

Project:	DH Haringey	Job No:	N/A
Subject:	Tottenham Hale – Previous Work Review		
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Tottenham Hale – Review of Previous Feasibility Study

Introduction

The Tottenham Hale feasibility study was completed in 2017, this memo summarises the outcomes of a compliance review with the CIBSE/ADE Heat Networks Code of Practice CP1 and to identify any further opportunities for the feasibility refresh. The purpose of this memo is to summarise the key points and recommended actions to ensure fully compliance is achieved and the development of the scheme reaches its full potential. A table detailing each point contained within in the standardised CP1 objectives checklist is presented in the Appendix. The sections of CP1 the study has been reviewed against is section 2. Items 2.1 to 2.12 covering feasibility.

Key Next Steps:

Following the review, the following next steps are proposed to ensure CP1 compliance and best practice for the DEN development; further feasibility work:

1. Peak heat demands and annual heat consumptions

- Revisit heat and electricity loads, as well as development timeframe based on submitted /planning documentation. Review latest accommodation schedules SAP and BRUKL calculations. Request developers peak heat demand estimates used to design and size their systems, and review and compare this to AECOM's own heat demand estimates.

2. Low carbon heat sources and location of energy centre

- Revisit previous identified potential heat sources as part of longlist to confirm their suitability/unsuitability including air source heat pumps, heat from underground ventilation shaft (Victoria Tube Line), Edmonton EfW Plant, heat recovery from buildings, local aquifers ground source heat pumps.
- The majority of the buildings have already secured planning applications on SAP 2012, which gives the DEN project some relaxation from applying a CHP based solution. However, demonstration of proposed transition to a lower carbon heat source will be required to secure HNIP if required.
- Advising on HNIP or other grant funding options and state aid calculations. In order to qualify for HNIP funding, heat networks must be served by a CHP engine generating at least 75% of the total heat, or renewable technology generating at least 50%. This is relevant when selecting the plant size, as achieving the required heat supply may not be the most economical option.
- Revisit and optimise the phasing of the generation plant in the energy centre based on the updated/finalised planning applications and development timescales.

3. Location of top-up and standby boilers and use of existing boilers

- Revisit top-up boiler's capacity based on revised planning information, revisit assumptions around plant sizing, ensuring load diversity and provision of redundancy have been optimised.
- Review option to retain satellite boilers and locate only the CHP in the EC offering potential for space optimisation.

4. Operating temperatures

- Establish most suitable operating temperatures for the network and heat source(s) selected. As network is to serve predominantly new developments, operating temperatures likely to be determined to suit the development's preferred design operating temperatures.
- Take all steps to drive down flow and return temperatures with pushing for best practice secondary side designs.
- Confirm tertiary side circuit types; radiators, AHU, underfloor heating etc.

5. Heat network distribution routes, pipe sizes and costs

- Revisit pipe sizes based on revised peak load assessments.
- Revisit pipe cost and assumptions made around insulation series level and dig type/depth.
- Update pipework routes as part of ongoing stakeholder engagement and agreement with developers on connection points.
- Review existing services record and coordinate network with current utilities re-configuration.
- Confirm whether thrust boring would need to be used to install the pipe section crossing Moselle Brook and Hale Road and Ferry Lane, if conventional dig techniques can be used instead then capital cost would be reduced.

6. Building connection costs including heat metering

- Revise capacity of heat substation (if required) in light of updated/finalised planning information.
- Revisit substation/connection costs (incl. redundancy of heat exchangers)
- Ensure accurate allowances for heat metering and billing costs are included in the TEM.

7. Minimise the negative impacts of phasing the development

- Review the options for future phasing of the network as part of the wider Haringey DEN proposals.
- Ensure EC design makes allowance of future installation phases where alternative generations technologies may be installed.

8. O&M

- Ensure O&M costs are specific to the technologies being proposed and use supplier data where available.
- All OPEX assumptions and inputs need reviewing to ensure they are up to date and reflective of the current market conditions.

