



darren evans
building energy efficiency

**Development at Culcheth
Lane/Tandlewood Mews
Manchester
M40 1LG**

Sustainability Statement

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1.0 Version History

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3.0 Executive Summary

This Sustainability Statement has been prepared in support of a planning application for the erection of 6 new dwellings on the land Culcheth Lane/Tandlewood Mews, Manchester M40 5DT. The statement includes an energy demand assessment showing how selected energy efficiency, low carbon and renewable energy measures have been considered and those, which are deemed appropriate for the scheme.

SAP Calculations have been prepared for the development based upon the construction specification set out within the report and using the detailed planning drawings. This provides an accurate assessment of the carbon dioxide emissions arising from the site and has allowed a number of different systems and technologies to be tested.

The proposed development falls within Manchester City Council. This development therefore needs to adhere to the Manchester's Local Development Framework – Core Strategy Development Plan Document (Adopted 11th July 2012). Under this strategy there is no requirement to meet a required reduction in emissions/reduction in onsite site energy through renewable technologies or low carbon technologies. However, the Energy Hierarchy is embedded in this policy paper and does need to be adhered to. This report will address what technologies are available on the market and if any of these technologies will be deemed suitable for the site.

The conclusion of the energy strategy is that the development reduces the buildings CO₂ emissions when compared to the baseline target, through a combination of passive measures and building fabric design improvements.

A saving in CO₂ of 14.92% has been achieved annually compared to the building regulations compliant baseline assessment across the site. This has been carried out in SAP 2012. This ensures compliance with Manchester's Local Development Framework – Core Strategy Development Plan Document (Adopted 11th July 2012), particularly Policy EN6. This policy requires a 15% reduction in emissions to be met in Building Part L 2010. The change in regulations in 2012 made tighter restrictions for buildings. This meant that a building passing by 0% in SAP 2009 (2010 Part L regulations) would need to be improved by approximately a 5-6% to obtain a 0% pass in SAP 2012 (2013 Part L regulations) This therefore shows that the development has improved on 2010 Part L regulations by **>15%** and would be in the region of a **20% improvement**.

4.0 Introduction

This Statement has been prepared in support of the new development at Culcheth Lane/Tandlewood Mews, Manchester M40 1LG. The work on site consists of the following;

- The erection of 6 new build dwellings

The following statement seeks to outline how the proposed development will comply with condition 4 of the planning approval notice (application No 107336/FO/2014/N2). The aim of this condition is to minimise the environmental impact of the development. To achieve this, principles of the following documents will be considered within this report: Policies SP1, T1-T3, EN4-EN7 and DM1 of the core Strategy for the City of Manchester. The Guide to Development in Manchester SPD(2007) will also be consulted in relation to the relevant points of Section 4 Environmental Standards.

Darren Evans Assessments have been commissioned to;

- Ensure the proposed dwellings achieves an improvement on building regulations emission targets (Part L 2013). Calculated using SAP Methodology, and approved software (FSAP 2012)
- To ensure each dwelling uses water efficiency measure so that mains water consumption does not exceed 125 Litres per person per day
- Reduce carbon emissions associated with the development by following the Energy Hierarchy (Be Lean, Be Clean, Be Green)
- Investigate potential renewable energy technologies based on their practical feasibility and technical viability

5.0 National Policy

The UK ratified the above Paris Agreement in November 2016. Also, the National Planning Policy Framework 2019 aims to make the planning system less complex and easier to understand.

*“At the heart of the Framework is a **presumption in favour of sustainable development**.”¹*

The framework encourages applications to comply with local plans on decentralised energy supply where feasible and to take into account landform, layout, orientation, massing and landscaping design to minimise energy consumption. Paragraph 151 encourages the use of renewable and low carbon energy where suitable and for applications to have a positive strategy to promote the above.

New development should be planned for in ways that:

- *“Avoid increasing vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and*
- *Can help to reduce greenhouse emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards.”¹*

This development is committed to meeting the regional and local requirements for carbon emissions and energy use from the development as a minimum.

