025

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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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Contents

Executive Summary

About Liverpool: Liverpool is a major city in the UK with a population of nearly half a million. It aims to be a Net Zero Carbon city by 2030.

Local Energy Policy: Liverpool City Council declared a climate emergency in 2019 and aims to decarbonise heating for residential and non-domestic buildings through the connection of 70,000 buildings to heat networks by 2030.

Existing heat networks: Several large heat networks exist at Paddington Village, Liverpool Waters and the major universities and hospitals. All are exploring decarbonisation options. Liverpool is an Advanced Zoning Programme (AZP) city.

Zones identified: A total of 18 heat network zones were identified in Liverpool, with two considered strategic zones. The overall heat demand for all buildings required to connect within zones is 850GWh/yr.

Strategic heat network zones: The Liverpool City Centre and Liverpool Speke/Garston are the two strategic heat network zones. The overall heat demand for all buildings required to connect within strategic zones is 700GWh/yr.

Key heat demands: The total annual heat demand for buildings connected to the initial zone opportunities is 500GWh/yr. Key stakeholders include the University of Liverpool, Liverpool John Moore University, and Liverpool Hope University.

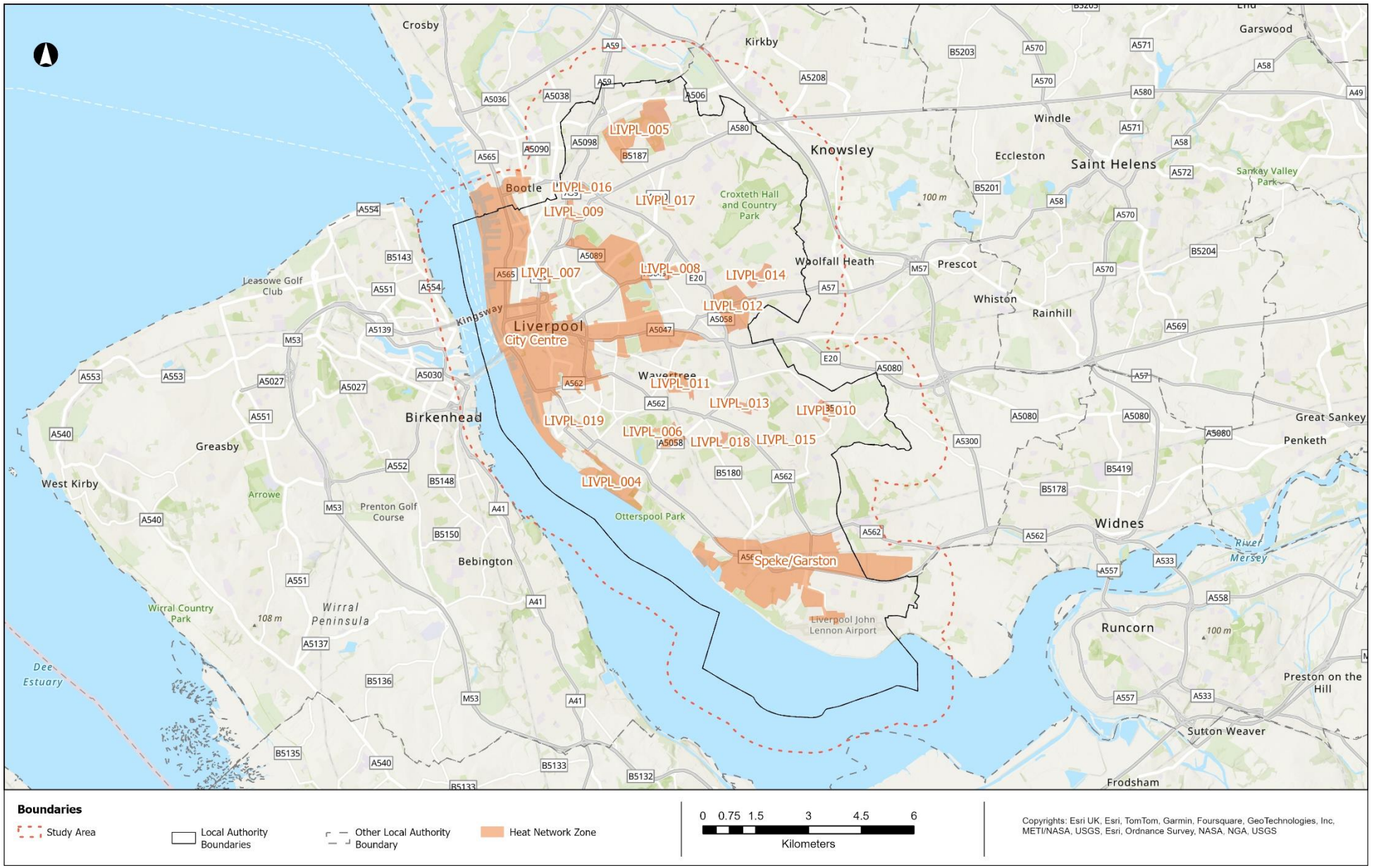
Key heat sources: Potential heat sources include the River Mersey, the Sandon Dock Wastewater Treatment Works, and the Docks. These sources are crucial for city-scale decarbonisation.

Estimated CapEx: The high-level estimate of capital expenditure to network all buildings required to connect in all zones is approximately £850m, of which the initial zone opportunities amount to approximately £500m.

Other heat network zones: Smaller heat network zones identified include areas such as Aintree Hospital and Broadgreen Hospital. These zones are not considered strategic but have potential for smaller heat networks.

Carbon savings: The initial zone opportunities identified could deliver carbon savings of more than 75ktCO_{2e} annually.

Figure 1 Overview of Heat Network Zones in Liverpool



1) Introduction

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

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

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

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

This report shows the Pilot programme outputs for Liverpool 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.

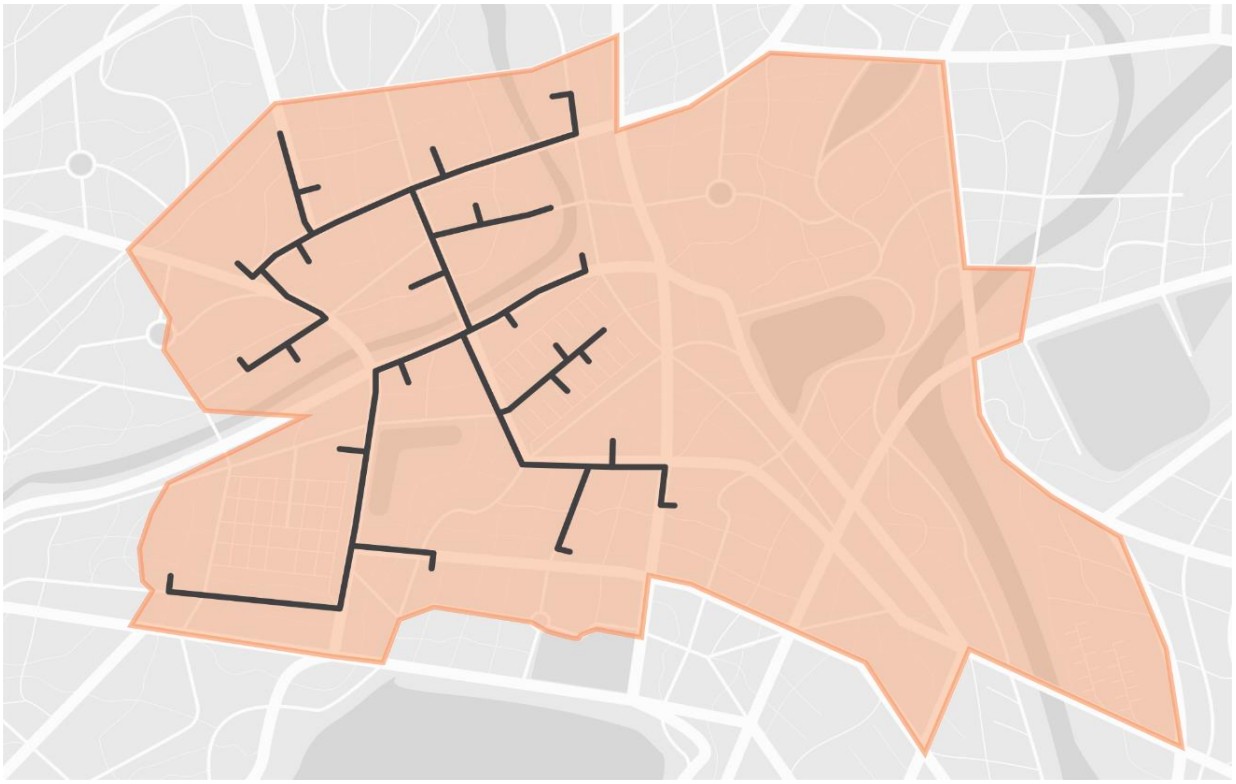
[1] More information can be found in the Heat Network Zoning Methodology Statements (Appendix 3, 4 & 5)

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 (including Liverpool) 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) Liverpool Heat Networks Context

2.1) Liverpool City Overview

Liverpool is a metropolitan borough in north-west England, with a population of close to half a million people (2021). Liverpool is the principal urban centre of the wider Liverpool City Region and is renowned for its cultural and artistic history and is closely associated with the arts. Liverpool City Council (LCC) is the governing body for the City of Liverpool. It is one of the six constituent local government districts of the Liverpool City Region (the others being Halton, Knowsley, Sefton, St Helens, and Wirral), which is governed by the Liverpool City Region Combined Authority (LCRCA).

The City of Liverpool forms an integral part of northwest England's economy, the third largest regional economy in the United Kingdom. The city is also a major contributor to the economy of Liverpool City Region, with the Liverpool Built-up Area Sub-Division contributing over £16billion gross value added[3]. Important sectors in the city include the knowledge economy, maritime, tourism, culture, hospitality, healthcare, life sciences, and creative and digital industries.

Social housing is provided by registered social landlords and there is no council-owned social housing stock. There are just under 60,000 social stock units in Liverpool, with 84% of these units provided by the largest seven providers[4].

Key areas of development and economic activity in the city include the waterfront area (new residential and commercial buildings), the Knowledge Quarter (science, health, technology and creative performing arts), the pharmaceutical cluster in Speke, the digital and creative industries within the Baltic Triangle, and the Jaguar Land Rover plant in Halewood.

2.2) Liverpool Net zero targets and commitments

In 2019, LCC declared a climate change emergency, and all political parties within the city agreed to work together to rise to the challenge by making Liverpool a Net Zero Carbon city by 2030[5]. LCC's plan[6] for achieving the 2030 Net Zero Target includes the key objective of decarbonising heating to residential and non-domestic buildings through connection of 70,000 buildings to heat networks.

