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Old Mill Street

New Islington, Manchester

Low Carbon Heat Appraisal

Date: 09/10/2026
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1.0 Executive Summary

Crookes Walker Consulting (CWC) have prepared this Low Carbon Heat Appraisal in support of the full planning application for the residential development at Old Mill Street, New Islington, Manchester (the scheme is presented in the architect's Design and Access Statement as 'Brick Fields'). The appraisal has been prepared with reference to the Greater Manchester Combined Authority (GMCA) 'Low carbon heat' guidance, Version 1.1 (March 2026), and sets out how the proposed heating and hot water strategy responds to Places for Everyone Policy JP-S3 (Heat and Energy Networks) and the linked Policy JP-S2 (Carbon and Energy).

The proposals comprise a six-storey residential building providing 41 apartments and duplexes (Use Class C3), with a gross internal area (GIA) of approximately 3,226 m², on a 0.15 hectare brownfield site at the corner of Old Mill Street and Lampwick Lane. As the development delivers more than 10 homes it is a 'major' application under the GMCA guidance, for which a Low Carbon Heat Appraisal is expected that reports the performance of the proposed heating system against the eleven GMCA Key Performance Indicators (KPIs) and compares it with relevant alternatives.

The proposed heating and hot water strategy (referred to throughout this report as 'the proposed system', and as Option 1 in Section 6) is all-electric and is summarised as follows:

- No fossil fuels – there is no gas supply to the site and no combustion plant is proposed;
- Space heating – individual electric panel heaters within each dwelling, with programmable and app-based controls;
- Domestic hot water – an individual air source heat pump water heater with an integral 230 to 300 litre storage cylinder within each dwelling;
- Ventilation – Mechanical Ventilation with Heat Recovery (MVHR) to each dwelling, with purge ventilation via openable windows; and
- Renewable energy – roof-mounted solar photovoltaic (PV) panels (an array of approximately 85 m² is currently proposed, serving the landlord areas; refer to Section 4.6).

On the basis of CWC's review of the Places for Everyone Heat and Energy Network Opportunity Areas mapping, the site is understood to fall within an Opportunity Area and has been assessed as 'Case 3' under the GMCA guidance. The GMCA guidance confirms that there are currently no operating low carbon heat networks in Greater Manchester.

The proposed system has been compared with three alternatives: the GMCA benchmark system (an individual air source heat pump to each dwelling), a communal air source heat

pump system, and connection to a notional low carbon heat network (refer to Section 6). The headline outcomes of the appraisal against the GMCA KPIs are:

- no fossil fuel is used on site;
- the carbon content of heat delivered by the proposed system is estimated at circa 69 gCO_2/kWh, below the 100 gCO_2/kWh threshold for a 'low carbon heating system';
- the proposed system has the lowest indicative capital cost of the four options assessed (circa £7,000 per dwelling, compared with circa £10,000 for the benchmark individual air source heat pump, i.e. approximately 30% lower);
- the proposed system has higher energy costs for residents than the benchmark individual air source heat pump (circa £690 against £340 per dwelling per year), which is the recognised trade-off of direct electric space heating; however, once maintenance and replacement costs are included, the total annual cost is within circa 9% of the benchmark; and
- connection to a low carbon heat network is not proposed, as no such network exists or is funded within range of the site.

The Part O overheating assessment of the development, carried out using the CIBSE TM59 method, shows all assessed rooms meeting the overheating criteria without active cooling. The proposed system introduces no communal heating pipework into the corridors or risers.

The principal issue raised by the GMCA guidance for this type of system is the risk of high energy bills where space heating demand is not very low. The SAP assessments of the 41 dwellings indicate an area-weighted fabric energy efficiency of circa 31 kWh/m²/yr, which is around twice the GMCA space heating demand target of 15 kWh/m²/yr for flats. Section 8 sets out the measures CWC recommend to limit this risk, together with the point at which a change to individual air source heat pumps should be considered.

On balance, CWC consider that the proposed system delivers low carbon heat at the lowest capital cost, avoids communal distribution pipework and its associated overheating and heat loss risks, preserves residents' ability to choose and switch energy supplier, and is appropriate to the scale and constrained urban location of the development, subject to the mitigation measures in Section 8 being taken forward. The justification for non-connection to a low carbon heat network is set out in Section 9. All costs and performance figures in this appraisal are indicative and are provided for comparison purposes only. This appraisal has been prepared for planning stage and design development is still progressing; the design solutions are therefore subject to change, but the principles of Places for Everyone Policies JP-S2 and JP-S3 will be adhered to (refer to Section 2.4).

2.0 Introduction and Planning Policy Context

2.1 Purpose and Scope

This appraisal has been prepared to accompany the full planning application for the Old Mill Street development and to set out the approach to Policy JP-S3. The GMCA 'Low carbon heat' guidance recommends that a Low Carbon Heat Appraisal is submitted with all planning applications, with the level of analysis depending on the scale and location of the development. For a major application within Cases 1, 2 or 3, the appraisal is expected to compare the proposed system with selected alternatives, including a low carbon heat network and an on-site communal heating system.

The scope of this appraisal is limited to the heating and hot water systems serving the dwellings and the landlord areas. It forms part of the wider Energy and Carbon Statement and GMCA Energy and Carbon Proforma being prepared for the application, which address operational energy use, renewable energy, overheating and whole life carbon.

2.2 Places for Everyone Policy JP-S2 and JP-S3

Places for Everyone, the joint development plan for nine Greater Manchester districts including Manchester, was adopted in March 2024. Policy JP-S2 (Carbon and Energy) sets the expectation that new development is net zero carbon, following the energy hierarchy of minimising energy demand, maximising energy efficiency, using renewable energy, using low carbon energy and then other energy sources.

Policy JP-S3(2) states that within the identified Heat and Energy Network Opportunity Areas, 'unless it can be demonstrated that there are more effective alternatives for minimising carbon emissions or such connection is not practicable or financially viable', new residential developments of 10 dwellings or more are expected to connect to an existing or planned heat/energy network, or be designed to enable future connection (where within 500 m of such a network), and/or install a site-wide or communal heat/energy network solution.