¹ National Planning Policy Framework

6.0 Local Planning Policy

Manchester's Local Development Framework – Core Strategy Development – Key Points

The Key points which this statement will address have been taken from policies SP1, T1-T3, EN4-EN7 and DM1 of the core Strategy for the City of Manchester and are detailed below;

- Promote sustainable transport encouraging a shift from private cars to public transport, walking and cycling
- Implement layout and building principles which consider siting, scale, form, massing, materials and solar gains to reduce reliance on energy
- Address the principles of the Energy Hierarchy
- Investigate the feasibility of low/zero carbon technologies along with centralized energy schemes

Manchester's Local Development Framework – Policy EN 6

Target Framework for CO2 reductions from low or zero carbon energy supplies

Applications for residential development of 10 or more units and all other development over 1,000 sq m will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2, unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO2 emissions for all phases of the development.

Developments smaller than the above threshold, but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable, but will not be expected to submit an energy statement.

The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows

- Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling).
- Target 2 Electricity intense areas: Locations where the predominant building type has an all electric fit-out such as retail units and leisure complexes.
- Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical.

Domestic CO2 Emissions Reduction Targets

Table 12.1

Target	% Minimum Requirement
Target 1: Network Development Area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity Intense Buildings	+15% increase on Part L 2010
Target 3: Micro Generation Area	+15% increase on Part L 2010

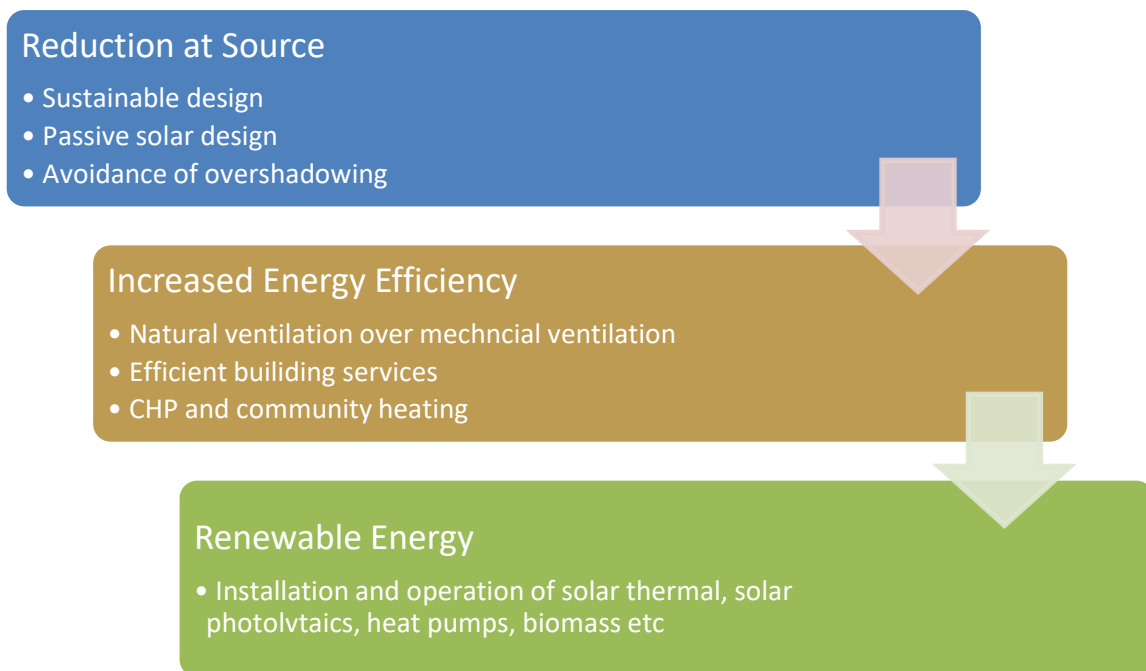
Where the CO2 emissions reduction required under any future revision to Part L of the building regulations becomes greater than the '% Minimum requirement', the reduction required under building regulations would apply.

Where the Council identifies an 'allowable solution', for example within an energy proposals plan, that would produce higher carbon reductions at no extra cost than that of achieving the '% Minimum requirement' (or required under building regulations if greater) the higher percentage reduction will be required. The cost comparison is based on the cost of incorporating the 'allowable solution' at design stage.