LCRCA has set out a Five-Year Climate Action Plan which sets out the actions to 2028 with the aim of meeting its commitment to a 2040 Net Zero Carbon emissions target. The Plan

[3] UK gross value added (GVA) and productivity estimates for other geographies - Office for National Statistics (ons.gov.uk), table 3, 2021 figure, E35001470, Available at Office for National Statistics (ons.gov.uk),
[4] https://www.gov.uk/government/statistics/registered-provider-social-housing-stock-and-rents-in-england-2022-to-2023, Available at: GOV.UK (www.gov.uk))
[5] Action on climate change - Liverpool City Council, Available at: liverpool.gov.uk (www. liverpool.gov.uk)
[6] https://liverpool.gov.uk/media/qefm2vbs/liverpool_action_plan_full_final_digi.pdf, Available at: liverpool.gov.uk (www. liverpool.gov.uk)

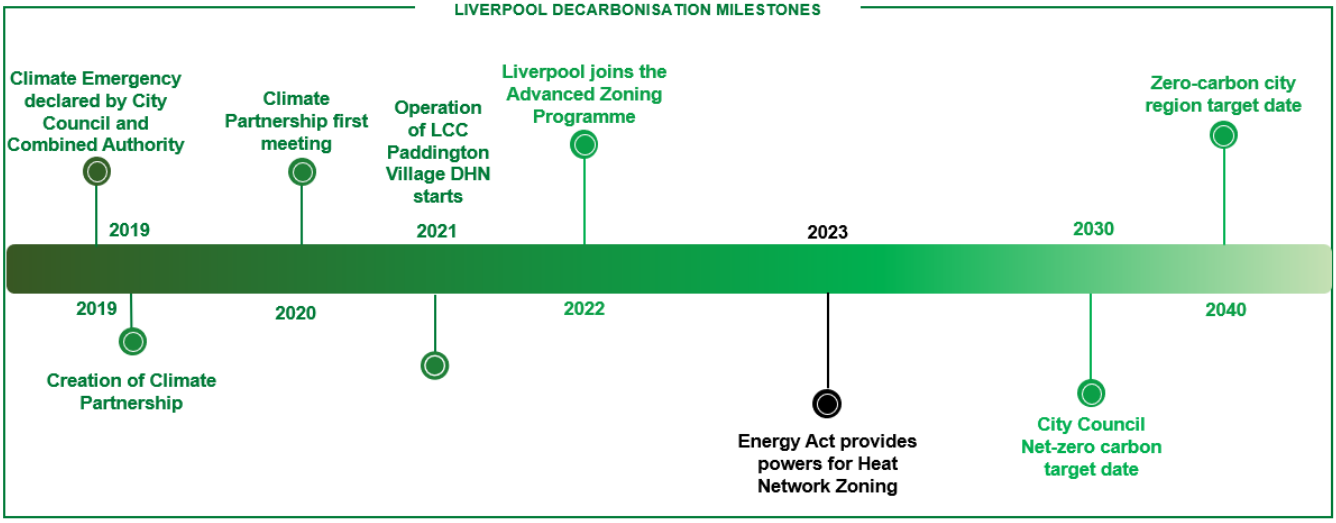
addresses five key areas, including 'Buildings'. The plan states the objective of removing fossil fuels from all buildings to move swiftly to net zero. The plan aims to:

- Work with partner local authorities to develop an approach to increase onsite low carbon energy generation; and
- Encourage the development of centralised heat networks to supply cheap, green heat to homes and businesses, incorporating waste heat recovery where available.

Like LCC, LCRCA recognises that the Plan provides the opportunity to reduce the city's impact on global emissions as well as creating new jobs and new opportunities for skills development, training and innovation. LCRCA has launched a Green Jobs and Skills Plan[7] to fill the gap in skills needed to deliver a net zero transition as well as improve prosperity in the region.

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

Figure 3 Liverpool Decarbonisation Milestones



2.3) Delivering Heat Networks in Liverpool

There are several existing heat networks within Liverpool. The main networks are:

- The Mersey Heat network on the waterfront, owned by Peel NRE and serving a mix of new development and existing buildings. This network has been constructed by Vital Energi under a design and build contract.
- The Paddington Village network in the Knowledge Quarter, owned by LCC, and implemented via a design, build, operate and maintain (DBOM) contractual arrangement.

[7] https://api.liverpoolcityregion-ca.gov.uk/wp-content/uploads/2023/09/LCR-Green-Jobs-Skills-Plan-.pdf, Available at: GOV.UK (www.gov.uk)

- The Liverpool University network serving the University campus area within the Knowledge Quarter.
- The Royal Liverpool University Hospital network also within the Knowledge Quarter.
- The Mersey Docks and Harbour Company which provides heat and power from the gas-turbine CHP system at the Port of Liverpool (outside of the official study boundary, but noted here given its significant scale).

Other networks include:

- Aintree University Hospital
- Broadgreen and Liverpool Heart and Chest Hospitals
- The link between the Museum of Liverpool and the neighbouring Pilotage building

LCC and the combined authority have excellent ongoing relationships with many of the key stakeholders that will be involved in the roll-out of a strategic approach to heat networks across the city, including universities, hospitals, Peel NRE, social housing providers and key institutions such as the museums.

Both LCC and LCRCA are fully supportive of the acceleration of the deployment of heat networks with the Liverpool area and are actively seeking to develop a route to allow investment to bring this opportunity forward.

The LCC Local Plan[8] supports the use of low carbon energy generation and district heating networks in its Policy R7, which states that “future development will be required to connect to a decentralised energy network where one has been or is programmed to be constructed, unless it can be demonstrated that this would not be viable”, and that “all major development proposals should seek to integrate low carbon energy and decentralised energy networks into the proposal”.

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

2.4) Liverpool Heat Network Zones

A total of 18 potential HNZs were identified in Liverpool, with two considered Strategic HNZs. Figure 4 shows the study area boundary as well as the boundaries of all HNZs identified within Liverpool. 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.

The maps within Appendix 1 highlight the key heat sources which could supply the Strategic HNZs, including water source heat pumps (WSHPs) recovering heat from the River Mersey,

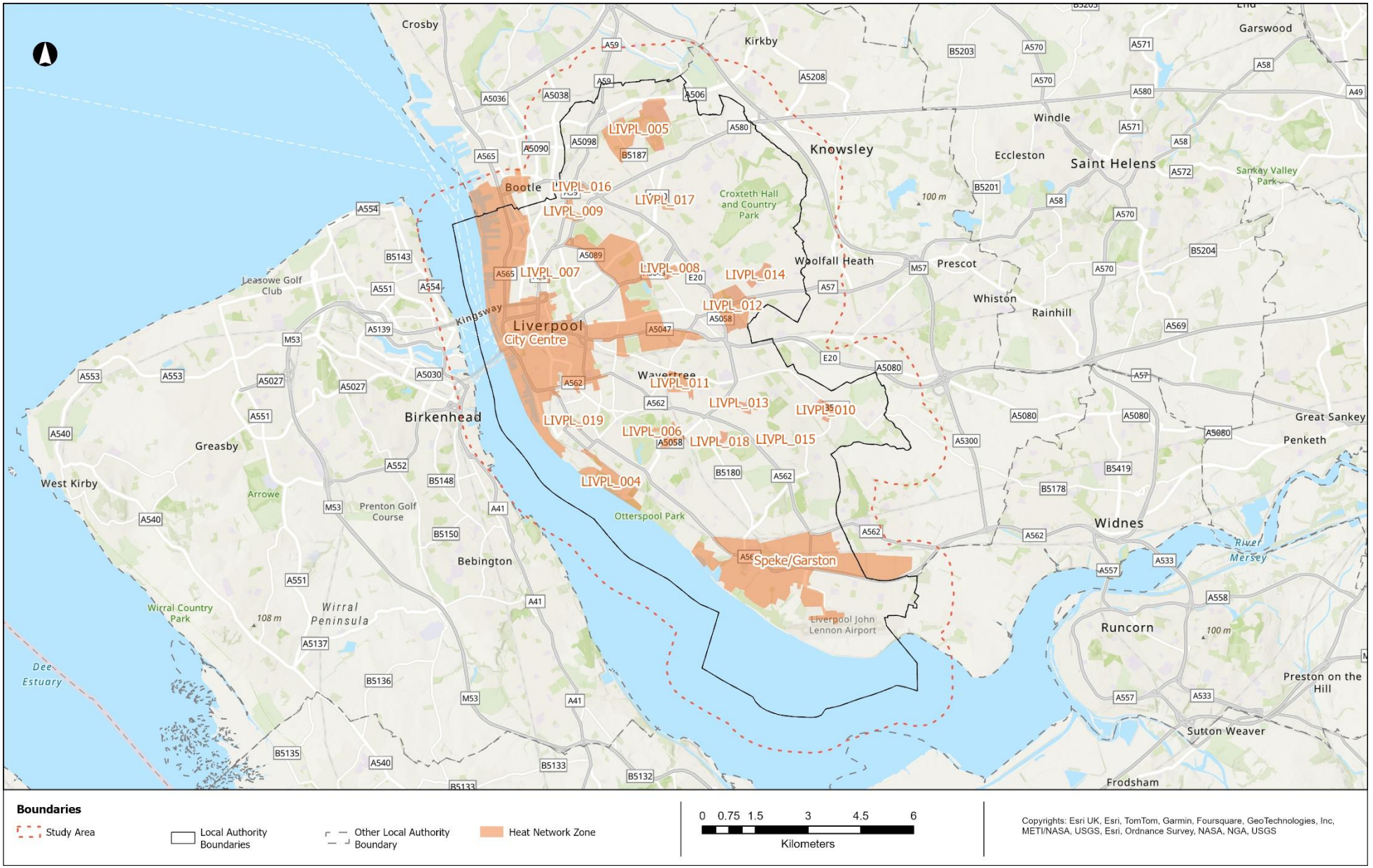
[8] https://liverpool.gov.uk/media/1tkbedcv/01-liverpool-local-plan-main-document.pdf, Policy R7, Available at: liverpool.gov.uk (www. liverpool.gov.uk)

docks, or the wastewater treatment works (WWTW) at Sandon Dock. This implies that city-scale decarbonisation systems would need either to be based around energy generation located close to the river/docks, or alternatively, that relatively large volumes of river water would need to be pumped to an energy centre(s) located close to the areas of highest heat demand within the city. The preferred approach outlined in this report is to locate an energy centre at, or close to, Sandon Dock, which should enable a heat network system to operate throughout large parts of the city, supplying heat to both the city centre and the Knowledge Quarter. At the same time, smaller areas which also have access to the docks or other potential sources of low carbon heat, could develop their own smaller heat networks. Examples include the King's Dock / Exhibition Centre area, and the area around Aintree Hospital.