2.3 GMCA Low Carbon Heat Guidance

The GMCA guidance confirms that a building cannot be net zero if its heating and hot water system uses fossil fuels, and that a heating system qualifies as 'low carbon' where the carbon content of heat delivered is less than 100 gCO_2/kWh. It also asks Local Planning Authorities to consider affordability for residents, consumer protection, simplicity of use, overheating risk and the impact of the

heating system on viability. These considerations are captured in the eleven KPIs listed in Table 2.1, which are used throughout this appraisal.

Table 2.1 – GMCA Low Carbon Heat Key Performance Indicators

Performance area	Key performance indicator	Unit
Environmental performance	1. Fossil fuel use	Yes / No
	2. Carbon content of heat	gCO_2/kWh
	3. Local pollution	Description
Impact on residents / building users	4. Estimated energy costs for heating and hot water	£/yr
	5. Estimated maintenance costs	£/yr (annualised)
	6. Estimated replacement costs	£/yr (annualised)
	7. Additional operating costs compared with benchmark low carbon heating system	+/- %
Impact on viability	8. Estimated capital cost of heating system	£/unit or £/building
	9. Additional cost compared with benchmark low carbon heating system	+/- %
Infrastructure development	10. Connection to low carbon heat network	Yes / No
	11. Scale of application	m^2 GIA

2.4 Basis of this Appraisal

This appraisal is based only on the information listed in Table 2.2. No site survey has been carried out for the purposes of this appraisal.

Table 2.2 – Information Relied Upon

Document	Reference / revision	Date
GMCA Net Zero guidance – Part 2: Low carbon heat	Version 1.1	03/2026
GMCA Net Zero guidance – Part 1: Design guidance for net zero; Part 3: Submission guidance	Version 1.1	03/2026

Document	Reference / revision	Date
Buttress planning GA plans, elevations and sections (Transmittal 36)	OLDMS-BUT-01-00-DR-A-94000 P04, 94001 P04, 94002 P03, 94005 P03, 94006 P03, 95001 P03, 95002 P03, 96001 P04, 96002 P04	28/09/2026
Buttress Design and Access Statement	OLDMS-BUT-XX-XX-RP-A-90020, Rev 3	15/09/2026
Buttress site location plan	OLDMS-BUT-ZZ-00-DR-A-90010 P01	03/09/2026
Buttress architectural notes for the Energy and Carbon Statement (area 3,226 m² GIA, window-to-wall ratios)	Email from Buttress	28/09/2026
Ofgem energy price cap, 1 October to 31 December 2026	Electricity, direct debit, GB average	08/2026
DESNZ Heat Network Zoning – GMCA zone opportunity report	Pilot programme report	2025

This appraisal has been completed to inform the M&E design and has been prepared independently of the other operational energy reports for the development. It is not intended to predict the energy use of the development. Where energy use has been estimated, this has been done for the purpose of comparing the heating options only, and the figures should not be relied upon as a prediction of actual in-use energy consumption.

The costs, energy demands and carbon figures in this appraisal are high-level estimates prepared for the purpose of comparing heating options at planning stage. They are not design calculations and are to be verified using CWC's approved design software, and by the project cost consultant for capital costs, as the design develops. The conclusions are based on the validity of the information provided at this stage.

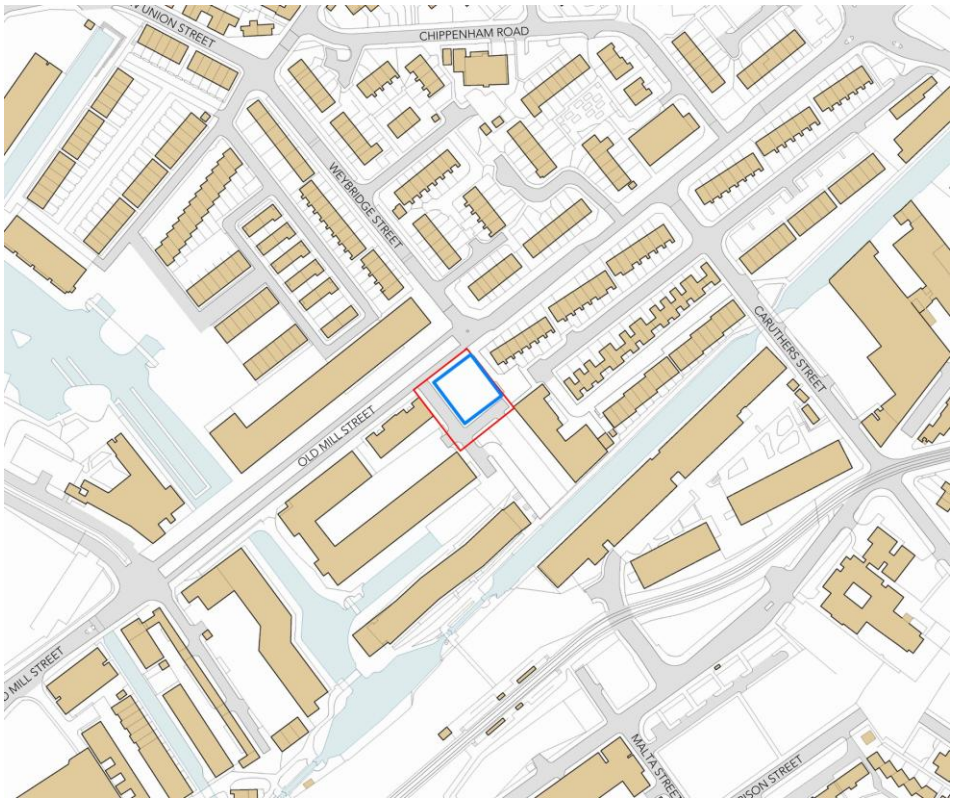
This appraisal has been prepared to support the planning application. Design development is still progressing and, as such, the design solutions described in this report (including the proposed heating, hot water, ventilation and renewable energy systems) are subject to change as the design develops. Notwithstanding this, the principles of Places for Everyone Policies JP-S2 and JP-S3 will be adhered to, and any changes to the proposals would be reviewed against these principles and the GMCA Low Carbon Heat guidance.