The energy statement will be required to be submitted at the outset of any proposed development (outline application or before). Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO2 mitigation, subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

7.0 The Energy Hierarchy

The Energy Hierarchy is a widely adopted and recognised set of principles to guide design, planning and development decisions to optimise energy provision. The Hierarchy prioritises minimising the need for energy consumption through firstly design and energy efficiency and then through generating the reduced energy demand via renewables. The Hierarchy can also help to balance the economic and environmental dimensions of sustainability, supporting choices which are both environmentally and economically sustainable.



It is considered that the above principles of carbon reduction form the most appropriate approach from both the practical and financial perspective. The industry is broadly in agreement that the energy efficiency and low carbon technologies have the greatest impact offsetting CO₂ emissions. Therefore, it is logical to encourage enhanced mitigation through energy efficiency and low carbon technologies in the first instance, as opposed to applying renewables as the first option at a significantly greater cost.

8.0 The Proposed Development

This proposal seeks the erection of 6 new build dwellings on the land at Culcheth/Tandlewood Mews, Manchester M40 1LG

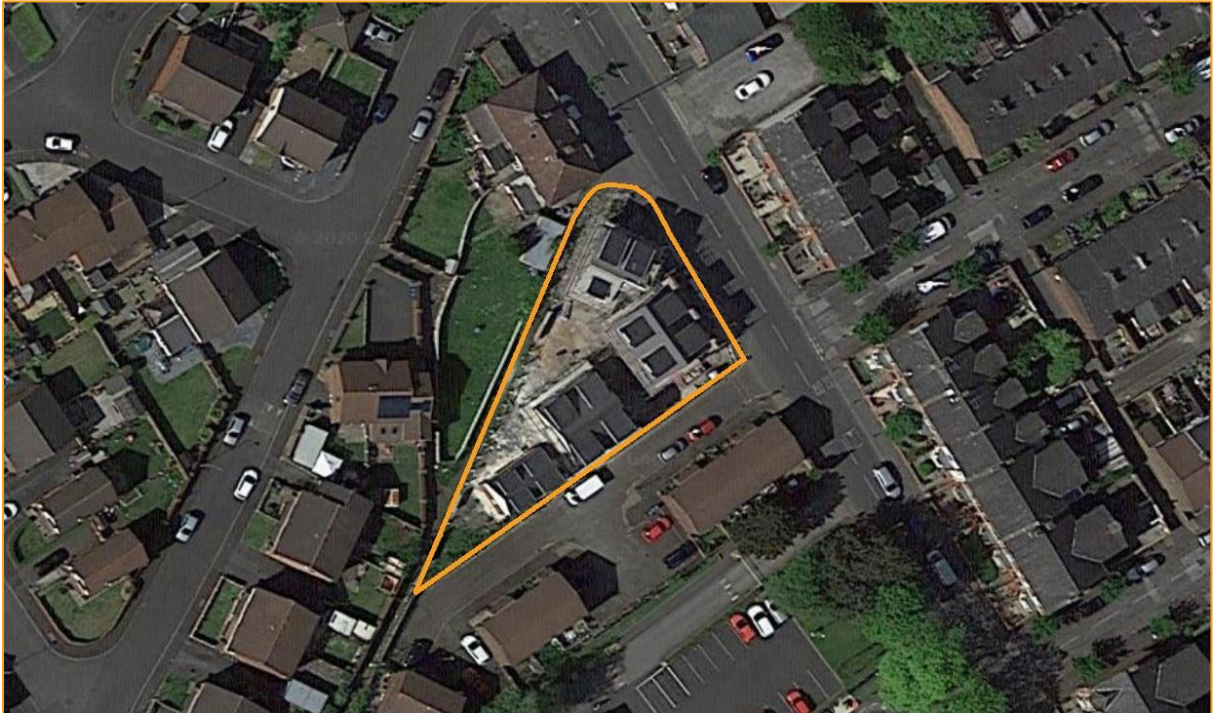


Figure 1: Ariel View of the Proposed Site - Sourced from Google



Figure 2: View of Proposed Site Provided by Tang & Associates

9.0 Assessment Methodology

This development is assessed as a minor development following the guidance from the GLA guidance on producing energy statements (March 2016) and The Department for Communities and Local Government's 'Planning Applications Decisions – Major and Minor Developments'.

This is detailed in Table 1 which has been adapted from the GLA Annex Six Glossary and guidance from the DCLG.

