# Development Management Update

Brighton & Hove City Council

## Information Note: Toads Hole Valley heat network design guidance

This guidance provides a summary of the technical Design Guidance taken from the 'Toads Hole Valley Heat Network Study'. The Study can be seen on the Brighton & Hove City Council website, on the Planning webpages.

This note should be read in conjunction with Brighton & Hove City Plan Part One and the Toads Hole Valley Supplementary Planning Document.

**Introduction**

High level design guidance for an on-site district heating scheme for Toads Hole Valley was developed with funding from the government's Heat Network Delivery Unit within the department of Business, Energy and Industrial Strategy. This note summarises the findings of the Study and viability work, it is intended to be helpful guidance for the design of the Toads Hole Valley site.

The study explores how the viability of a heat network scheme could be improved at this greenfield site. It explores how density, phasing and infrastructure may influence the viability of a heat network. Further feasibility and viability studies will be needed to provide greater accuracy once the masterplan for the site is developed.

## Design Considerations

### 1. Considerations for development density and a heat network zone

- The study finds that to improve viability of a heat network at Toads Hole Valley it is recommended that a heat network zone be developed.
- The Toads Hole Valley site DA7 policy allocates residential density between 50-75 dwellings per hectare. Residential density is likely to be higher in areas with block of flats. It is suggested that a heat network zone be considered where local development density is increased and concentrated. This could include:
    - Mixed use buildings areas (shops, cafes and community hub combined with some flats in scenarios 2 and 3 providing mixed used buildings) – density above around 84 dwellings/Ha is recommended – as per scenario 4.
    - Flats
    - Business areas
    - School
    - Energy Centre
- A heat network zone could return higher line density than a site wide scheme and an increased technical and commercial performance.

### 2. Considerations for an Energy Centre

- To deliver a future proofed scheme and to allow for transition to renewable heat sources in future, design of the energy centre should balance the following considerations and be located close to:
    - the area of the development with highest block density to minimise distribution costs and efficiencies.
    - Phase 1 of the development scheme (in the Construction phasing plan)
    - gas infrastructure to reduce utility connection costs
    - major electrical infrastructure to allow for connection and enable future electrification of heat generation, and electricity export to the grid
    - road access for simplified delivery and plant maintenance as well as delivery and access for any potential biomass scheme
    - Close to access to the A27 to allow for potential routing of a gas transmissions pipe from the Anaerobic Digestion plant at the Hangleton Bottom site in the future
    - Close to access to the A27 for fuel delivery to enable delivery in case of biomass heating.
- If possible the energy centre should be located on a high part of the site, this would return lower operating pressures at the energy centre and avoid potential costs from higher pressure rated plant.
- The Study indicates a space allowance for an energy centre approximated as ~500m2.

### 3. Considerations for heat sources

- In terms of heat sources for a heat network, the site may have potential for ground source heat pump, biomass plant though viability assessment has been undertaken for gas combined heat and power (CHP) only. Biomass and ground source heat pump offer the lowest carbon solutions and potential for the site, it is therefore recommended that further feasibility and viability assessment be undertaken for these options as part of the masterplan development.

- Gas fired CHP plant is a 'transition technology': a heat network could initially adopt gas CHP plant but be converted later to a renewable fuel at the end of the life of the CHP plant. The Energy Centre location should therefore allow for a future transition.

## 4. Considerations for phasing of development

- The energy centre location should follow the phasing plan for the development, i.e. locating the energy centre close to phase 1 buildings. This reduces distribution costs during the initial phases of the development, and safeguards the network from higher future distribution costs in the event that no further phases are developed.
- City Plan Part One policy DA7 suggests that the first phase of the development includes the business area in order to attract residents on site. It is therefore suggested for THV that the energy centre is located near the business areas of phase 1.
- Modular plant installation should be considered to allow the energy centre capacity to increase with the increase in heat demand as the development progresses. This ensures the energy centre is not oversized and idle plant avoided during the first phases of the development.
- It is suggested that the heat network phasing runs in parallel with the overall development phasing so that it meets the heat demand requirements when these appear on site.
- It is recommended that the heat network installation runs in parallel with the installation of other utilities so that it benefits from reduced trenching costs.

## 5. Considerations for the pipe network

- The DH pipe network routing should be designed and installed to follow the phasing plan.
- The DH pipes should be installed in a multi-utility trench simultaneously with all other utilities – this will reduce trenching costs for the DH network.
- The network should be routed so as to avoid interfering with construction projects in future phases, which will avoid re-laying pipework.
- Design of the heat network should be optimised to minimise the service network length.

## 6. Considerations for building services design

The greenfield nature of the development site means that the development designers have the opportunity to optimise and reduce operating temperatures. Building service systems for both DHN and individual systems should:

- Comply with the CIBSE Heat Networks code of Practice for the UK CIBSE Heat Networks code of Practice for the UK [1]: CP1
- Ideally operate low temperature heat emitters as recommended by the Heat Networks Code of Practice for the UK (CP1) working at a maximum of 70°C-40°C should be used. Underfloor and other radiant heating systems will typically operate with floor temperatures below 35°C and typically flow

[1] CIBSE Heat Networks code of Practice for the UK, www.cibse.org/knowledge/

temperatures of 45°C should be used where possible which is advantageous for heat delivery this results in lowered return temperatures,

- Adopt 2-port control and variable flow systems installations in all cases.
- Generate instantaneous Domestic Hot Water (DHW) with use of a plate heat exchanger. This should always be operated at a suitable temperature to mitigate Legionella risk.
- It is recommended that if a heat network is installed, a specific connection guide should be created and written into any development contracts to include compatible design guidance.

### 7. Considerations for heat network temperatures

- The heat network should aim to minimise flow temperatures and maximise the differential between flow and return temperatures.
- High delta T reduces peak volume flow rates leading to smaller pipes and lower costs.
- Maintaining low return temperatures under part-load conditions is important to keep heat losses and pumping energy low,
- Designing for lower operating temperatures will result in higher efficiencies with some types of heat sources, e.g. heat pumps.
- Flow temperatures will be driven by the building systems (assuming a 5K temperature rise across a heat exchanger) installed with a maximum primary temperature of 75°C flow, return temperatures should be as low as possible.
- Adopt best practice, as per CIBSE Heat Networks Code of Practice (2015), which recommends a return temperature of below 40°C for a scheme supplying only new buildings.
- A summer network temperature relaxation should be considered but as a minimum should still be capable of providing safe DHW.

### 8. Considerations for town houses

- In the event that individual houses offer low line densities and poor economic performance in terms of heat network efficiency, delineation of a heat network zone (potentially excluding any very low density townhouses) may improve viability. This should be reassessed when detailed design is known. A separate approach for the individual houses may need to be developed.
- If an alternative approach is developed for townhouses, one potential approach may be to explore an air source heat pump solution with photovoltaic panels in place of individual gas boilers. This delivers low carbon heat in the absence of a heat network connection. Air source heat pump central heating systems are usually based on low temperature heating, therefore fit out of internal wet systems would be consistent with in all dwellings whether connected to a low temperature heat network or not. In this way a consistent buildings design approach is applied in the development.

### 9. Considerations for customer protection

- The heat network scheme should use a recognised industry scheme such as the Heat Trust Scheme to provide customer protection in relation to standards of service and fair pricing of heat.