3.0 The Proposed Development

3.1 Site and Context

The site is a 0.15 hectare cleared brownfield plot, most recently used as a surface car park, on the corner of Old Mill Street and Lampwick Lane within the New Islington regeneration area to the east of Manchester city centre. It is bounded by Old Mill Street to the north-west, Lampwick Lane and the Grade II listed Ancoats Dispensary to the south-west, existing terraced housing to the north-east and the Stubbs Mill complex to the south-east. The site location is shown in Figure 3.1.

Figure 3.1 – Site Location (extract from Buttress drawing OLDMS-BUT-ZZ-00-DR-A-90010 P01; planning application boundary in red)



The site is tightly constrained: the building footprint sits close to the boundary on all sides, with approximately 1 m of planting to two elevations and approximately 100 mm to the remaining two. There is a level difference of approximately 500 mm across the site. These constraints limit the space available for external plant at ground level and on the elevations, which is relevant to the heating options considered in Section 6.

3.2 Development Proposals

The proposals are for the erection of a six-storey residential apartment building comprising 41 dwellings (Use Class C3), together with landscaping and associated

works. The ground floor contains a residential entrance, cycle store, bin stores, a meter room and plant space, together with the lower levels of the duplex dwellings. The building is of concrete frame construction with a brick masonry façade. An extensive sedum green roof is proposed.

Figure 3.2 – Proposed Development, View from Old Mill Street (extract from Buttress drawing OLDMS-BUT-01-ZZ-DR-A-97000 P01)



The dwelling mix is summarised in Table 3.1. Floor areas are the total floor areas used in the SAP assessments of the dwellings.

Table 3.1 – Dwelling Mix

Dwelling type	Number	Floor area (m^2)
1 bed 1 person apartment	19	40
2 bed 4 person apartment	19	70 to 90
Duplex (2 bed 4 person, 3 bed 6 person and 4 bed 7 person)	3	82 to 128
Total	**41**	**2,429 (total area of dwellings)**

3.3 Building Fabric

A fabric first approach has been adopted. The fabric parameters used in the SAP 10.2 assessments of the dwellings are summarised in Table 3.2, alongside the Approved Document L (2021 edition) limiting values for context.

Table 3.2 – Building Fabric Parameters

Element	Proposed (SAP assessments)	Approved Document L limiting value
External wall	0.14 W/m²K	0.26 W/m²K
Roof	0.11 W/m²K	0.16 W/m²K
Ground floor	0.16 W/m²K	0.18 W/m²K
Windows	1.20 W/m²K, double glazed (g-value 0.40 south facing; 0.50 north facing)	1.60 W/m²K
Doors	1.20 W/m²K	1.60 W/m²K
Air permeability	3.0 m³/h.m² at 50 Pa (design)	8.0 m³/h.m² at 50 Pa
Thermal bridging	Calculated psi-values (e.g. lintels 0.04, sills 0.03, jambs 0.03, party floors 0.07 W/mK)	–

On this basis, the SAP assessments give an area-weighted Dwelling Fabric Energy Efficiency (DFEE) of circa 31.1 kWh/m²/yr against a target of circa 31.9 kWh/m²/yr. The DFEE results are used in Section 8 as an indicator of space heating demand.

4.0 Proposed Energy and Heating Strategy

4.1 Overview

The proposed strategy (referred to throughout this report as 'the proposed system', and as Option 1 in Section 6) is all-electric, with no gas supply to the site and no combustion on site. It corresponds to the GMCA guidance archetype of an individual 'hot water heat pump + direct electric' system, which the guidance describes as suitable for high density flat blocks where outdoor space is constrained and heating loads are very low. Because all heat is generated from electricity, the strategy benefits directly from the continuing decarbonisation of the electricity grid.

4.2 Space Heating

Space heating to each dwelling is proposed by individual electric panel heaters, sized room by room, with programmable time and temperature control and app-based control. Electric towel rails are proposed to bathrooms and en-suites. Panel heaters have no water content, no distribution losses and no moving parts, are simple for residents to operate and have a long service life.

4.3 Domestic Hot Water

Domestic hot water is proposed to be generated by an individual air source heat pump water heater within each dwelling, located in the utility cupboard and ducted to outside, with an integral 230 to 300 litre storage cylinder, so that hot water is generated by a heat pump without the need for a separate external unit. The basis of design is the KERS Weatherby unit.

For the purposes of this appraisal, a seasonal performance of 2.5 has been estimated for the heat pump water heater, with a cylinder standing loss of 1.46 kWh/day. The refrigerant type of the selected unit will be confirmed at the detailed design stage.

4.4 Ventilation and Overheating

Each dwelling is provided with Mechanical Ventilation with Heat Recovery (MVHR), supplying air to the living rooms and bedrooms and extracting from the kitchen and bathrooms, with purge ventilation via openable windows. The SAP assessments use MVHR units with a heat recovery efficiency of 91% and specific fan powers of 0.76 to 0.88 W/(l/s) (88% and 1.07 W/(l/s) to two of the duplexes).

A Part O overheating assessment of the development has been carried out using an IES dynamic thermal model, with reference to Approved Document O (2021

edition) and the CIBSE TM59 (2017) method, using the Manchester DSY1 2020s high emissions (50th percentile) weather file. The results show that all 107 assessed occupied rooms (66 bedrooms and 41 kitchen / living / dining rooms) meet the TM59 criteria without active cooling, both when assessed as naturally ventilated and against the fixed temperature test for mechanically ventilated rooms. The results are summarised in Table 4.1.

Table 4.1 – Part O Overheating Assessment Results (CIBSE TM59)

Assessment	Criterion	Highest result	Rooms passing
Naturally ventilated – Criterion A (all occupied rooms)	$\Delta T \geq 1$ K for no more than 3% of occupied hours (May to September)	1.3%	107 of 107
Naturally ventilated – Criterion B (bedrooms)	Above 26°C for no more than 1% of night-time hours (32 hours)	22 hours	66 of 66
Mechanically ventilated – fixed temperature test	Above 26°C for no more than 3% of annual occupied hours	2.95% (duplex kitchen / living / dining room)	107 of 107

The ventilation rates assumed in the Part O model are those of the MVHR system, including boost rates, as set out in CWC's ventilation flow rate schedule.