9. TEM

- Power Export prices to be reviewed. GLA License lite scheme not currently in operation.
- All forecasts to be updated to 2019/20 projections.
- Heat Tariffs option to use heat trust calculator rather than comparison to a boiler BaU case. (<https://heattrust.org/test-the-comparator>)
- Review counterfactual case in future developments (& phases) as these are unlikely to be gas boilers.

Appendices:

- **Appendix A – CP1 Checklist**
- **Appendix B - Load List (New Developments)**

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Appendix A – CP1 Checklist

CP1 Checklist			Previous Study (Feasibility Phase 2017)		Haringey Decentralised Energy Network (2019-2020)	
Item	Objective	Key Outputs	Has CP1 been followed?	Information from Previous Phase Report	Opportunities to improve compliance	Recommendations / Actions
2.1	To achieve sufficient accuracy of peak heat demands and annual heat consumptions	Output 2.1a - Energy (heat, cooling & electricity) mapping report	Met	Heat demands based on benchmarks developed for GLA for new build with most up to date new build quantities. Existing non-domestic buildings use measured data. Existing domestic estimated from LSOA data. Development plans reviewed and where more information on areas and numbers of dwellings available these have been used in the updated analysis.	Revisit the heat and electricity loads for the new developments based on revised masterplan. Obtain recent metered energy data for identified existing buildings.	1) Revisit energy demands for new developments, in light of updated/finalised planning information. Confirm development accommodation schedule and timeframe with LBH planning department and developers 2) Confirm whether Tottenham Hale Park will be developed and level of interest/connection potential. Develop energy loads for site if site identified as potential connection.
		Output 2.1b - Accurate estimates of heat demands				
		Output 2.1c - Predicted future heat demands				
		Output 2.1d - Report on potential stakeholders				
2.2	To identify the most suitable low carbon heat sources and location of an energy centre	Output 2.2a - Energy Masterplanning report	Met	Review of heat sources included in Phase 1 report (Table 5). While Gas-CHP identified as initial technology, consideration has been given to the future linking with EFW or the replacement of the CHP with heat pumps.	Revisit previous identified heat sources to confirm suitability/unsuitability, including: heat pumps, heat from underground ventilation shaft (Victoria Tube Line), heat recovery from buildings, heat from Edmonton EFW plant etc.	1) Revisit previous identified potential heat sources to confirm suitability/unsuitability, including heat pumps, heat from underground ventilation shaft (Victoria Tube Line), heat recovery from buildings, heat from Edmonton EFW plant etc. 2) Consider phasing of the energy centre plant in light of updated/finalised planning application
		Output 2.2b - Heat network energy model				
		Output 2.2c - Heat source(s) assessment report				
		Output 2.2d - Energy centre location report				
2.3	To determine the location of top-up and standby boilers and use of existing boilers	Output 2.3a - Top-up & standby heat source(s) report	Met	Initial network all new build so new energy centre for top up / back up.	Revisit top-up boiler's capacity, installation phasing and revisit assumptions around plant sizing; ensure load diversity and provision of redundancy have been captured.	1) Revisit top-up boiler's capacity based on revised planning information, revisit assumptions around plant sizing, ensuring load diversity and provision of redundancy have been captured.
		Output 2.3b - Control strategy report				
2.4	To select suitable operating temperatures	Output 2.4a - Target operating temperatures report	Met	80/50 to supply existing buildings in later phases unless heat pump to be used for new build where drop to 70/40. Further investigations into existing heating systems could confirm whether 70/40 can be achieved for all networks.	Further investigations into existing heating systems required to confirm whether 70/40 can be achieved for all networks. Confirm with developers whether their buildings were designed to operate at lower temperature, confirm circuit types radiators, AHU, underfloor heating etc.	1) Investigations into existing heating systems required to confirm whether 70/40 can be achieved for all networks. 2) Confirm with developers whether their buildings were designed to operate at lower temperature, confirm circuit types radiators, AHU, underfloor heating etc.
		Output 2.4b - Network control strategy report				
		Output 2.4c - Heat Exchanger approach temperatures report				
2.5	To define heat network distribution routes, pipe sizes and costs	Output 2.5a - Network pipe routes & sizing report	Met	Route identified in Figures 43-45. Alternative routes have been tested to determine minimum network length. Pipe sizes provided in Figures 38 & 39. Costs identified in Tables 7 and 18. Review of network route with contractor confirmed suitability of route.	Revision of pipe sizing in light of updated peak loads. Revisit pipe cost and assumptions made around dig type/depth and insulation series level. Revisit heat loss calculation with new pipe sizes.	1) Revisit pipe sizes in case peak demand is changed as energy demand is amended in light of updated/finalised planning information. Revisit pipe cost and assumptions made around insulation series level and dig type/depth. Update heat loss calculation based on new pipe sizes.
		Output 2.5b - Initial insulation thickness calculations				
		Output 2.5c - Initial network cost calculations				