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

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

Figure 4 Heat Network Zones Identified within the Liverpool Study Area



3) Strategic Heat Network Zones

Strategic HNZs in Liverpool

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

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

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

Scope	Annual heat demand (GWh/yr)
All buildings required to connect in all zones[9]	850
All buildings required to connect in strategic zones	700
All buildings connected to the IZOs	500

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

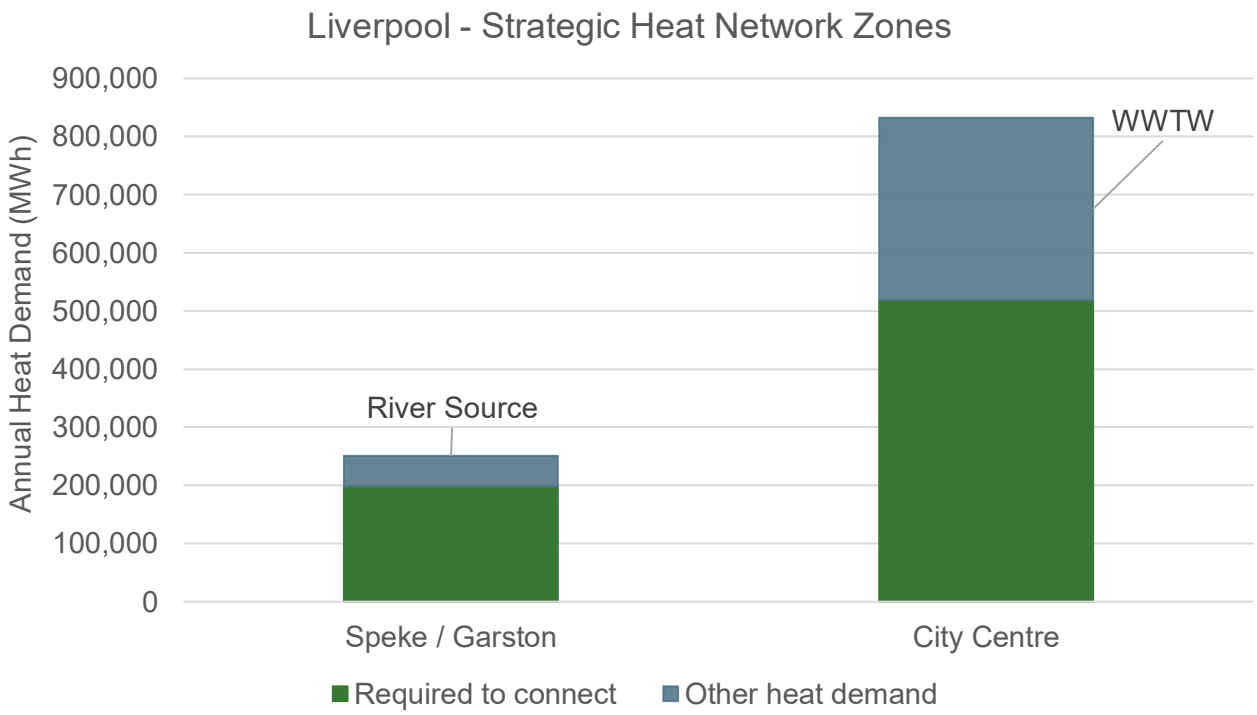
The two strategic zones are summarised below. Figure 5 illustrates the size of each, alongside the potential heat source and the proportion of buildings that may be required to connect.

Liverpool City Centre – is the largest potential HNZ identified by heat demand and encompasses a large area of high heat density in the city centre, from the retail centre to the Knowledge Quarter and beyond. For more information, please see Section 3.1.

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

Liverpool Speke / Garston – This potential HNZ focusses on the industrial operations in Speke and Garston, close to Liverpool Airport. For more information, please see Section 3.2.

Figure 5 Summary of Heat Demands in all Strategic HNZs Identified



3.1) Liverpool City Centre

3.1.1) Liverpool City Centre – HNZ Summary

The Liverpool City Centre HNZ covers a large portion of the waterfront and docks area and extends inland to the Knowledge Quarter area. LCC has an aspiration to utilise the expansion of heat networks as a route to social regeneration and alleviation of fuel poverty. As a result, some residential areas near the Knowledge Quarter and towards Anfield have also been included within this HNZ.

The key opportunities and strength of this zone are the high density of potential heat demands in the city centre and Knowledge Quarter, coupled with low carbon heat sources with potential for a WSHP recovering heat from the Sandon Docks WWTW and the docks of the Mersey. The zone includes 340 buildings that may be required to connect under the Heat Network Zoning policy. Key anchor loads include public sector office buildings and further education facilities of the University of Liverpool, Liverpool John Moore University, and Liverpool Hope University.

3.1.2) Liverpool City Centre - Existing Heat Networks

Operational Heat Networks and Planned Expansions

There are four operational heat networks within the zone, described below and shown in Appendix 1: Map D.

Mersey Heat Network

The Mersey Heat Network is being developed by Peel NRE to provide low carbon heat to the Liverpool Waters development and surrounding areas. A dedicated ESCo ("Mersey Heat") has been established to build, own and operate the network. The Mersey Heat system is currently operating from a temporary first phase energy centre (operating on gas boilers), but a permanent WSHP is currently being installed and will be operational soon.

Mersey Heat will continue to expand their network to encompass the remaining elements of the emerging Liverpool Waters development, as well as planning to expand to neighbouring buildings including the iconic 'Three Graces' and the Museum of Liverpool. The permanent energy centre will serve the expanded system and contain 6MWth of WSHP, drawing from the Leeds / Liverpool canal, alongside 40MWth of gas boiler capacity and 260 cubic metres of thermal storage. The installation of one of the two 3MWth heat pumps is supported through the Heat Network Investment Project[10]. Mersey Heat is also seeking to expand its operations to include the '10 Streets' area immediately adjacent to the Liverpool Waters development.

University of Liverpool

The University of Liverpool currently operates a heat network across its campus in the Knowledge Quarter, where the primary sources of heat are three reciprocating gas-fired CHP engines (2 x 2MWe and 1 x 3.3MWe unit), two 12MWth gas boilers and a combined flue-gas recovery and fired boiler (13.4MWth). These are in a central boiler house within its campus area and serves approximately 60 buildings. The network is divided into different sections, with different sections operating at HTHW, MTHW, and LTHW[11] temperatures.

Royal Liverpool University Hospital

The Royal Liverpool University Hospital currently operates a steam system serving the older elements of the site, based around generation from gas-fired CHP. The hospital has an energy centre comprising three packaged boilers and a waste heat boiler recovering heat from two CHP units. The maximum steam output is approximately 19 tonnes/hour at 6.2 bar (~11 MW).

Paddington Village

The Paddington Village system is owned by LCC and is supplied by gas-fired CHP as the primary heat source. The energy centre currently has 1.2MWe CHP and 10MWth gas-fired boiler capacity, alongside 160m^3 of thermal storage. The original design allowed for an additional CHP unit of the same size to be installed, but it is unlikely that this design will be taken forward. There is currently a Heat Network Delivery Unit (HNDU) study being undertaken to evaluate the potential decarbonisation options for the system. Whilst the work is still

[10] https://tp-heatnetworks.org/peelnre/, Available at: tp-heat networks (tp-heatnetworks.org)
[11] HTHW – High Temperature Hot Water; MTHW – Medium Temperature Hot Water; LTHW – Low Temperature Hot Water

ongoing, the potential to expand the network to serve other neighbouring loads and to introduce heat pump plant falls within the scope of this investigation.

3.1.3) Liverpool City Centre - Initial Zone Opportunities

A single IZO was identified in the Liverpool City Centre zone. Potential routing[12] for the IZO is shown in Figure 6 and summary statistics provided in Table 2.

Table 2 Liverpool City Centre - Summary Statistics for Initial Zone Opportunities[13]

CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£325m	>300GWh/yr	>40km	50ktCO_{2e}/yr	8.0MWh/m	WWTW and docks WSHPs

The identified IZO is in an area of high heat density, where a heat network is highly likely to be viable and able to deliver low carbon heat at a lower cost against alternative low carbon approaches. It is also close to the largest key sources of low carbon heat identified in the city (i.e. the Sandon Docks WWTW, the docks themselves, and the River Mersey).

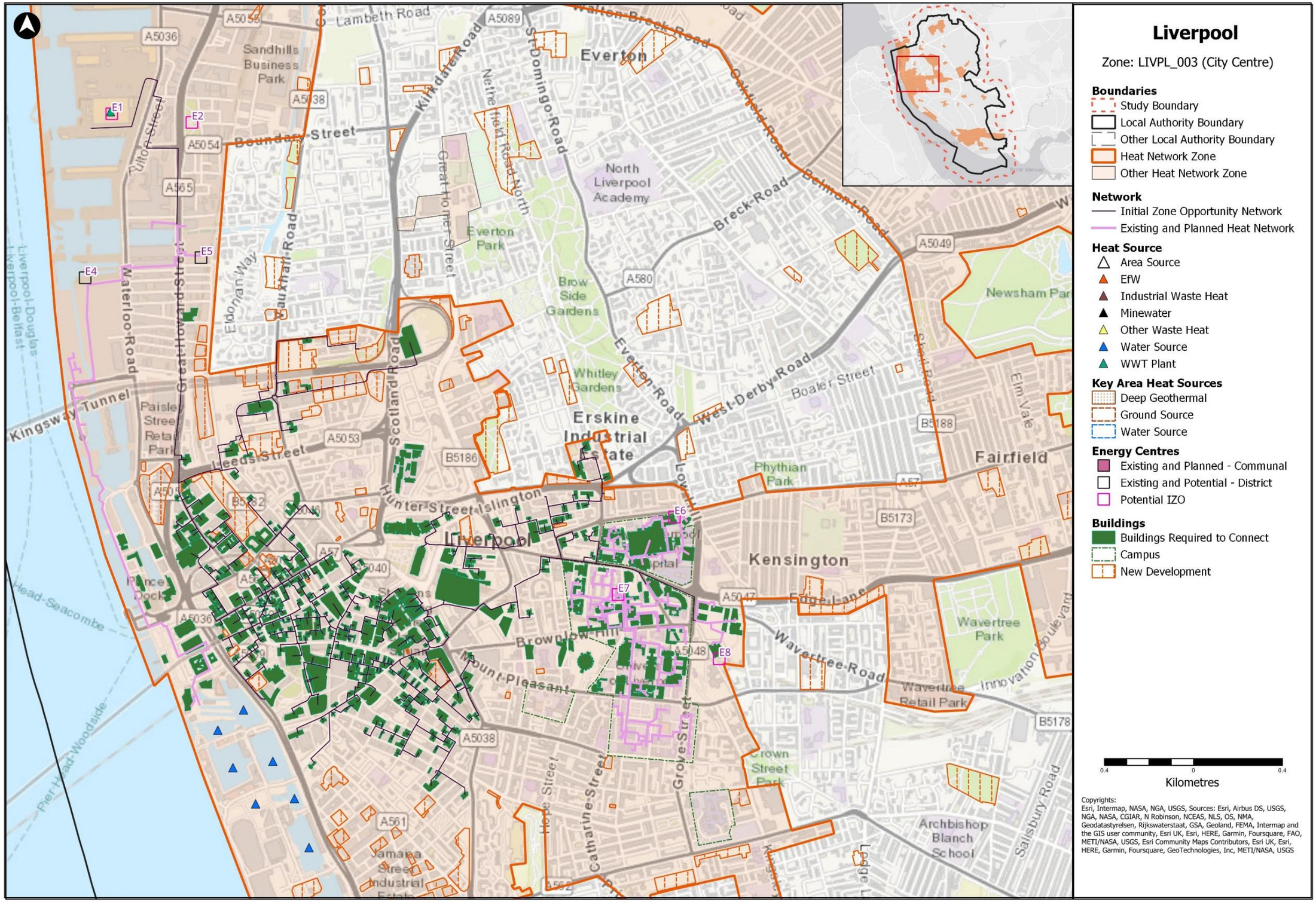
At a more strategic level, the area forms a key link between the low carbon heat sources identified, the large institutions with existing heat networks, and decarbonisation aspirations in the Knowledge Quarter. The selection of the IZO in this area is also complemented by previous HNDU funded work in Liverpool Docks that highlighted the potential for smaller-scale docks-water based WSHPs to be installed to serve key buildings on the Waterfront.

To successfully deploy the IZO, it is recommended that existing heat network assets are upgraded to be compatible with a heat pump system. This is particularly the case for the existing University of Liverpool and Royal Liverpool University Hospital networks. It is envisaged that the energy centres of these existing networks could be reutilised both as a means of accessing the significant connected demands of these systems, and as a location to house top-up and standby heating plant to meet the peak heat demands of the network.

The extent of the IZO identified has also been influenced by the constraints represented by the docks water and the challenge of installing pipework linking to some areas of the waterfront.