The proposed strategy has no communal heating or hot water pipework in the corridors or risers, which avoids one of the main contributors to overheating in apartment buildings identified in the GMCA guidance.

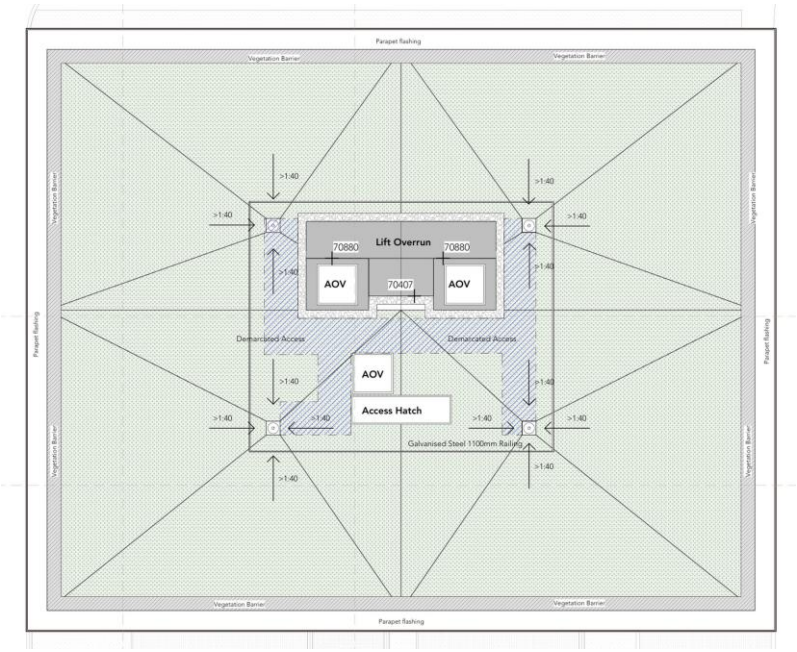
4.5 Landlord Areas

The landlord areas (entrance, corridors, stair and stores) are to be actively heated with local electric heating where required.

4.6 Renewable Energy

Roof-mounted solar PV is proposed. The GMCA design guidance sets an expectation that the PV array footprint is at least 40% of the building ground floor area where feasible. Based on a footprint of circa 540 m^2 (3,226 m^2 GIA over six storeys), this equates to a PV array area of circa 215 m^2, or an indicative capacity of circa 40 kWp. The roof is shared with an extensive sedum green roof, the lift overrun and smoke vents, as shown in Figure 4.1.

Figure 4.1 – Roof Plan as Submitted (extract from Buttress drawing OLDMS-BUT-01-R5-DR-A-94006 P03)



Given the shading from the parapets and lift overrun, and the roof access requirements, the space available for solar PV is limited, and an array of approximately 85 m² (an indicative capacity of circa 16 kWp) is currently proposed. Whilst this falls short of the GMCA expectation, a significantly larger array is unlikely to be achievable on this roof. The array layout will be developed at the next design stage, with PV provided in suitable locations where it can provide a reasonable payback.

The PV will serve the landlord areas only.

The SAP assessments of the dwellings do not include any contribution from PV.

4.7 Electrical Infrastructure

All dwelling electricity supplies are proposed to be metered in the ground floor meter room. An Electricity North West point of connection application will be made for the development and updated as the design progresses towards construction. Direct electric space heating has a higher peak electrical demand than a heat pump system; the effect on the supply capacity and the use of controls to manage peak demand (for example, programmable heaters and off-peak hot water heating) will be confirmed as part of that application.

5.0 Heat Network Context and Location Assessment

5.1 GMCA Location Cases

The GMCA guidance identifies four location cases for major applications, which determine the heat network options to be included in the appraisal:

- Case 1 – the site is within 500 m of an existing low carbon heat network;
- Case 2 – the site is within 500 m of a planned low carbon heat network;
- Case 3 – the site is within a Heat and Energy Network Opportunity Area; and
- Case 4 – any other location in Greater Manchester.

5.2 Assessment for Old Mill Street

The guidance confirms that there are currently no operating low carbon heat networks in Greater Manchester, so Case 1 does not apply. CWC are not aware of any planned low carbon heat network within 500 m of the site. Confirmation is sought from Manchester City Council that no planned low carbon heat network lies within 500 m of the site (Case 2).

The site lies within the area east of Manchester city centre covered by the Places for Everyone Heat and Energy Network Opportunity Areas mapping, and has therefore been assessed as Case 3. The DESNZ heat network zoning pilot work for Greater Manchester identifies a 'Central Greater Manchester' strategic zone, including a Manchester city centre initial zone opportunity. The extent of any formal zone, and its timing, is not yet confirmed.

The nearest existing heat network known to CWC is the Manchester Civic Quarter Heat Network, circa 2 km to the south-west, which is supplied by gas-fired combined heat and power. The GMCA guidance states that existing networks of this type are likely to have a carbon content of heat in excess of 300 gCO_2/kWh, and that major applications in their vicinity should not connect to them unless a funded and verifiable decarbonisation plan is in place.

5.3 Implications for the Appraisal

For a Case 3 site, the guidance requires a notional low carbon heat network with a carbon content of heat delivered of 100 gCO_2/kWh to be included as one of the options assessed, and for the applicant to liaise with the Local Planning Authority on the likelihood of a network coming forward. The applicant is not required to

install an interim communal heating system or to commit to future connection unless the area has been formally designated as a heat network zone.

6.0 Heating System Options Considered

6.1 Shortlisted Options

In line with the guidance for a major application in Case 3, the proposed system (Option 1) has been compared with the GMCA benchmark system (Option 2, an individual air source heat pump to each dwelling), an on-site communal heat pump system (Option 3) and a notional low carbon heat network (Option 4). The four shortlisted options are described in Table 6.1.