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2.6	To determine building connection costs including heat metering	Output 2.6a - Direct/indirect connection report	Met	Heat connection costs have been based on recent cost information from suppliers. Included in Table 7.	Revision of heat substation's capacity, cost (incl. provision of redundancy heat exchangers), based on updated peak demands. Ensure accurate allowances for heat metering and billing are included in the TEM.	1) Revise capacity of heat substation based on updated masterplan (incl. the provision of redundancy of heat exchanger). 2) Consider whether direct or indirect connections are required at building level and dwelling level and the type of domestic hot water services provision 3) Revise substation/connection costs (incl. redundancy of heat exchangers). 4) Ensure accurate allowances for heat metering and billing costs are included in the TEM.
		Output 2.6b - Connection/metering cost report				
2.7	To minimise the negative impacts of phasing the development	Output 2.7a - Overall phasing plan	Met	Detailed phasing remains unclear at the time of carrying out the analysis, but phasing has been included in the economic analysis based on information available at the time. Section 5 of report sets out assumed phasing and heat build-up.	Review and confirm development phasing with developers/council.	1) Review and update phasing in light of updated/finalised planning information. 2) Engage with developers to confirm development accommodation schedule and timeframe, where possible.
		Output 2.7b - Future proofing plan				
2.8	To assess lifecycle operation, maintenance and replacement requirements, costs and revenues	Output 2.8a - Operational energy model	Met	Energy, maintenance and replacement costs are included in the economic model.	Revisit costs and assumptions made around operating and maintenance. Ensure costs and assumptions are up to day and reflective of the current market conditions.	1) Update operating and maintenance cost as necessary.
		Output 2.8b - Repair/replacement strategy				
2.9	To conduct a consistent economic analysis and options appraisal	Output 2.9a - Initial CAPEX model	Met	Techno-economic analysis has been undertaken for a number of options based on a consistent set of assumptions and data. Section 5 of report.		1) Review economic assumptions and update where necessary. 2) Update inputs for the techno-economic model.
		Output 2.9b - Life cycle cashflow model				
		Output 2.9c - NPV and IRR calculations				
2.10	To analyse risks and carry out a sensitivity analysis	Output 2.10a - Risk register & risk analysis	Met	Sensitivity analysis carried out as part of techno-economic modelling, section 5 of report. Risk register presented in section 6 of the report.	Undertake sensitivity analysis to show impact of major risks on projects financial performance (parameters and lower/upper limits to be agreed with the client). Update risk register correspondingly.	1) Undertake sensitivity analysis and update risk register correspondingly.
		Output 2.10b - Sensitivity analysis report				
2.11	To assess environmental impacts and benefits	Output 2.11a.a - Life cycle CO2 emissions calculations	Met	CO2 emissions calculated as part of the techno-economic assessment and reported in Section 5.	Significant risks around air quality given scheme located within an AQMA – updated feasibility work will include an outline AQ assessment carried out by specialist.	1) Update CO2 impacts and benefits.
		Output 2.11a.b - Network heat losses calculations				
		Output 2.11a.c - NOx emissions calculations				
2.12	To contribute to the development of business structure, contract strategy and procurement strategy	Output 2.12a – The business case (redacted if necessary, to protect sensitive commercial information).	Met	Business structures likely to be most appropriate to a Tottenham Hale DH scheme discussed in section 7 of Phase 1 report.	Based on the results from the techno economic analysis identify the preferred business structure for developing the scheme – this part of the wider programme works.	This is to be looked at as part of the wider works to develop the DEN procurement processes. Project wider programme to capture all necessary steps to deliver required business structures.
		Output 2.12b – Procurement strategy				