Scale	Description
Householder	Extensions to houses (including roof extensions)
Minor	Residential development of 1 to 9 units in scale including conversions. Non-residential development of up to 999 m ² .
Major	Residential development over 10 units. Non-residential development over 1,000 m
Large Scale Major	Residential development over 200 units or a site of 4 hectares or more. Non-residential development over 10,000 m ²

Table 1: The GLA Annex Six Glossary, Major or Minor Development

As the proposed site has 6 new build dwellings the development is classed as a minor development. As it not classed as a major development the development needs to meet the requirements of Building Regulations Part L1A.

With regards to Manchester City Council's Core Strategy the development falls into Target Network 3. Therefore a 15% reduction on Part L 2010 will need to be met.

10.0 Sustainable Energy Strategy

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practical. It is possible to exceed Building Regulations requirements (Part L 2013) through demand reduction measures alone, which typically include a combination of passive design measures (e.g. building design and efficient building fabric) and active design measures (e.g. Building services).

Passive Design

Passive design is a key principle of sustainable design, and can be used to reduce the building's energy demand. Passive design responds to local climate and site conditions to maximise the building users' comfort and health while minimising energy use.

At the earliest stage the buildings have been designed using a fabric first approach as to initially minimise energy and resulting CO₂ emissions. Particular attention will be paid to thermal envelope and a high level of insulation will be specified to all thermal elements to minimise heat losses.

Passive solar gain reduces the amount of energy required for space heating during the winter months. The layout of the dwellings is partially dictated by the existing street scene. However, the building is designed to maximise passive solar gain by the specification of fenestrations to the south-east and south-west where possible to maximize passive solar gain.

The development has been designed to improve daylighting in all habitable spaces, as a way of improving the health and wellbeing of its occupants. The majority of the habitable rooms, such as living rooms, will benefit from large windows to increase the amount of daylight within the internal spaces. Blinds will be installed for minimizing glare and regulating solar gains during hottest summer months.

A portion of the buildings heat loss will occur due to air infiltration. Good construction detailing and the use of best practice construction techniques will minimise the amount of air infiltration. Extra attention to detail will be paid, with adequate sealing to all junctions in the thermal envelope, service penetrations and window casements. This will ensure an air test target of 5m³/m² at 50Pa or better is achieved.

Natural ventilation will be used to provide fresh air to all units to minimise energy demand for mechanical ventilation plant. All units' fenestrations will be equipped with trickle vents and operable windows in order to prevent overheating during hottest summer months.

The SAP calculation contains an overheating analysis to ensure that the risk is appropriately mitigated in the dwellings. The analysis demonstrates that all dwellings achieve a compliant level of overheating risk.

SAP Data Input Table				
Element		Details	Comments	
Floor U-Values	New Build Ground Floors	0.14 W/m²K	SAP Completed by G Reports	
Wall U-Values	New Build External Walls	0.25 W/m²K	SAP Completed by G Reports	
	New Build External Walls - Stud Walls	0.20 W/m²K	SAP Completed by G Reports	
	New Build External Walls – Dormers	0.13 W/m²K	SAP Completed by G Reports	
Roof U-Values	New Build Roof - Insulation at Rafters	0.15 W/m²K	SAP Completed by G Reports	
	New Build Roof – Flat Roof	0.13 W/m²K	SAP Completed by G Reports	
	New Build Roof – Roof Void	0.14 W/m²K	SAP Completed by G Reports	
Opening U-Values	Windows	1.15 W/m²K	Double Glazed, Low-E Coated G Value: 0.63	
	Door – Half Glazed	1.20 W/m²K	Double Glazed, Low-E Coated G Value: 0.63	
	Door – Solid	2.00 W/m²K	Solid Composite Door	
Thermal Bridging	y - value	Various	Accredited Construction Details (ACDs) Used	
Ventilation	Air Tightness	5.00	-	
	Mechanical Ventilation	Natural	Mechanical Extract Fans in Kitchens and Wet Rooms Only	
Heating and Hot Water	Primary Heating System	Gas Fired Condensing Boiler	Ideal Logic Combi ESP1 – Efficiency 89.6%	
			Boiler Information	Pump in Heated Space, Boiler Interlock, Fan Assisted Flue
	Controls	Programmer	Full Time and Temperature Zone Controls by Suitable Arrangement of Plumbing and Electrical Services - Delayed Thermostats Specified	
	Heat Distribution	Underfloor/Radiators	Underfloor Heating Installed in Screed on Ground Floor, Radiators Installed on Remaining Floors	
	Water Heating	From Gas Boiler	Hot Water Supplied Directly from Combi Boiler	
	Secondary Heating System	None	-	
Low Energy Lighting		100% Low-Energy Fittings	Minimum Efficiency 45 Lumens per Circuit Watt	