Table 6.1 – Shortlisted Heating Options

Option	Description
Option 1 – Proposed	Individual electric panel heaters for space heating, with an individual air source heat pump water heater and storage cylinder (230 to 300 litres) in each dwelling, and MVHR. No communal heating pipework and no external plant.
Option 2 – Benchmark	Individual air-to-water air source heat pump (monobloc) to each dwelling, providing space heating via low temperature radiators (circa 45°C flow) and hot water via a storage cylinder (circa 60°C). Requires an external unit for each dwelling.
Option 3 – Communal heat pump	Roof-mounted communal air source heat pumps serving a heating network in the risers and corridors at circa 65°C, with a heat interface unit in each dwelling providing space heating and instantaneous hot water. Heat metered and billed to each dwelling.
Option 4 – Notional heat network	Connection to a notional low carbon heat network (carbon content of heat 100 gCO_2/kWh), with a building heating network and heat interface units as Option 3, and an interim on-site communal plant until a network is available.

6.2 Options Discounted at Screening

The following options were reviewed at the outset of this appraisal and were not taken forward for the reasons given in Table 6.2.

Table 6.2 – Options Discounted at Screening

Option	Reason not taken forward
Gas boilers (individual or communal)	Fossil fuel based; not compatible with net zero or the GMCA guidance.
Direct electric space heating with immersion heater hot water	The GMCA guidance recommends this is only accepted in ultra-low energy homes (for example, Passivhaus certified), due to the risk of high energy bills.

Option	Reason not taken forward
Exhaust air heat pump (combined extract ventilation and hot water unit)	Not taken forward, as MVHR has been adopted to the dwellings; an exhaust air heat pump would compete with the MVHR unit for the heat in the extract air.
Air-to-air heat pumps (split units)	Provide active cooling, whereas the GMCA guidance expects overheating to be addressed without active cooling; also require an external unit for each dwelling.
Air source or ground source ambient loop	Highest indicative capital cost in the GMCA guidance (circa £16,000 to £17,000 per dwelling), with both communal and in-dwelling plant. A ground source system would require a borehole array on a constrained 0.15 hectare site, which would need specialist ground investigation input.

7.0 Assessment Against the Key Performance Indicators

The four options have been assessed against the eleven GMCA KPIs. The results are compared in Table 7.1 and discussed in the following sub-sections. The basis of the calculations is set out in Appendix 2, and the KPI values for the proposed system are summarised in Appendix 1.

Table 7.1 – Comparison of Heating Options Against the GMCA KPIs (indicative, per dwelling)

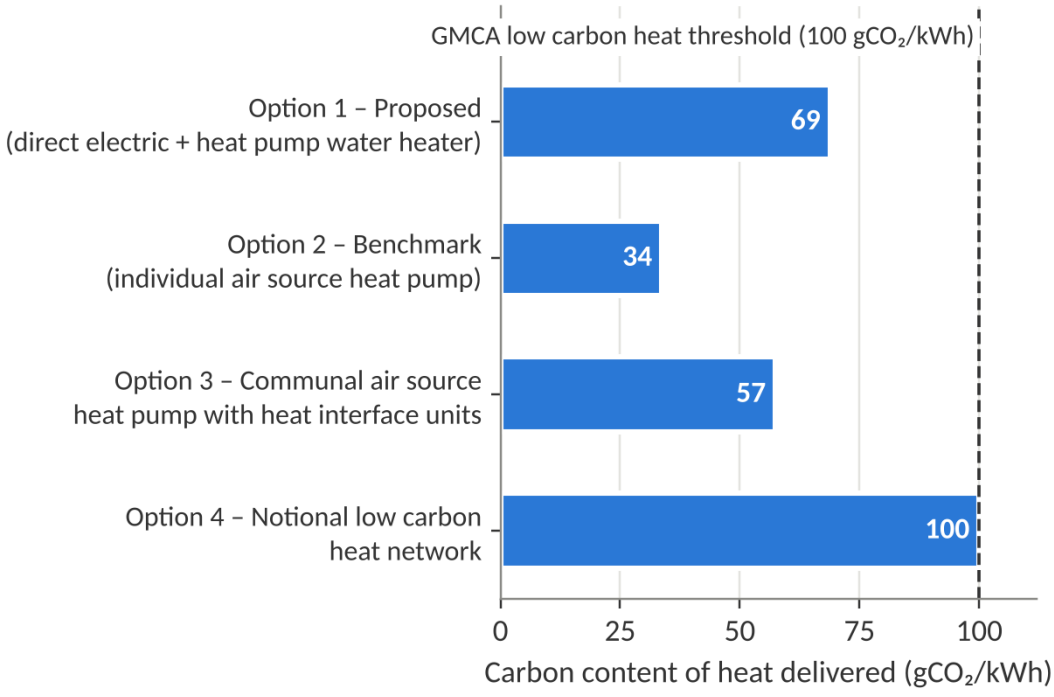
KPI	Option 1 Proposed	Option 2 Benchmark	Option 3 Communal heat pump	Option 4 Notional heat network
1. Fossil fuel use	No	No	No	No (assumed)
2. Carbon content of heat (gCO_2/kWh)	69	34	57	100
3. Local pollution	None; small refrigerant charge in each unit	None; external unit to each dwelling	None; roof plant	Depends on energy centre
4. Energy cost (£/yr)	690	340	480 + 150 charge	380 + 350 charge
5. Maintenance cost (£/yr)	60	150	220	120
6. Replacement cost (£/yr)	230	410	330	80
7. Operating cost vs benchmark (total)	+9%	–	+32%	+4%
8. Capital cost (£/dwelling)	7,000	10,000	12,000	14,000
9. Capital cost vs benchmark	–30%	–	+20%	+40%
10. Connection to low carbon heat network	No	No	No	Yes
11. Scale of application	3,226 m² GIA; 41 dwellings			

7.1 Environmental Performance

Fossil fuel use (KPI 1) – none of the shortlisted options use fossil fuel. The proposed development has no gas supply.

Carbon content of heat (KPI 2) – the GMCA guidance requires the carbon content of heat to be calculated using HM Treasury Green Book average electricity carbon factors over the first 15 years from the anticipated completion date. In the absence of a confirmed completion date, a grid electricity factor of 0.100 $kgCO_2e/kWh$ has been Assumed for the period 2029 to 2043. The sensitivity of the results to this factor is shown in Appendix 2 (Table A2.2); the proposed system remains below the 100 gCO_2/kWh threshold across the range of factors assessed. On this basis, the proposed system delivers heat at circa 69 gCO_2/kWh, below the 100 gCO_2/kWh threshold (Figure 7.1). Space heating by direct electric heaters is delivered at the grid factor, while hot water from the heat pump water heater is delivered at circa 40 gCO_2/kWh; because hot water accounts for around half of the annual heat demand of these small, well insulated dwellings, the blended figure is below the threshold.