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

Figure 6 Initial Zone Opportunities in Liverpool City Centre HNZ



3.1.4) Liverpool City Centre – IZO Heat Demands

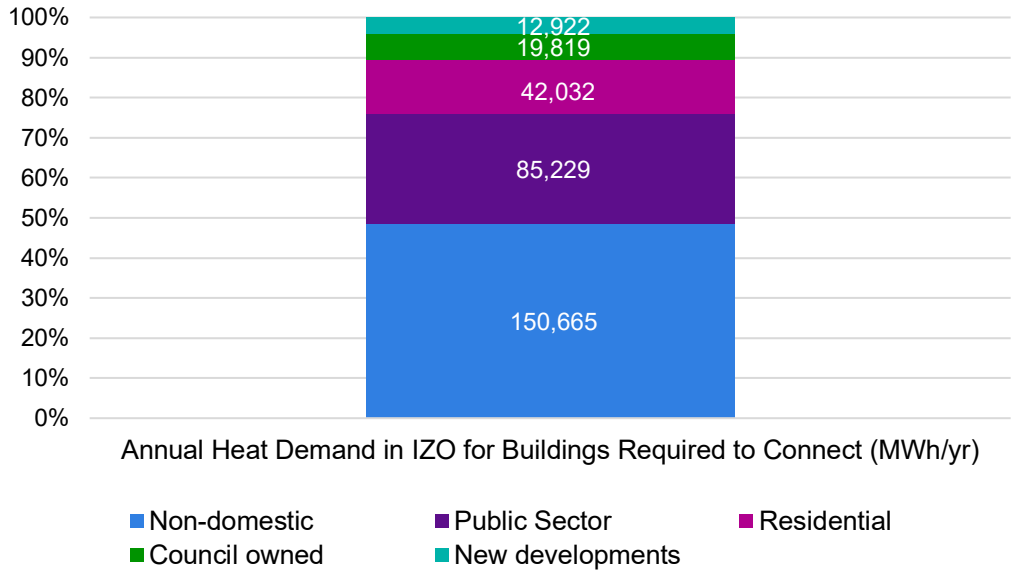
The heat demands identified within the IZO are described below. The Pilot programme used several sources including local data collected from building owners; national energy demand datasets; benchmarks applied via the National Zoning Model (NZM); and a standardised approach to estimate the potential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

Where there are different values between datasets, the methodology prioritised the use of the early prototype version of the National Zoning Model, for consistency. This 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 buildings potentially required to connect to the IZO comprise a mix of retail, hotels, commercial offices, and public sector buildings. The total heat demand from all buildings that may be required to connect within the IZO is estimated at 300GWh/yr.

A breakdown of heat demand per building typology is presented below, with most of the demand identified being non-domestic or public sector (Figure 7). This is followed by the largest heat demands that may be required to connect in the IZO (see Table 3).

Figure 7 Liverpool City Centre - Categorisation of Heat Demand for Buildings Required to Connect in IZO



Key buildings potentially required to connect include the University of Liverpool, Mersey Heat Network, Royal Liverpool University Hospital, the Capital Shopping Centre, Paddington Village District Heating Network, Premier Court (Hatton Garden), The Department (a gym / hotel), India Building (Water Street), The Plaza (Old Hall), Liverpool One, World Museum, QEII Law Courts and Liverpool John Moore University.

Other buildings that might appear relatively large, but which are not currently incorporated with the IZO include the warehouses and docks buildings on the Waterfront to the north of the HNZ as there is uncertainty as to whether these are heated and/or would be compatible with a low-temperature heat network system.

Table 3 Liverpool City Centre - Key Heat Demands Required to Connect in the IZO[14]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
University of Liverpool Campus	Public Sector	Unknown	75,100	Metered
Royal Liverpool University Hospital	Public Sector	1	19,700	Estimate based on stakeholder plant capacities
The Capital Shopping Centre	Non-domestic	Unknown	7,000	Benchmark (NZM)
The Department	Non-domestic	1	3,500	Benchmark (NZM)
India Building	Non-domestic	1	3,400	Benchmark (NZM)
Liverpool John Moore University James Parsons Building	Public Sector	1	3,300	Metered
The Plaza, Old Hall	Non-domestic	1	3,300	Benchmark (NZM)
World Museum	Non-domestic	1	2,900	'Metered'
QEII Law Courts	Public Sector	1	2,900	National Dataset (MoJ)
Martin's Bank Building[15]	Non-domestic	1	1,400	Benchmark (NZM)

[14]Please refer to Appendix 3 for definitions related to building categories in this table.
[15]This building at the time of writing this report is undertaking refurbishment.

As can be seen, there is a very significant heat demand that is currently served by the centralised plant at the University of Liverpool. This is currently distributed at different temperatures and the HTHW and MTHW network sections will require conversion to allow for the integration of lower temperature heat. The University is working towards decarbonisation and heat electrification, planning to lower campus temperatures gradually and increase the use of heat pumps.

The Royal Liverpool University Hospital also represents a significant demand in a similar situation (i.e. with a high temperature (steam) system that requires conversion to serve the retained older elements of the hospital site). The NHS Trust is currently working on identifying an appropriate decarbonisation strategy for its assets. This strategy will likely include at least partial compatibility with heat pump heating systems, although the timeline for this conversion has yet to be determined.

The other buildings listed in Table 3 represent a selection of the wide array of buildings in the dense centre of Liverpool. There are multiple buildings where the historic nature of their construction (including ornate rooflines in many cases) would seem to preclude, or at least make extremely challenging, the installation of ASHP as a counterfactual option for decarbonising heat and therefore connection to a heat network will be the most reasonable solution. An example would include the India Building (occupied by HMRC).

There are also several more modern buildings (including The Capital and Plaza buildings) where their size and anticipated heat demand suggests that they represent potentially useful anchor loads for an emerging network. However, the city centre is characterised by a high-density urban environment, featuring numerous buildings of comparable scale to those mentioned here.

3.1.5) Liverpool City Centre – IZO Heat Sources

The key potential low carbon heat sources identified to supply the IZO all lie directly adjacent to the docks and the River Mersey. In the future, however, as decarbonisation plans for key institutions develop, these plans may also lead to other heat source opportunities.

Currently, the Sandon Docks WWTW (United Utilities) is identified as a key potential location for waste heat recovery. It is proposed that WSHPs could be used to upgrade the temperature of the outfalls from the facility to generate heat for a heat network. Early discussions with United Utilities have also suggested that they would be amenable to the use of a portion of their Sandon Dock site to house plant associated with heat recovery.

The docks that line the Mersey throughout the city offer significant potential to be used as a natural heat source for WSHPs. The River Mersey itself also offers a potentially almost limitless source of ambient heat but is heavily silted and tidal. Both factors pose challenges for the extraction of heat.

The Hospital and University within the Knowledge Quarter are both developing decarbonisation plans for their sites, and this transition may offer additional opportunities for low carbon heat provision to a city-scale network.

Table 4 and Table 5 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 6 in Section 3.1.3 and Appendix 1: Map C.

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

Heat source type	Supplied Capacity (kWp)	Temperature (ºC)	Potential Energy Centre (Ref number)
WSHP WWTW Docks water	 30,000 20,000	 70-80 ºC[16]	 E1, E2
Existing heat networks University of Liverpool	 45,000	 80-120 ºC[17]	 E7

Table 5: Liverpool City Centre - Potential IZO Energy Centre Locations

EC Ref Number	Site type	Size (m^2)	Ownership	Heat Source
E1	Land	~1,200	United Utilities Leasehold (TBC)	WSHP from WWTW and docks
E2	Land	~6,000 (based on half of available space)	LCC	WSHP from WWTW and docks
E7	Existing EC	~800	University of Liverpool	Top-up / standby plant

3.1.6) Liverpool City Centre – IZO Heat Distribution

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

[16] The temperature at which heat will be distributed to heat offtakers, after upgrade processes.
[17] The temperature at which existing energy centre plant supplies heat to heat offtakers.

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

The network route of the IZO is proposed to serve city centre heat demands with a LTHW distribution system via Great Howard Street from an energy centre located at Sandon Dock.

Whilst this represents one possible configuration of a network, an alternative that has also been considered, but not presented here, would be to locate a filtering / pumping station at the Sandon Dock, and to distribute low/ambient temperature water to one or more energy centres located within or close to the city centre. This approach would have the advantages of potentially reducing the cost (in comparison with the LTHW generation option at Sandon Dock) of the distribution network (recognising that the small temperature differential across the flow and return pipework of the ambient loop element would result in large internal diameters), reducing heat losses, and facilitating the use of ambient heat by multiple energy centres.

Table 6 Liverpool City Centre - Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Liverpool City Centre	40	125

3.1.7) Liverpool City Centre – IZO Key Constraints and Mitigations

[C1] Rail crossing: The proposed network route needs to cross the railway to connect the loads closer to the city centre to those further to the north-east (Royal Liverpool University Hospital / University of Liverpool campus). There are numerous bridges over the railway in the area which could provide potential routes; Russell Street was identified as a preferred option during a walked inspection of the area. Further feasibility assessment is required to fully assess the suitability of this route for heat network pipework.

3.2) Liverpool – Speke / Garston

3.2.1) Liverpool – Speke / Garston – HNZ Summary

In the south of the LCC boundary area, in Speke / Garston there is a concentration of industrial sites close to the Liverpool John Lennon Airport which provide another opportunity for the roll-out of heat networks. As shown in Figure 4, there is a significant distance between this area and Liverpool City Centre.

Key opportunities are likely to include the ability to recover heat from the industrial operations active in the area as well as WSHPs recovering heat from Garston Docks and/or the River Mersey.

3.2.2) Liverpool – Speke / Garston - Existing Heat Networks

No existing district-scale heat networks have been identified in the potential zone.

3.2.3) Liverpool – Speke / Garston – Initial Zone Opportunities

A single IZO was identified in the Speke / Garston zone. Potential routing[18] for the IZO is shown in Figure 8 and summary statistics provided in Table 7.