Table 2: Energy Efficient Measures of SAP Calculations

11.0 Residual Assessment

SAP calculations have been produced for the dwellings as a means of determining the Dwelling Emission Rate (DER) using the approved modelling software STROMA FSAP 2012.

Incorporating the energy saving measures from the previous section into the design SAP Assessment will reduce the sites overall energy demand and subsequent CO₂ emissions beyond the requirements of Part L Building Regulations by 14.92%.

Residual Emissions Summary

Dwelling	Floor Area m ²	Target Emission Rate kgCO ₂ /m ² /yr	Dwelling Emission Rate kgCO ₂ /m ² /yr	Percentage Improvement	Total Emissions kgCO ₂ /year
2 Tandlewood	81.00	18.67	15.88	14.93%	1,286.28
4 Tandlewood	81.00	18.67	15.88	14.93%	1,286.28
6 Tandlewood	89.85	18.59	15.37	17.32%	1,380.99
26 Culcheth	106.87	18.04	15.54	13.85%	1,660.76
28 Culcheth	86.00	17.99	15.33	14.78%	1,318.38
30 Culcheth	86.00	18.14	15.58	14.10%	1,339.88
Total					8,272.57

Table 3: Summary of Emissions (Regulated) of Residual Assessment

$$\frac{(Target\ Emissions - Proposed\ Emissions)}{Target\ Emissions} \times 100 = \% Improvement$$

$$\frac{(9,723.46 - 8,272.57)}{9,723.46} \times 100 = \mathbf{14.92\%}$$

The emissions for the site are calculated to be **8,577.33kgCO₂** per annum.

Total Target Emission Rate: **9,723.46 KgCO₂/Year**

Total Design Emission Rate: **8,272.57 kgCO₂ /Year**

Total CO₂ Savings over Part L: **1,146.13 KgCO₂/Year**

Improvement over Part L: **14.92%**

The Total Target Emission Rate (TER) was calculated by multiplying the TER of each dwelling by its respective floor area. The Target emissions for the 6 dwellings was added together to determine the Total Target Emission Rate. The same methodology was used to determine the Total Dwelling Emission Rate (see Table 3)

SAP 2012 has stricter requirements than SAP 2009. The variance in the pass rate between SAP 2012 and SAP 2009 is around 5-6%. This therefore means that as 14.92% pass in SAP 2012 would equate to 19.92-20.92% Pass in SAP 2009 which was used as the compliance too for Building Regulations Part L 2010.

12.0 Renewables Feasibility

The following renewable technologies have been evaluated for use:

- Solar Photovoltaic Cells (PV)
- Solar Hot Water
- Wind Turbines
- Biomass
- Ground Source Heat Pump
- Air Source Heat Pump

Photovoltaics

Solar photovoltaics (PVs) convert energy from daylight into electricity using a semiconductor material such as silicon. When light hits the semiconductor, the energy in the light is absorbed, 'exciting' the electrons in the semiconductor so that they break free from their atoms. The resultant flow of electrons through the semiconductor material produces electricity.

Feasibility	Further Consideration
The proposed dwellings have large area of pitched roof/flat roof areas where solar PV panels could be installed on to frames to be orientated due-South or East/West for maximum efficiency. There are no potential over shading risks which will limit efficiency of the installed array. As PV systems have no moving parts, generate no noise or pollution, this is an attractive option. If designed and properly installed require minimal maintenance and have long service lifetimes.	Yes

Solar Thermal (Hot Water)

Solar water heating systems convert solar radiation to heat carried by water for use in space heating or the provision of domestic hot water. Solar water heating systems normally operate with a back-up source of heat, such as gas condensing boilers. The solar water heating preheats the incoming water, which is topped up by the back-up heat source when there is insufficient solar energy to reach the target water temperature.