Figure 7.1 – Indicative Carbon Content of Heat Delivered by Each Option



As a sensitivity check, using the current SAP 10.2 electricity factor of 0.136 $kgCO_2/kWh$, the proposed system would deliver heat at circa 94 gCO_2/kWh, which remains below the threshold, although with a reduced margin. The benchmark individual air source heat pump is the lowest carbon option, at circa 34 gCO_2/kWh.

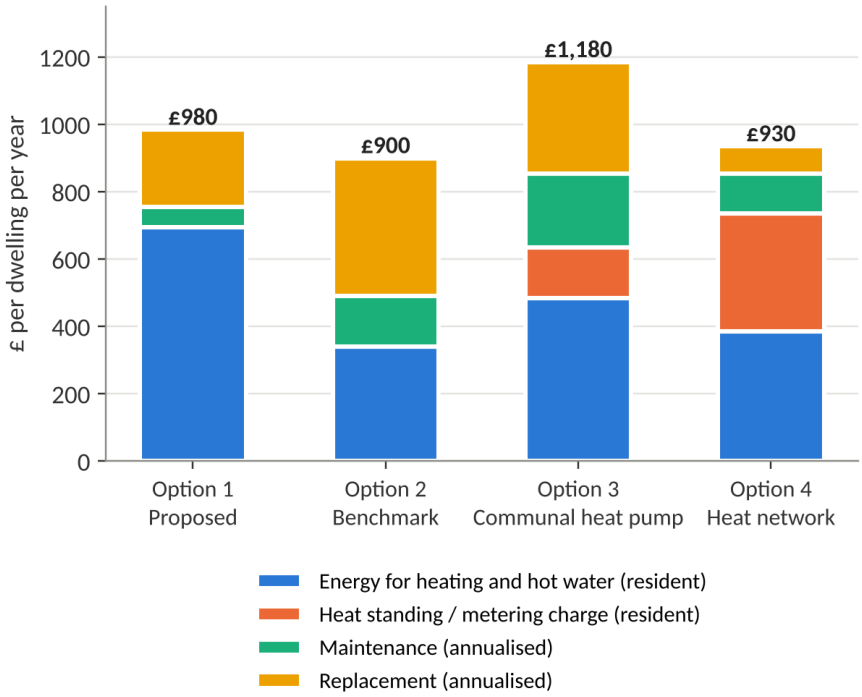
Local pollution (KPI 3) – there is no combustion on site and therefore no local air pollution from the heating system. The heat pump water heaters contain a small factory-sealed refrigerant charge within each dwelling. Options 2 and 3 introduce external heat pump plant, which would require an acoustic assessment by the project acoustician. The GMCA guidance recommends that the embodied carbon of heating systems, and the global warming potential of refrigerants, are considered with reference to CIBSE TM65.1. The refrigerant type and global warming potential of the selected heat pump water heater will be confirmed at the detailed design stage, and the embodied carbon of the heating system will be considered within the whole life carbon assessment for the development.

7.2 Impact on Residents

Energy, maintenance and replacement costs (KPIs 4 to 7) – the main trade-off of the proposed system is its energy cost. Direct electric heating uses around three times more electricity per unit of heat than an air source heat pump. Using the Ofgem price cap electricity unit rate for October to December 2026 (26.32 p/kWh), the energy cost for heating and hot water is estimated at circa £690 per dwelling per year for the proposed system, against circa £340 for the benchmark, a difference of circa £350 per year.

The proposed system has lower maintenance and replacement costs than the benchmark, as panel heaters are simple and long-lived and only the heat pump water heater requires periodic servicing. Once these costs are included, the total annual cost of the proposed system is circa £980 per dwelling, compared with circa £900 for the benchmark (+9%), circa £1,180 for a communal heat pump system and circa £930 for the notional heat network (Figure 7.2). It should be noted that energy costs are paid by residents, while maintenance and replacement costs may fall to the landlord or be recovered through a service charge. The allocation of these costs will depend on the tenure and management arrangements for the development.

Figure 7.2 – Indicative Annual Heating and Hot Water Costs per Dwelling



Consumer protection and simplicity of use – with Options 1 and 2, each dwelling has its own electricity supply, so residents can choose and switch supplier, are covered by the regulated retail price cap, and can benefit from time-of-use tariffs. Options 3 and 4 supply heat through a communal system or network, which introduces heat metering and billing, a standing charge and a single heat supplier that residents cannot change. Panel heaters with programmable and app control are simple to understand and operate.

Overheating – Options 1 and 2 have no communal heating pipework. Options 3 and 4 introduce circulation pipework operating at circa 65°C through the corridors and risers, which the GMCA guidance identifies as a contributor to overheating risk, and which would need to be addressed in the Part O assessment. The Part O results for the proposed system are summarised in Section 4.4.

7.3 Impact on Viability

Capital cost (KPIs 8 and 9) – using the indicative costs in the GMCA guidance, the proposed system has the lowest capital cost of the options assessed, at circa £7,000 per dwelling against circa £10,000 for the benchmark (−30%), circa £12,000 for a communal heat pump system (+20%) and circa £14,000 for a heat network connection with interim communal plant (+40%). Capital costs will be reviewed by the project cost consultant as the design develops.

7.4 Infrastructure Development

Connection to a low carbon heat network (KPI 10) – no. There is no existing or funded low carbon heat network within range of the site (Section 5).

Scale of application (KPI 11) – 3,226 m^2 GIA, 41 dwellings. The development is a major application, below the large major threshold of 150 dwellings or 5,000 m^2 at which the guidance places a stronger expectation of connection.