Table 7 Liverpool – Speke / Garston - Summary Statistics for Initial Zone Opportunities[19]

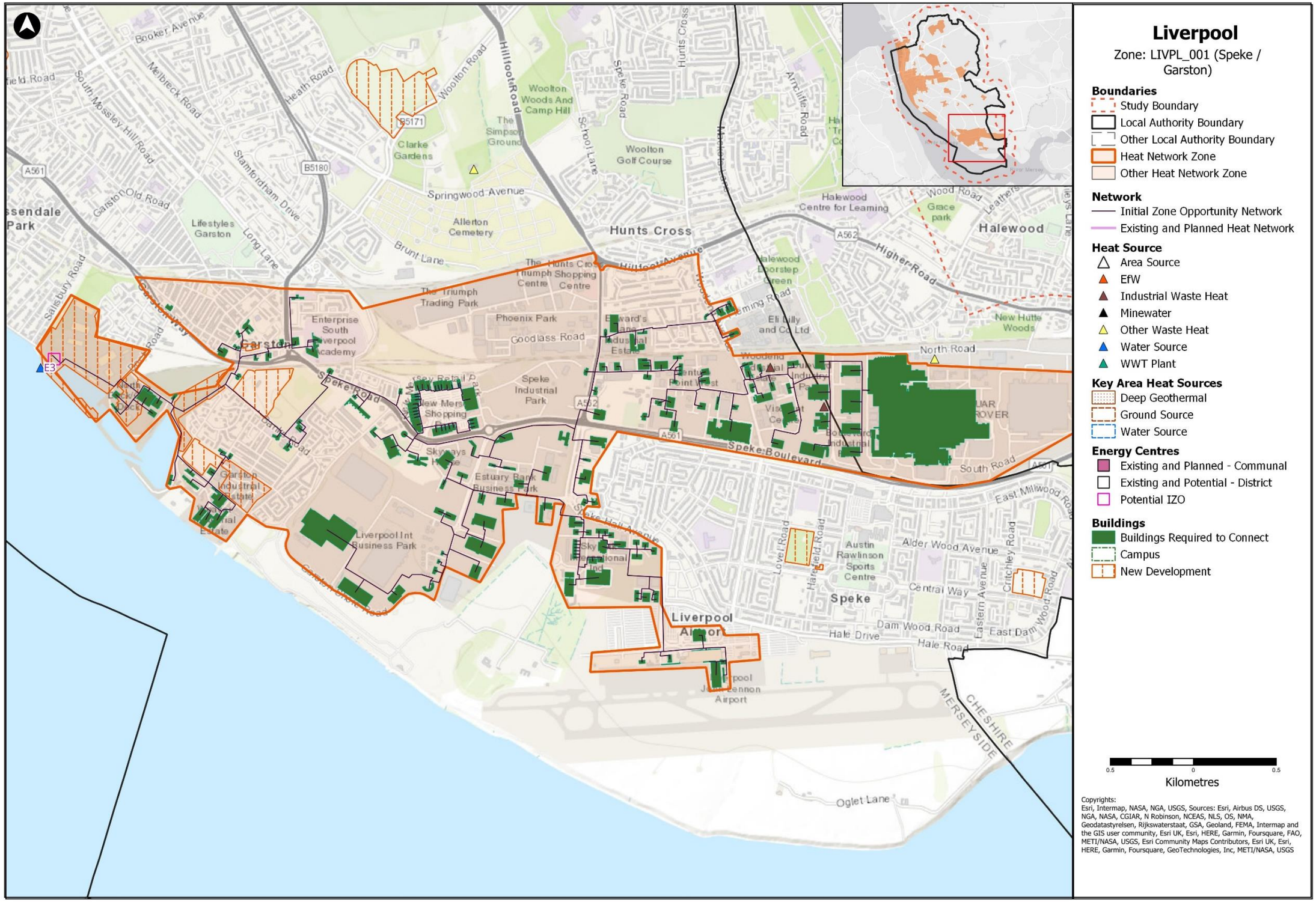
CapEx	Heat	Network	CO_{2e} savings	Linear Heat Density	Heat Sources
~£200m	~200GWh/yr	>40km	30 ktCO_{2e}/yr	5.5MWh/m	Docks / River-source WSHP / waste heat

The identified IZO connects to several large industrial customers and is proximal to the Mersey and the Garston docks (North Dock, Old Dock, Stalbridge Dock). The John Lennon Airport and its surrounding development are also notable elements of the area.

The IZO has been identified predominantly due to the large volumes of heat being generated at multiple sites, coupled with significant visible heat rejection equipment in the area. It has been difficult to obtain energy consumption data for the key sites, but nevertheless, there would appear to be opportunity for the electrification of heat and to create a system that interlinks these major sites. At the same time, an additional opportunity illustrated here is to exploit the heat available within the docks system and/or the Mersey, to provide a source of low carbon heat for a network that would displace local boiler operation.

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

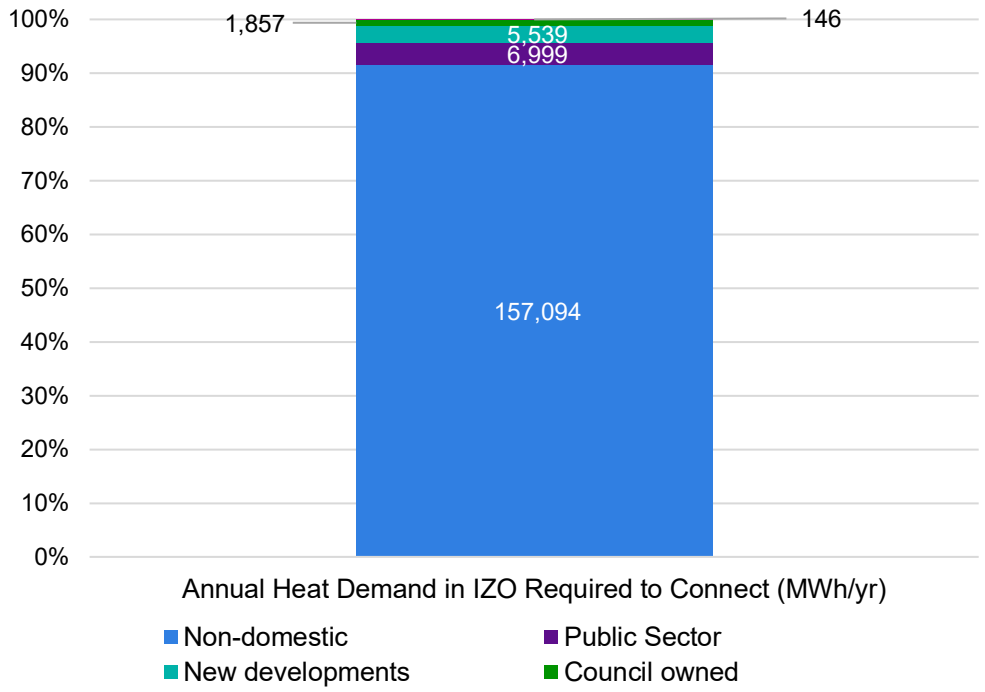
Figure 8 Initial Zone Opportunity in Liverpool – Speke / Garston HNZ



3.2.4) Liverpool – Speke / Garston – IZO Heat Demands

The total estimated demand of the buildings potentially required to connect in the IZO is approximately 200GWh/yr. A breakdown of heat demand per building typology is presented below. Figure 9 illustrates that most of the estimated heat demand[20] consists of non-domestic buildings (encompassing the industrial, commercial, and logistic operations). Further details of the key heat demands for buildings potentially required to connect in the IZO are provided in Table 8.

Figure 9 Liverpool – Speke / Garston - Categorisation of Heat Demand for Buildings Required to Connect in IZO



The two sites that dominate the area are the Jaguar Land Rover Halewood plant, and the Ford Halewood Transmission site, with other notable buildings being the hotels associated with the Airport, the New Mersey Shopping Park, and pharmaceutical operations (AstraZeneca / HP Chemie Pelzer / Medimmune UK / CSL Seqirus). To the east of John Lennon Airport, there is a significant area of low-rise housing with a retail centre and several schools and other small community facilities.

The largest site in the area is Jaguar Land Rover. The sub-regional level data for the area shows that there is a very high consumption of gas. Given the presence of many large distribution centres in the area (and given that it is unlikely that the primary spaces of large distribution sites are heated), there is reasonable confidence that large volumes of gas are being consumed at a few key industrial locations. The key questions that remain to be resolved for these industrial sites are the degree to which gas is being consumed for high-temperature processes (which could not easily be displaced by electrification of heat), and the degree to which there is waste heat available for recovery. The Jaguar Land Rover site has several

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

cooling towers and flues, but their future operational status is uncertain as the organisation undergoes significant changes under the 'Re-imagine strategy' aimed at reducing heating and cooling demand. This should be further investigated with the stakeholder in due time.

Table 8 Liverpool – Speke / Garston - Key Heat Demands Required to Connect in the IZO[21]

Building name	Building category	Number of connections	Annual Heat Demand (MWh)	Data Source
Jaguar Land Rover	Non-domestic	Unknown	68,000	Benchmark (NZM)
Liverpool International Business Park	Non-domestic	1	10,000	Benchmark (NZM)
Southern Gateway Business Centre	Non-domestic	1	3,900	Benchmark (NZM)
CSL Seqirus (Site 4)	Non-domestic	1	3,800	Benchmark (NZM)
Johnsons Controls	Non-domestic	1	3,600	Benchmark (NZM)
Magna Exteriors Ltd	Non-domestic	1	3,300	Benchmark (NZM)
AstraZeneca	Non-domestic	1	2,300	Benchmark (NZM)
HP Chemie Pelzer	Non-domestic	1	2,200	Benchmark (NZM)
Hampton by Hilton	Non-domestic	1	1,600	Benchmark (NZM)
Medimmune UK	Non-domestic	1	1,400	Benchmark (NZM)
South Liverpool NHS Treatment Centre	Non-domestic	1	600	Benchmark (NZM)

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

3.2.5) Liverpool – Speke / Garston – IZO Heat Sources

The primary source of low carbon heat identified to supply the IZO is the Garston Docks and the River Mersey. Access to this resource is suggested at the point of interface between the North Dock and the River Mersey, where new development around the docks could provide a route to access the water, and house WSHP heat generation plant.

Whilst the docks water represents a source of low carbon heat, the potential recycling of heat between industrial users is seen as an opportunity in the future. This is contingent upon several factors, which would include negotiation with the sites involved, as well as the design of a system that is capable of effectively transferring the waste energy between a recovery point and heat consumers. The quantum, reliability, space available (for energy plant) and other factors could influence the design of an ambient loop networks in this area, with local heat pumps upgrading the heat to required operational temperatures on an individual site basis. An ambient loop network is not modelled in the figures presented in this report.

Key sites that are thought to have potential waste heat would include the Jaguar Land Rover and Ford Transmissions sites as well as the Medimmune UK and CSL Seqirus Vaccines sites. This could potentially be supplemented through heat recovered from electrical substations such as the Halewood, Speke grid-level substations (132/33kV), and Medeva primary substation (33/11kV), which currently serve the large industrial loads with power.

Table 9 and Table 10 summarise the key heat sources and potential energy centre locations identified for this IZO. These are also shown in Figure 8 in Section 3.2.3 above and Appendix 1: Map C. The supplied capacity in these tables represent the estimated low carbon heat generation output for the IZO.

Table 9: Liverpool – Speke / Garston - Key Heat Source Opportunities for the IZO

Heat source type	Supplied Capacity (kWp)	Temperature (ºC)	Potential Energy Centre (Ref number)
WSHP Docks River	30,000 (estimated combined)	70-80 ºC (WSHP output)[22]	E3

Table 10: Liverpool – Speke / Garston - Potential IZO Energy Centre Locations

Reference	Site type	Size (m^2)	Ownership	Heat Source
E3	Land	~2,000	Private	WSHP

[22] The temperature at which heat will be distributed to heat offtakers, after upgrade processes.

3.2.6) Liverpool – Speke / Garston – IZO Heat Distribution

Table 11 shows the network statistics for the IZO including the network length and associated costs. Please refer to Section 3.1.6 and Appendix 5 for the assumptions used. The proposed IZO network route developed for the Speke / Garston zone is based on a LTHW distribution network with generation at an energy centre located by the Garston Docks. However, as noted in Section 3.2.5 above, with greater resolution of information on the quality and quantum of waste heat available and heat demand requirements, could influence the design of an ambient loop distribution network. However, for the purposes of this document, figures associated with a more traditional LTHW network design approach are presented.