Feasibility	Further Consideration
Just as with photovoltaics the dwellings have adequate area of pitched roofs for a solar thermal system. Hot water demand for the residential properties is minimal. Hot water requirement is at its highest during the winter, where generation is at its lowest. The dwellings are a good size to incorporate a solar thermal system. However, the heat and hot water for the dwellings is being provided through combination boilers to minimise hot water losses through storage. In order for solar thermal to be considered the dwellings would have to be heated by a system boiler.	No

Wind Turbines

Wind turbines are modern, high-technology descendants of the windmills that have been around for centuries. In modern windmills the kinetic energy of the wind is used to turn a turbine to generate electricity as opposed to moving water or turning a grist mill wheel. There are two types of wind turbine, the horizontal-axis type which faces up or downstream of the wind and where the rotational movement of the blade is connected to a generator to create electricity. The other is the vertical-axis design, which is by far the most flexible type of wind turbine being best suited to more urban sites as it is more cost effective and operates with wind coming from any direction.

Feasibility	Further Consideration
Owing to site-constraints, micro-wind turbines have not been considered as part of this feasibility study. The primary constraint is the and associated potential planning restrictions and relatively low wind speeds in this area, averaging ~ 4.5 ms⁻¹ at 10m above ground level. (http://www.rensmart.com/Weather/BERR) Wind turbines are also likely to have a significant visual impact on local environment, as well as health and safety implications for occupiers or users on-site and on adjacent areas as a result of noise and light flicker associated with the wind turbines.	No

Biomass

Biomass boilers are an alternative to conventional fossil fuel heating. They burn woodchip, wood pellets, cereal waste or a combination of organic fuels, and are a carbon neutral option. Using biomass as an energy source creates a 'closed carbon cycle' – i.e. as a biomass energy source grows it absorbs CO₂ from the atmosphere, when it is burnt the CO₂ stored by the biomass is released, making it carbon neutral.

Feasibility	Further Consideration
Consideration needs to be given to the frequent deliveries that would be required for this system as well as the size of storage. There are also potential noise, dust and odor problems associated with the deliveries as well as air quality issues from the burning of the fuel. Biomass is a heating option that needs careful consideration as the fuel usually has to be delivered in bulk to reduce cost and the fuel needs to be stored in a dry area for maximum fuel efficiency. The dwellings would need a suitable drive to accommodate a large delivery van for regular deliveries. The higher NOx emissions are also of concern so would need to be looked at if this was considered.	No

Ground Source Heat Pumps

Ground source heating takes advantage of the stable ground temperature of 12°C to heat either air or water to provide energy efficient heating (and optional comfort cooling) to a building. The energy flow is driven by the temperature difference between the ground and the circulating fluid which can then be used to deliver heating (and optional cooling) to the building.

The direct bore hole type of installation requires a number of boreholes with a depth of up to 100m and a minimum centreline distance of 6m separating each bore hole.

Alternatively, closed loops can be installed along with the piles and or pad foundations of the building to take advantage of the foundation excavations to maximise the earth-connectivity of the system

Feasibility	Further Consideration
The use of heating and providing hot water via a ground source heat pump has steadily increased over the last decade or so. The reason being is that the ground temperature below the surface stays at a more constant temperature throughout the year. This mean that if this heat can be extracted is relatively similar throughout the year. Heat pumps can be incredibly efficient when they are properly designed. It is very common to have annual efficiencies of ground source heat pumps at over 400%. This equates to a ground source heat pump producing over 4kW of heat for every 1kW of electricity that is provided to run the unit. This makes the fuel bill for using this technology low in comparison to other methods of heating. The major draw-back with ground source heating is the installation cost and the method to which the heat is extracted from the ground. Horizontal collectors are only eligible if there is an expansive use of land to extract the heat from. Installing horizontal collectors too closely together can lead to the top soil freezing as the collector is extracting all the available heat from the ground which can cause the transfer fluid in the collectors to freeze. Installing bore holes can be incredibly expensive as the holes can be 100m or so into the earth. This requires large machinery to be hired out, so this is something to be costed prior to the commencing using this type of technology. The ground can also be a factor as different rocks and ground structures can prove difficult for drilling. The cost for the heat pump unit and ancillaries is also more expensive than other heating technologies As with solar thermal and other renewable technologies the system requires a cylinder or have a heat pump unit with a built in cylinder	No

Air Source Heat Pumps

An air source heat pump (ASHP) is a system which transfers heat from outside to inside a building. Under the principles of vapour compression refrigeration, an ASHP uses a refrigerant system involving a compressor and a condenser to absorb heat at one place and release it at another.