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Appendix B – Load List (New Developments)

						Information Received?									Notes
New Developments	Developers	Building Name	Use Type	Number of Dwellings	Non-Residential Floor Area m2	Accommodation schedule	Development timeframe (based on planning)	Information on cooling requirement and cooling system	Energy Statement Documentation incl. SAP calculations	Energy supply proposed to be installed to serve development	System operating temperatures	Plant Room location	S106	Carbon Offsetting Contribution	
1 Station Square, Station Road	Micuber Estates Ltd.		Residential, retail	128	434	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Approved in May 2017. Due for completion in winter 2020 or 2021. S106 provided but no information on carbon offsetting contribution. Approved in May 2017. Due for completion in winter 2020 or 2021. LTHW connection available Energy supply proposed: CHP + PV onsite. Carbon Offsetting Contribution: No Information found.
Ashley Park	Notting Hill Home Ownership	Core A	Residential, retail	62	38.1	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	First phase of construction (Core A) anticipated to be completed by summer 2020. Carbon Offsetting Contribution calculation has been provided to represent the cost of carbon offset based on the future connection to the District Energy Network. Gas fired CHP with thermal storage and supplement from gas fired boilers. Carbon Contribution to be approx. £77,696 (information taken from Energy Statement). Carbon Offsetting Contribution based on 60 £/tonne CO2. Committed to connecting to DEN. Carbon Offsetting Contribution: £77,697.
		Core B	Residential, retail	35	131.9	Yes	No	No	Yes	Yes	No	Yes	No	Yes	
Ashley Gardens	Berkeley Square Developments Tottenham Hale Limited (BSDTHL)	Building 1	Residential, retail	276	710	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Summer 2021 completion. Committed to connecting to DEN. Pumps heat exchangers etc. to connect to DEN located in building 1. Building 1 CO Limit: a maximum amount of £336,957 (adjusted in accordance with any proportional increase in the Index from the date hereof to the date on which full payment is received and not limiting any late payment interest under clause 8.4).
		Building 1A	Residential, retail	101	501	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Building 1A CO (Limit): a maximum amount of £118,263 (adjusted in accordance with any proportional increase in the Index from the date hereof to the date on which full payment is received and not limiting any late payment interest under clause 8.4). Carbon Offsetting Limit (Total): £455,220