Table 11 Liverpool – Speke / Garston - Indicative Heat Network Statistics for the IZO

IZO Heat Network description	Network length (km)	Network cost (£m)
Speke / Garston	40	90

3.2.7) Liverpool – Speke / Garston – IZO Key Constraints and Mitigations

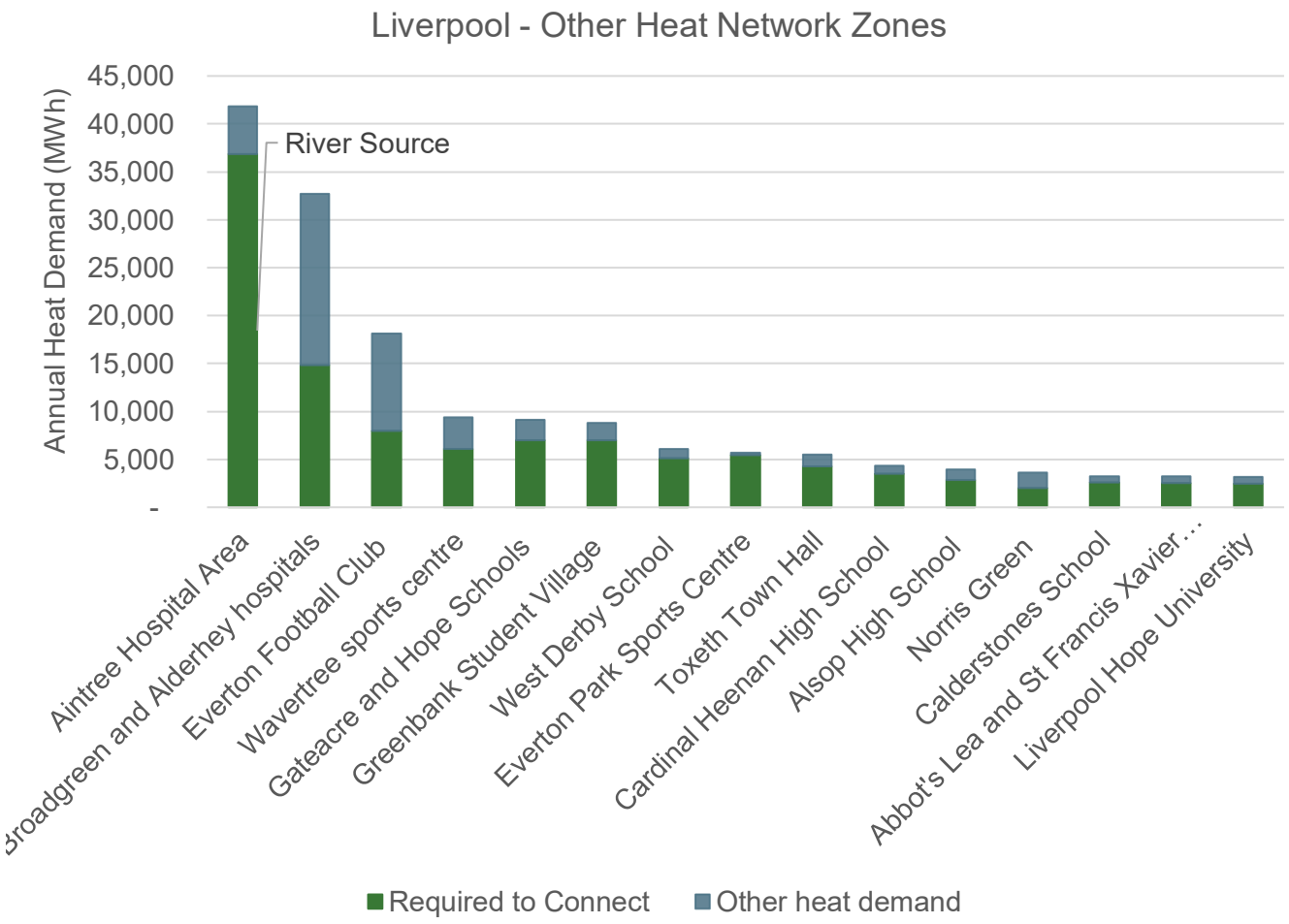
[C2] Rail crossing: A Merseyrail railway line runs through the length of the zone and would need to be crossed to connect all buildings proposed to connect to the IZO. There are two bridges, situated on Speke Hall Road and Woodend Avenue, that could be used for crossing the three sets of railway lines. Visually, the two options appear to be near identical and therefore Speke Hall Road has been selected to minimise distribution pipework length. A feasibility assessment would be required to assess the suitability of the proposed solution.

4) Other Heat Network Zones

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

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

Figure 10 Total Heat Demand and Proportion Required to Connect in Other HNZs



Aintree Hospital Area (LIVPL_005): is in the north-east of the city and is not deemed strategic. This is due to its surroundings, which consist largely of low-density residential areas, making it challenging to envision a strategic interconnection of this area with a broader zone scale system. The area is dominated by Aintree University Hospital and HMP Altcourse Prison, with a large light-industrial / retail area to the west. The United Utilities Fazakerley Wastewater

Treatment Works to the south-east of the hospital has the potential to provide low grade heat to serve WSHPs.

Festival Gardens (LIVPL_004): is a large development site that is at concept development stage. LCC appointed a team in November 2023 to prepare a development brief for an iconic waterfront residential community. This new development lies approximately 3 miles south of the Liverpool City Centre and is therefore not considered a strategic HNZ as it is likely to remain a stand-alone network. Nevertheless, it represents a significant opportunity for low carbon heat network development. On this site, there would be potential for WSHP supply from the River Mersey, or GSHPs. This zone is not shown in Figure 10 due to the early stage of the masterplan development.

Other HNZs based around hospital sites include Broadgreen (LIVPL_012) and Mossley Hill (Greenbank Student Village - LIVPL_006). The Broadgreen zone is dominated by the heat demands of Broadgreen Hospital and Alder Hey Hospital. This contrasts with the Mossley Hill zone where most of the estimated heat demand relates to the student village facilities (University of Liverpool). Within Mossley Hill, there appears to be a good opportunity for GSHPs, given the large open areas adjacent to the main heat demands.

Other HNZs based around sports facilities: include areas in proximity to Everton Football Club (LIVPL_009), Everton Park Sports Centre (LIVPL_007), Peter Lloyd Leisure Centre within the West Derby School HNZ (LIVPL_008) and the Wavertree Sports Centre (LIVPL_011). These zones all contain schools and other public buildings in addition to the sporting facilities which could provide anchor loads for heat networks. Each of these also has large green spaces associated with them (Stanley Park in the case of Everton Stadium), leading to potential consideration of GSHPs.

Other HNZs based around schools: include areas in proximity to the heat demands of schools (Gateacre and Hope (LIVPL_010), Cardinal Heenan (LIVPL_014), Alsop High School (LIVPL_016) Calderstones School (LIVPL_018), and Abbot's Lea and St Francis Xavier College (LIVPL_015). These are mainly a mix of secondary and primary buildings, with other public buildings or retail facilities close by.

Other HNZs: shown in Figure 10 above include Toxteth Town Hall (LIVPL_019), Liverpool Hope University (LIVPL_013) and Norris Green (LIVPL_017). They have different core loads: the Toxteth zone includes public buildings and retail typical of a suburban town centre, the University consists mainly of teaching and research buildings, and the Norris Green area is primarily retail oriented.