7.5 Wider Technical Considerations

The GMCA guidance recommends that the following points are also considered:

- Space constraints – Option 2 would require 41 external heat pump units. The building sits close to the site boundary and has a brick façade adjacent to the Grade II listed Ancoats Dispensary, so the location and visual impact of these units would need to be agreed with the architect and planning consultant. Options 3 and 4 would require roof plant space, which would compete with the PV array and green roof;
- Ease of operation and maintenance – Option 1 has the fewest maintainable components and no communal plant. Options 3 and 4 require a communal maintenance contract and metering and billing arrangements;
- Integration with PV and dynamic tariffs – all of the individual options can use time-of-use tariffs (the proposed PV array will serve the landlord areas only). The heat pump water heater cylinder provides thermal storage that can be heated at off-peak times; and
- Electrical capacity – Option 1 has the highest peak electrical demand of the options (Section 4.7). Option 2 would reduce the peak electrical demand.

8.0 Space Heating Demand and Mitigation of Running Costs

8.1 GMCA Position

The GMCA guidance identifies the risk of high energy bills as the main concern with direct electric space heating, and describes the hot water heat pump and direct electric system as suitable where heating loads are very low. The GMCA design guidance sets a space heating demand target of 15 kWh/m²/yr for flats, calculated using predictive modelling.

8.2 Indicated Space Heating Demand

The Dwelling Fabric Energy Efficiency (DFEE) results from the SAP 10.2 assessments of the 41 dwellings have been used as an indicator of space heating demand. These are summarised by dwelling type in Table 8.1.

Table 8.1 – Indicative Space Heating Demand by Dwelling Type (SAP DFEE)

Dwelling type	Number	DFEE range (kWh/m²/yr)	Area-weighted DFEE (kWh/m²/yr)	Average annual space heating (kWh/dwelling)
1 bed apartment	19	24 to 33	27	1,100
2 bed apartment	19	27 to 39	32	2,260
Duplex	3	34 to 41	38	3,860
All dwellings	**41**	**24 to 41**	**31**	**1,840**

The area-weighted demand of circa 31 kWh/m²/yr is around twice the GMCA target of 15 kWh/m²/yr. The one bed apartments are closest to the target, while the duplex dwellings, which have more exposed floor, wall and façade area, are furthest from it. SAP fabric energy efficiency is a compliance metric calculated under standardised conditions and is not a direct substitute for predictive space heating demand.

8.3 Mitigation Measures

To reduce the space heating demand towards the GMCA target, and to limit the running cost risk to residents, CWC recommend that the following measures are reviewed with the design team as the design develops:

- fabric enhancement, prioritising the duplex and corner dwellings – for example, window U-values of circa 0.8 to 1.0 W/m^{2}K (triple glazing), and an air permeability target of 1.5 m^3/h.m^2 or better;
- thermal bridging details for the brick façade and masonry support brackets developed to achieve at least the psi-values used in the SAP assessments;
- MVHR units with a high heat recovery efficiency and low specific fan power, located with short external duct runs and commissioned to the design flow rates;
- panel heaters with accurate electronic thermostats, open window detection and time and temperature zoning, with app control to support time-of-use tariffs; and
- a resident handover guide explaining the efficient operation of the heating, hot water and ventilation systems.

If the predictive space heating demand of the dwellings cannot be brought close to the GMCA target, CWC recommend that individual air source heat pumps (Option 2) are reconsidered, as they would roughly halve the energy cost to residents, subject to the location and visual impact of the external units being acceptable.

9.0 Justification for Non-Connection to a Low Carbon Heat Network

As the site is assessed as Case 3, Policy JP-S3 sets an expectation of connection to a heat network, design to enable future connection, or a communal solution, unless more effective alternatives for minimising carbon emissions can be demonstrated, or connection is not practicable or financially viable. The GMCA guidance sets out four grounds for exemption, which are addressed below.

- Carbon grounds – the proposed on-site system delivers heat at circa 69 gCO_2/kWh, and the benchmark individual heat pump at circa 34 gCO_2/kWh, both lower than the 100 gCO_2/kWh assumed for a notional low carbon heat network. The nearest existing network is gas-fired and high carbon.
- Heating cost grounds – the heat network option would cost residents circa £730 per year in heat charges, including a standing charge, compared with circa £340 for the benchmark individual air source heat pump, which has a lower carbon content of heat; this is more than 10% higher than an on-site system of lower carbon content. The heat network option would also cost residents more than the proposed system (circa £690). Residents connected to a network would also lose the ability to switch supplier.
- Cost effectiveness grounds – no network operator is able to provide a connection cost, as no network exists or is funded. The capital cost of a building heating network, heat interface units and interim communal plant (circa £14,000 per dwelling) is higher than that of the proposed system (circa £7,000 per dwelling).
- Technical and practical grounds – there is no programme for a low carbon network in this location and no formal heat network zone designation. Installing communal distribution pipework on the basis of a network that may not come forward would add heat losses and overheating risk to a small, compact building.

CWC note that the proposed system is not the lowest carbon option assessed; the benchmark individual air source heat pump has a lower carbon content of heat and lower energy costs for residents. The proposed system has been selected on the balance of low carbon heat below the GMCA threshold, lowest capital cost, the space constraints of the site and building, simplicity and consumer protection for residents, and the avoidance of communal pipework, subject to the space heating demand mitigation set out in Section 8. The decision on whether to accept an exemption rests with the Local Planning Authority.

10.0 Conclusions and Next Steps

CWC consider that the proposed all-electric heating and hot water strategy for Old Mill Street uses no fossil fuel, delivers heat below the GMCA low carbon threshold of 100 gCO_2/kWh (circa 69 gCO_2/kWh), has the lowest capital cost of the options assessed and is well suited to a compact, constrained urban site. The main residual issue is the higher energy cost of direct electric space heating, which is linked to the space heating demand of the dwellings and should be kept under review using the predictive modelling for the Energy and Carbon Statement.

Whilst CWC consider this appraisal to be robust, there is opportunity for further investigation and refinement as the design progresses. Design development is ongoing, and opportunities for improvement will continue to be sought in all aspects of the energy and heating strategy.