In domestic heating use, an ASHP absorbs heat from outside air and releases it inside the building, as hot air, hot water-filled radiators, under floor heating and/or domestic hot water supply.

Feasibility	Further Consideration
Using an air source heat pump would be similar to a gas heating arrangement, the only difference is that the heat pump units would need a heat pump rated cylinder within the dwellings to provide hot water and the emitter need to accommodate a lower flow/return. Air source heat pumps have a higher capital cost than a conventional gas heating and domestic hot water system. For a start they require a cylinder that is not required with a combi gas boiler. However, heat pumps are becoming more prevalent as there is better understanding from installers and the general public as to their operation. Heat pumps when installed correctly with an appropriate emitter system can be incredibly efficient. Heat pumps can run at over 300% efficient over the course of a year meaning for every 1kW of electricity used to run the compressor it will produce 3kW of heat. This means that running cost can be lower when compared to conventional systems. Maintenance costs at present are higher than conventional heating system but this will change as the energy market diversifies away from conventional heating. There are potential risks in relation to noise and neighbouring dwelling(s), but most installers need to provide evidence that noise of a heat pump does not exceed a certain limit when sited near a habitable room. There are also risks with pressure losses in the system and loss of refrigerant gas. Refrigerant gases have a much higher environmental impact than carbon emissions in relation to global warming and ozone layer depletion. As these gases are contained within heat pump unit and the regulations with heat pumps have been significantly tightened since they entered the market this has become less of an issue but still one worth consideration There is the potential of use of air source heat pumps on site. It might be an unusual arrangement of trying to conceal the heat pump from view, but it is something that could potentially be achieved.	Yes

Renewables Summary

Based on the above, the most feasible option for this development would be to install photovoltaic panels, a solar thermal hot water system or the installation of an air source heat pump. From a practical and cost-effective perspective reducing energy demand through lifestyle choices and fabric first solutions and then generating power with solar photovoltaic panels is the strongest candidate to achieve the most significant emission reductions. With both solar thermal and air source heat pumps they would require a hot water cylinder, and this would take away from any storage space in the dwelling. As the dwellings are fitted with gas combi boilers, retrospectively fitting these technologies would be a costly exercise.

In relation to the implementation of Combined Heat and Power (CHP) it would not be feasible to install this type of system on site. CHP boilers require a high energy and heating demand and as development consists of 6 dwellings it would not have a suitable heating or electrical demand. There is also a limited amount of space to house a boiler room.

With regards to district heating lines further evidence would need to be shown that these are installed near to the site or there are provisions for the heat network to be installed near to the site in the future to make it financially viable option going forward.

The heating hierarchy has been looked into within this application. Unless there are provisions for the heat network to be installed near to the site is not cost effective to futureproof 6 dwellings for a heating system that may or may not be installed in this area in the future. With the use of Combined Heat and Power it is not financially or practically viable in this application. The development is not a major development as it consists of 6 new build houses. The heating and electrical demands of the site are low. CHP plants are generally for large scale developments; again, this is not practically viable or cost effective. Renewable heating technologies such as heat pumps have been looked at as a possible alternative for gas. However, this technology has space constraints and the requirement for a cylinder for the domestic hot water system.

As the development has already significantly reduced its emissions beyond building regulations through a fabric first approach and a high efficiency combi boiler it has been decided not to proceed with the inclusion of any renewable technologies. The development already meets the national and local reduction in emissions.

13.0 Dwellings Water Consumption – Part G

Reducing Water Consumption

The incorporation of water saving measures in dwellings is required in order to meet building regulation water consumption targets of 125litre/per person/per day. SAP 2012 methodology recognises a 5% reduction in domestic hot water heating energy if the dwelling is designed to achieve a water use.