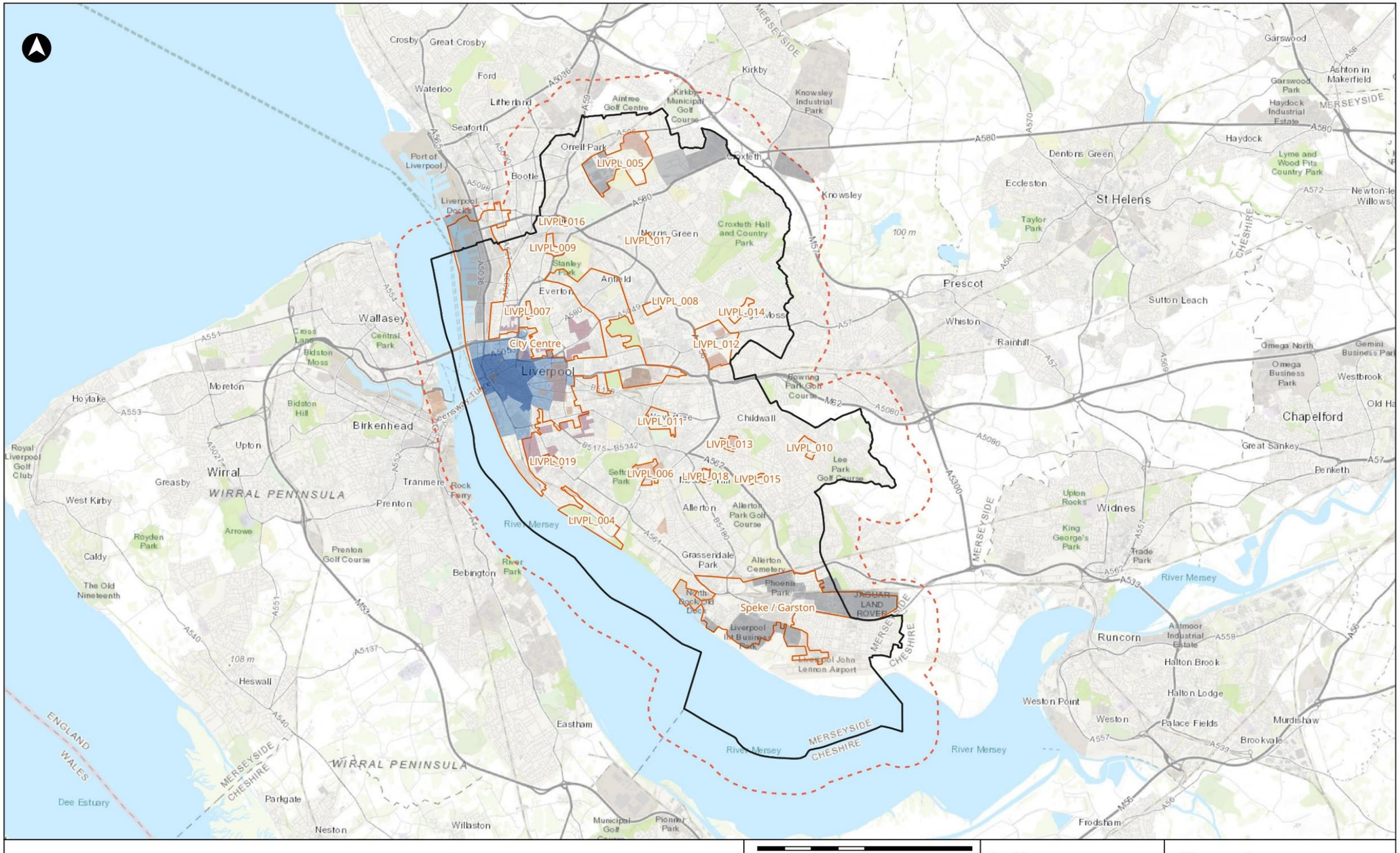
Appendix 1: Maps and Legends

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

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

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

A. Liverpool Typology Map



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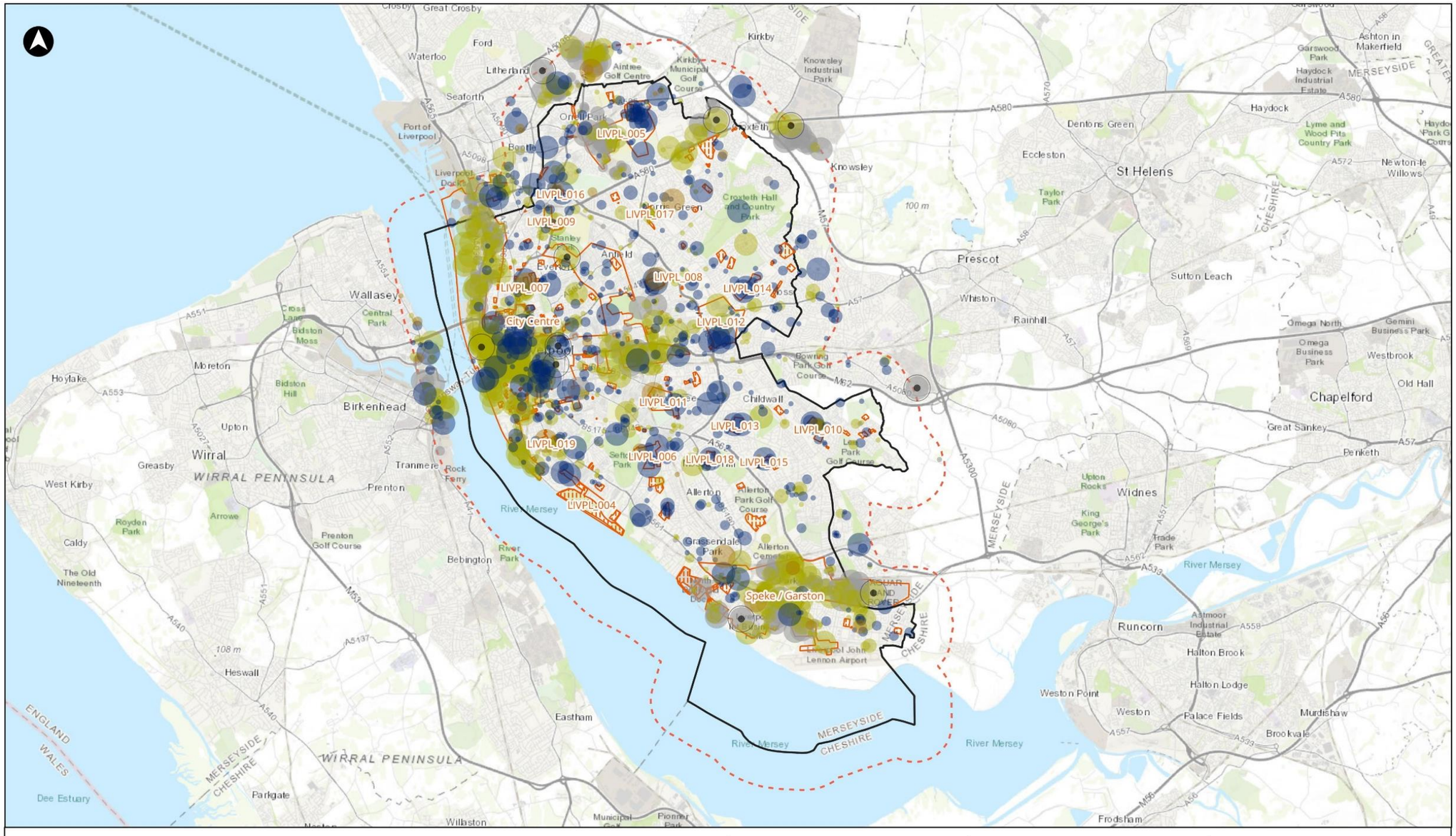
B. Key Heat Demands



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

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

6 0 6
Kilometres
Scale: 1:100,000

Coordinate System: OSGB36 / British National Grid

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Department for Energy Security & Net Zero

Liverpool

Map B

Key Heat Demand

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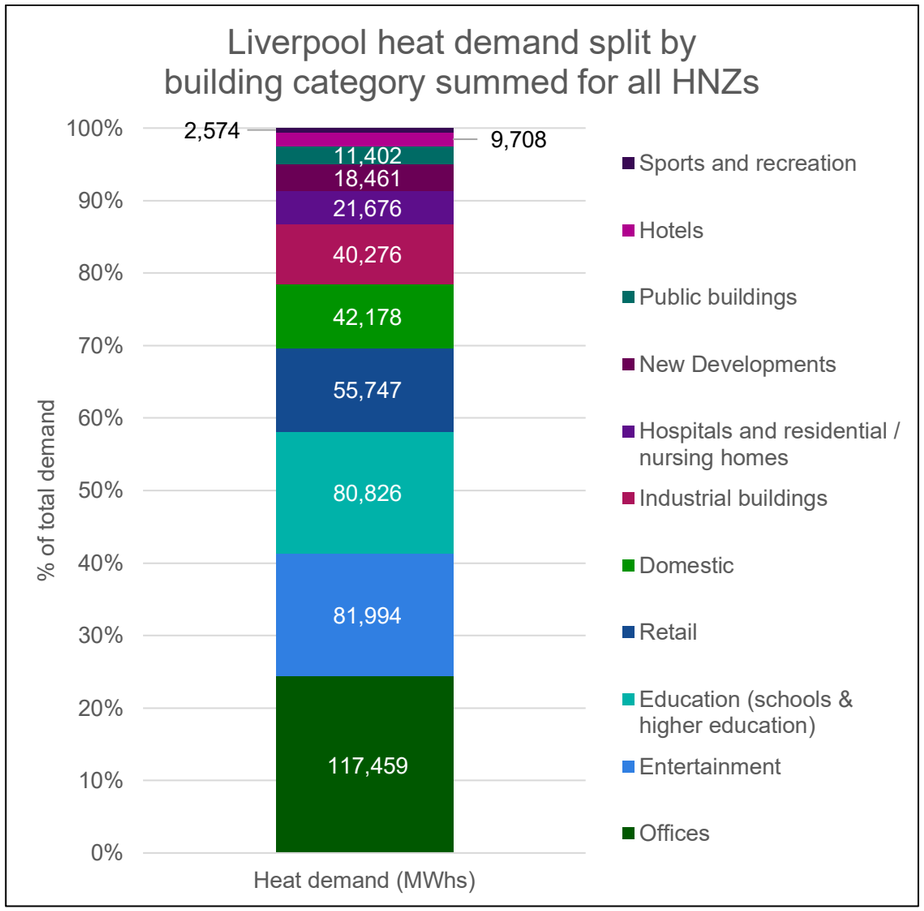
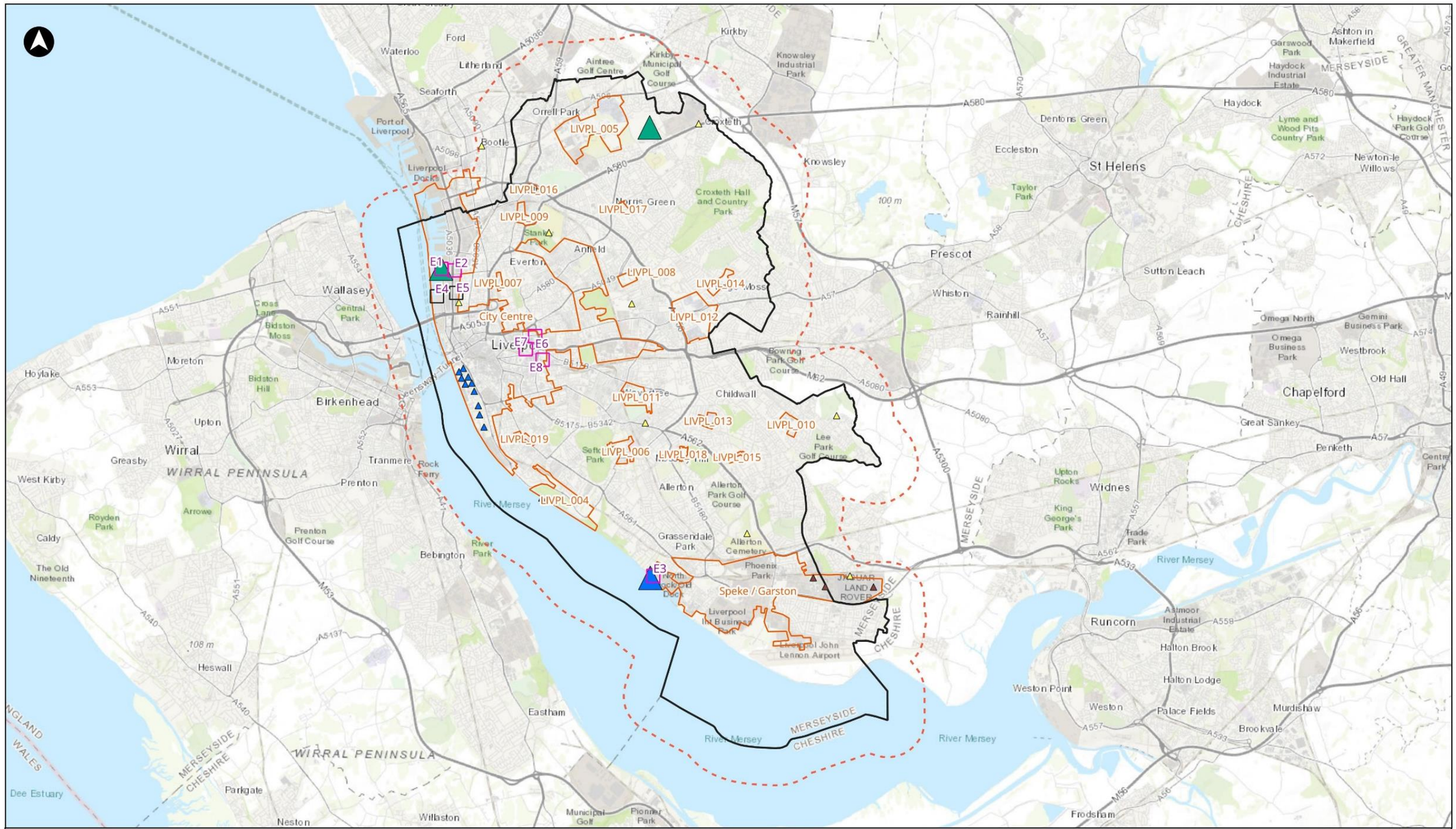
Table 12 Heat Demand split further by Building Categories across all Initial Zone Opportunities identified in Strategic HNZs in the study area

Building category	Annual Heat Demand of buildings required to connect across IZOs (MWh)
Offices	117,459
Entertainment	81,994
Education (schools & higher education)	80,826
Retail	55,747
Domestic	42,178
Industrial buildings	40,276
Hospitals and residential / nursing homes	21,676
New Developments	18,461
Public buildings	11,402
Hotels	9,708
Sports and recreation	2,574
Totals	**482,303**