As the design progresses through the subsequent stages, it is anticipated that further SAP iterations will be undertaken to seek optimised solutions in terms of energy efficiency and operational energy impact. A detailed review of the PV array locations, in relation to shading throughout the day, is also to be undertaken by a PV specialist so that the maximum amount of PV can be utilised in the most efficient arrangement. The capital costs, maintenance and replacement cost arrangements, and the measures to mitigate space heating running costs (refer to Section 8) will continue to be refined as part of this ongoing design development.

This appraisal is high level and has been prepared to set out the approach to Policy JP-S3 at planning stage. Its conclusions are based on the information available at this stage and may be revisited as the design, and the policy position on heat network zoning, develop.

Appendix 1 – GMCA Low Carbon Heat KPI Summary (Proposed System)

The table below summarises the GMCA KPIs for the proposed system. All figures are indicative and for comparison purposes only.

Table A1.1 – KPI Summary for the Proposed System

KPI	Indicator	Unit	Proposed system
1	Fossil fuel use	Yes / No	No
2	Carbon content of heat	gCO_2/kWh	circa 69
3	Local pollution	Description	None (no combustion); small sealed refrigerant charge per dwelling (refrigerant to be confirmed at detailed design)
4	Estimated energy cost for heating and hot water	£/yr	circa 690 per dwelling
5	Estimated maintenance cost	£/yr (annualised)	circa 60 per dwelling
6	Estimated replacement cost	£/yr (annualised)	circa 230 per dwelling
7	Additional operating cost compared with benchmark	+/- %	+9% (total); +104% (energy only)
8	Estimated capital cost of heating system	£/unit	circa 7,000
9	Additional cost compared with benchmark	+/- %	circa −30%
10	Connection to low carbon heat network	Yes / No	No
11	Scale of application	m^2 GIA	3,226 m^2 (41 dwellings; major)

Appendix 2 – Calculation Basis and Assumptions

This appendix sets out the basis of the indicative figures used in Section 7. The figures are high-level estimates for comparing options and are to be verified in CWC's approved design software as the design develops.

Heat Demand

Space heating demand has been taken as the DFEE multiplied by the floor area of each dwelling, from the SAP assessments (Table 8.1). Hot water demand has been estimated for each dwelling using the SAP 10 method for the average daily volume, based on its floor area, with an allowance of 15% for distribution losses and an Assumed cylinder standing loss of 1.46 kWh/day. On this basis the average dwelling has a space heating demand of circa 1,840 kWh/yr and a hot water demand of circa 1,990 kWh/yr.

System Efficiencies and Losses

Table A2.1 – System Efficiency and Loss Assumptions

Option	Space heating	Hot water	Distribution losses
1 – Proposed	Direct electric, 100%	Heat pump water heater, seasonal performance 2.5 (Assumed)	Negligible (in-dwelling)
2 – Benchmark	Heat pump, seasonal performance 3.5 (45°C)	Heat pump, seasonal performance 2.6 (60°C)	Negligible (in-dwelling)
3 – Communal heat pump	Plant seasonal performance 2.6 (65°C)	As space heating, via heat interface unit	45% of heat delivered; 3% pumping energy
4 – Notional heat network	100 gCO_2/kWh delivered (GMCA notional)	As space heating, via heat interface unit	Included in network tariff

Carbon Factors and Sensitivity

Table A2.2 – Sensitivity of Carbon Content of Heat to the Electricity Carbon Factor (gCO_2/kWh)

Electricity carbon factor	Option 1 Proposed	Option 2 Benchmark	Option 3 Communal heat pump
0.050 $kgCO_2e/kWh$ (lower sensitivity)	34	17	29
0.100 $kgCO_2e/kWh$ (adopted)	69	34	57
0.136 $kgCO_2/kWh$ (SAP 10.2)	94	46	78

Cost Assumptions

Table A2.3 – Cost Assumptions

Item	Assumption
Electricity unit rate	Ofgem price cap, 1 October to 31 December 2026, direct debit, GB average: 26.32 p/kWh. The electricity standing charge is common to all options and has been excluded.
Heat network tariff (Option 4)	12 p/kWh heat delivered, plus a standing charge of £350 per dwelling per year
Communal system charge (Option 3)	Heat metering and billing charge of £150 per dwelling per year
Maintenance (annualised)	Option 1 £60; Option 2 £150; Option 3 £220 (including share of communal plant); Option 4 £120
Replacement (annualised)	Based on typical service lives of 15 years (heat pumps and heat interface units) and 25 years (panel heaters and cylinders): Option 1 £230; Option 2 £410; Option 3 £330; Option 4 £80 (network plant recovered through the tariff)
Capital costs	GMCA 'Low carbon heat' guidance indicative costs per unit (present day, including installation and main contractor allowances, excluding emitters common to all options); Option 4 includes an allowance for interim communal plant and connection

Appendix 3 – Glossary of Terms and Abbreviations

Table A3.1 – Glossary

Term	Meaning
Benchmark system	The on-site air source heat pump system against which the GMCA guidance asks other options to be compared.
Carbon content of heat	The carbon emissions associated with each kilowatt hour of useful heat delivered to a dwelling, taking account of the fuel, the efficiency of the plant and distribution losses (gCO_2/kWh).
DESNZ	Department for Energy Security and Net Zero.
DFEE	Dwelling Fabric Energy Efficiency – SAP space heating and cooling demand under standard conditions ($kWh/m^2/yr$).
Heat pump water heater	A packaged heat pump with an integral cylinder that heats domestic hot water using heat from the air.
GIA	Gross Internal Area.
GMCA	Greater Manchester Combined Authority.
Heat interface unit	A unit in each dwelling that transfers heat from a communal heating system to the dwelling's heating and hot water.
Heat network	A system of pipes distributing heat from a central source to multiple buildings or dwellings.
KPI	Key Performance Indicator.
MVHR	Mechanical Ventilation with Heat Recovery – recovers heat from extracted air to warm the incoming fresh air.
PHPP	Passivhaus Planning Package – a predictive energy modelling tool.
PV	Solar photovoltaic panels, which generate electricity from sunlight.
SAP	Standard Assessment Procedure – the government method for assessing the energy performance of dwellings for Building Regulations.
TM59	CIBSE TM59 – the method for assessing overheating risk in homes.
Seasonal performance	The average ratio of heat output to electricity input of a heat pump over a year (seasonal coefficient of performance).