This scheme will aim to reduce potable water consumption in the dwellings to below 125 litres per person per day to meet Approved Document Part G standards. This will be achieved through the use of internal potable water fixtures and fittings which utilise low flow rates and capacities without reducing an individual's ability to enjoy their property. An example of potential flow rates and fixtures is outlined in the table below:

Internal Potable Water Fixing	Flow Rate / Capacity
Toilet	Dual Flush 6 and 4 litres / min
Basin Taps	6 litres / min
Bath	190 litre capacity to overflow
Shower	10 litres / min
Kitchen Taps	8 litres / min

Table 4: Flow rates and capacities to achieve Part G

14.0 Encouraging More Environmentally Friendly Transport

Policy T1 of the Core Strategy is aiming to encourage a shift away from private car use to public transport, walking and cycling. The location of this development provides the future occupants with strong alternatives to private car use. There are bus stops on Culcheth Lane less than a minute's walk from the development with regular buses into Manchester city centre. A 0.2 mile walk along Culcheth Lane will take you to Old Church Street where there are two supermarkets. There is a larger Morrisons Supermarket on Poplar Street which is 0.7miles away. The nearest train station is Ashburys which is 2.5miles away. This will provide further transport around Manchester and further afield. Further to this the development has been designed as to offer adequate space for bicycle storage for all occupants of the dwellings. As a result of the above a practical alternative to the use of cars is available for all journeys encouraging more sustainable patterns of travel.

15.0 Materials and Waste

In line with policies EN4 & SP1 of the Core Strategy there are targets to ensure efficient use of materials, using material with low embodied Carbon and to reuse previously developed land where possible. During this project all materials are to be sourced as locally as possible to reduce carbon cost of transport, In addition to this where possible materials with a high recycled content will be used. Where timber is used in the development, the preference will be given to products from certified sustainable sources such as the FSC- or PEFC-certified.

Sufficient space shall be provided for recycling stores for all users of the site, this should encourage building users to recycle through improving awareness.

Whilst on site contractors will be encouraged to manage recycling and waste efficiently. The developer is committed to a policy framework for waste management with the best approach considered to be reducing the amount of waste that arises in the first place. The principles of the waste hierarchy will be followed, by that, emphasis is placed on re-use followed by recycling and composting before energy recovery and disposal is considered. The aim is to reduce the waste arising from the start and encouraging waste to be diverted from landfill.

16.0 Conclusions and Summary

This statement has reviewed the sustainability performance of the proposed development Culcheth Lane/Tandlewood Mews against national and local policies.

The developer has considered all sustainable solutions and has reduced the energy demand and resultant carbon dioxide emissions of the development above and beyond the requirements of the Building Regulations Part L1A. The proposed energy strategy has been proven to meet the key regulatory and local planning policy targets established by Manchester's Local Development Framework – Core Strategy Development Plan Document (Adopted 11th July 2012).

This report has shown how the proposed development has been designed using the principles of the Energy Hierarchy in order to deliver significant carbon dioxide savings. In particular, the design team have sought to minimise emissions at source by the incorporation of the “Fabric First” approach utilising the principles of passive design. Furthermore, the implementation of sustainable design features such as the high efficiency boilers coupled with advanced controls, as well as high efficiency lighting throughout.

A review of the possible low carbon or renewable energy strategies for the development has been carried out and it has concluded that as the development meets the national and local policies that no renewable technologies would be adopted on site.

These improvements to the specification will ensure the development achieves a reduction in emissions of **14.92%** over the baseline Target Emission Rate in SAP 2012 (Building regulations Part L1A 2013). 2013 Part L regulations are approximately 5-6% stricter than the previous version of Building regulations 2010. This would therefore imply that the proposed development would achieve an approximate **20%** reduction in emissions if the dwellings were modelled in SAP 2009 to comply with 2010 Building Regulations.

The overall energy strategy through the combination of a fabric first approach and sustainable design has ensured the proposed development at Culcheth Lane/Tandlewood Mews achieves a reduction in CO₂ against the development's Residual case and complies with Manchester's Local Development Framework – Core Strategy Development Plan Document (Adopted 11th July 2012) Policy EN6.

It has been evaluated this is the most technically viable and financially feasible approach and the appropriate way to proceed to satisfy National Planning Policy Framework, Manchester City Council Planning Policies and Building Regulation requirements.



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