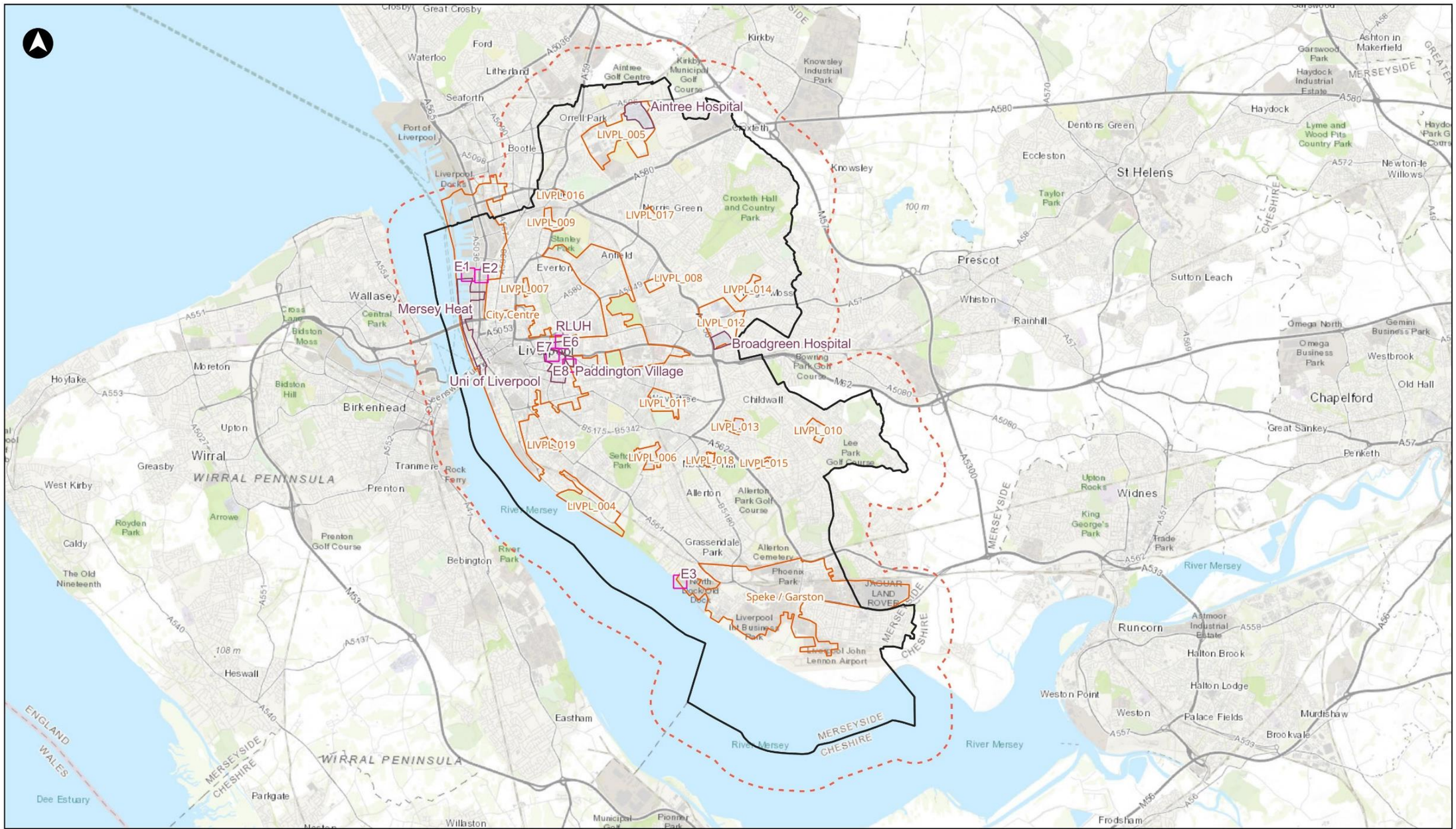


Note: In Liverpool there are two Strategic HNZs with two IZOs identified across them. The table and graph above summarise the heat demand for buildings required to connect to these IZOs.

C. Key Heat Sources and Potential 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

6 0 6
Kilometres
Scale: 1:100,000
Coordinate System: OSGB36 / British National Grid

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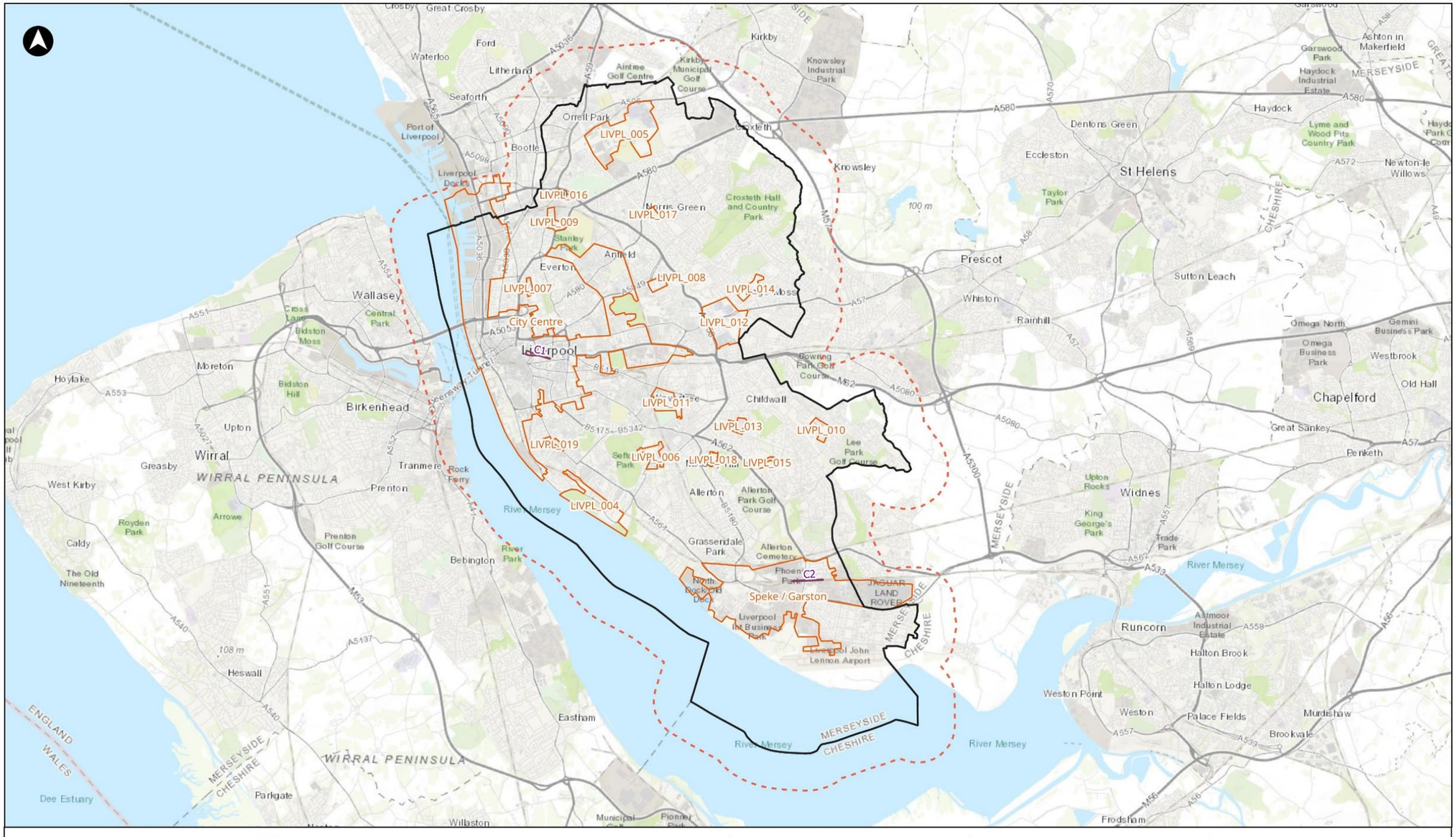
Department for Energy Security & Net Zero

Liverpool

Map D

Existing and Planned Heat Networks

E. Physical constraints



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

Key Constraints

6 0 6
Kilometres
Scale: 1:100,000

Coordinate System: OSGB36 / British National Grid

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Department for Energy Security & Net Zero

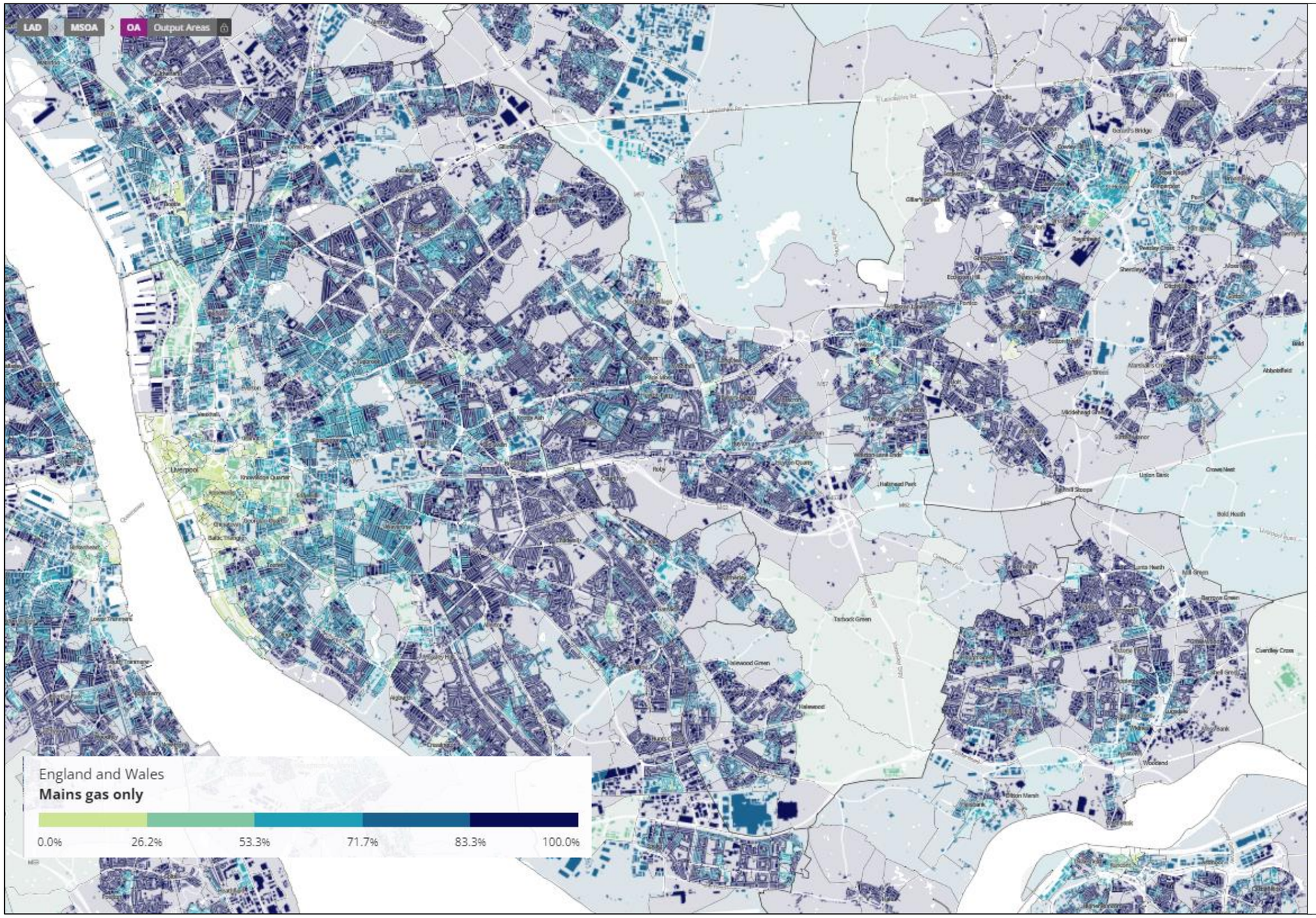
Liverpool

Map E

Physical Constraints

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.

F. Off-Gas Grid areas in Liverpool



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

Appendix 2: Data Room Resources

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

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

Table 13 Pilot Programme Standardised Information Resources

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

Table 14 Pilot Programme Study-Area-Specific Information Resources

Information resource	Description of resource
Stakeholder Directory	A directory listing key stakeholder. 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.

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

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