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Berol House Yard	Berkeley Square Developments Tottenham Hale Limited (BSDTHL)	Building 4	Residential, retail	156	891	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Completion in spring 2021. Committed to connecting to DEN. Energy supply propose for site: Space heating and Hot Water to the development will be served by a centralised heating system, led by communal scale condensing boilers. Heat to the dwellings will be supplied and metered by heat interface units (HIUs) located in each dwelling/tenancy. Building 4 and Berol House CO Limit: means a maximum amount of £250,200 (two hundred and fifty thousand two hundred pounds) (adjusted in accordance with any proportional increase in the index from the date hereof to the date on which full payment is received and not limiting any late payment interest under clause 8.4). Based on £1,800 £/tonne CO2 Carbon Offsetting Limit (Total): £250,200
		The National College for Digital Skills (NCDS)	Education	-	7,275	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	
		Berol House	Residential, retail	18	3,685	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	
Cannon Factory and Ashley House	Notting Hill Housing	Ashley House	Residential, retails, offices, health	79	725	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Committed to connecting to DEN. Pumps heat exchangers etc. to connect to DEN located in building. A sum of £201, 174 towards the Council's implementation of projects to reduce carbon emissions in its area to offset the proposed shortfall in meeting London This is based on £1800 per tonne) in order to compensate for unachieved carbon reduction targets arising from the Development. Proposed on-site energy supply: The retail space is to be served by separate VRF air source heat pumps for heating and cooling. This is to be specified and fitted out by tenants. Space heating and Hot Water to the development will be served by a centralised heating system, led by communal scale condensing boilers. Heat to the dwellings will be supplied and metered by heat interface units (HIUs) located in each dwelling/tenancy. Carbon Offsetting Contribution (Total): £250,200
		Cannon Factory	Residential	15		Yes	No	N/A	Yes	Yes	No	Yes	Yes	Yes	
		Cannon Factory	Residential, retails, offices, health	168	2,565	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	
Harris Academy, Tottenham Hale		Main building	Education al		8,500	Yes	No	N/A	Yes	Yes	No	Yes	Yes	Yes	Space will be made in plant room to connect to DEN. On-site proposed energy supply: Space Heating System: LTHW radiators/radiant panels, gas boiler 95% efficiency, variable speed pump with multiple pressure sensors in the system, provision for metering with 'out of range alarm'.
		Annex	Education al, Leisure		1,835	Yes	No	N/A	Yes	Yes	No	Yes	Yes	Yes	

		Gym	Education al, Leisure		1,305	Yes	No	N/A	Yes	Yes	No	Yes	Yes	Yes	DHW System: Dedicated Hot water gas boiler, 0.97% efficiency Carbon Reduction Contribution: a sum of Fourteen Thousand Four Hundred pounds (£14,400.00) for the Carbon Reduction Contribution Purpose. Carbon Reduction Contribution (Total): £14,400
Premier Inn, Tottenham Hale			Hotel		3,623	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	S106 provided but no information regarding carbon offsetting payment. On-site energy supply proposed: gas CHP. Air source heat pumps are already incorporated into the scheme from the initial baseline assessment as a source of renewable energy. These are to provide heating and cooling to the Premier Inn bedrooms, restaurant, reception and office. Space will be made in plant room to connect to DEN. Soft foundations around entry point for DEN connection. Carbon Offsetting Contribution: No Information found.
Argent - Strategic Development Partnership (SDP) Sites	Argent	Welbourn e	Residenti al, Retail, Restaura nt, Office, Health	137	1910	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Information from S106: Carbon Offsetting Contribution" means the sum of £939,650 (Index Linked) to be applied towards the Council's implementation of projects to reduce carbon emissions in its area to offset the proposed shortfall in meeting London Plan policies; "DEN Connection Payment" means the sum of £250,000 (TWO HUNDRED AND FIFTY THOUSAND POUNDS) (Index Linked) to be paid by the Developer to the Council towards the cost of the Council providing, installing, commissioning and adopting any new infrastructure or plant or equipment required to enable the DEN to connect to the Development including but not limited to the following: (a) heat exchangers, meters and associated controls within the Plant Room; (b) the connection to the Agreed Connection Points, and any internal pipework required (including the indicative pipework shown in orange on Plan 4) , in order to supply heat from the DEN to the Development; (c) alteration to the existing building pipework in order to facilitate the connection;
		North Island	Residenti al, Retail, Restaura nt, Leisure	136	448	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
		Ferry Island	Residenti al, Retail, Restaura nt, Office, Leisure	482	1478	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

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		Ashley Road West	Residential, Retail, Restaurant, Office	98	522	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	(d) builder's work associated with (a) through (c) above (including like for like reinstatement of finishes); (e) any professional fees (design, legal or other) incurred by the Council or their energy supply company in relation to the DEN; and (f) any other works required in order to ensure that heat is supplied to the primary heat exchanger or, in the event that a supply is provided directly to each individual Dwelling, any works required to supply heat to the metering point (including, if required by the DEN operator, pumps and water quality treatment); Carbon Offsetting Contribution (Total): £1,189,650
		Ashley Road East	Residential, Retail, Restaurant, Office, Leisure	183	1901	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	