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Intelligent engineering,
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Land to the West of Rodney Street, Manchester

Environmental Standards Statement

For Wates Construction Ltd.

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Document History

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Executive Summary

This Environmental Standards Statement has been prepared by Method Consulting on behalf of Wates Construction Ltd., to support the planning application for a residential development to provide 118no. apartments and 10no. townhouses on land to the west of Rodney Street in Manchester.

The proposed development seeks to repurpose the disused space between Rodney Street and Wadeford Close, creating a high standard of new dwellings with communal amenity space and landscaped public space. Two new apartment blocks are proposed, with two smaller blocks of townhouses at the south of the site.

This statement seeks to address the following Manchester City Council policies in relation to climate change and addressing the climate emergency. The following policies are addressed:

- Manchester Core Strategy (July 2012)
 - Core Strategy Policy DM1: Development Management
 - Core Strategy Policy EN4: Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development
 - Core Strategy Policy EN6: Target Framework for CO₂ Reductions from Low or Zero Carbon Energy Supplies
 - Core Strategy Policy EN8: Adaptation to Climate Change
 - Core Strategy Policy EN9: Green Infrastructure
 - Core Strategy Policy EN14: Flood Risk
 - Core Strategy Policy EN15: Biodiversity and Geological Conservation
 - Core Strategy Policy T1: Sustainable Transport
- Guide to Development in Manchester SPD (2007)
- Manchester: A Certain Future (2013)
- Manchester Climate Change Board – The Zero Carbon Framework 2020-2038
- Climate Change and Low Emissions Implementation Plan 2016-2020
- Manchester Climate Change Framework – 2020-25
- Manchester Residential Quality Guidance 2017

This statement demonstrates how the Rodney Street development will incorporate sustainable design measures in line with the Energy Hierarchy, and how further measures will be implemented in order to address adaptation to potential future climates.

A specific requirement for the development is to achieve a 15% reduction in carbon emissions over Part L 2010 of the Building Regulations. Due to the consequential

improvements required in Part L 2013 (the current Building Regulations), this equates to a 9% improvement against Part L 2013.

The proposed development and sustainability measures are targeting a carbon emissions reduction of 17.5% over Part L 2013, which is a significant improvement over the policy standards. This is set to be achieved through a high standard of building fabric, electric space heating, and hot water supplied by cylinder-integrated heat pumps.

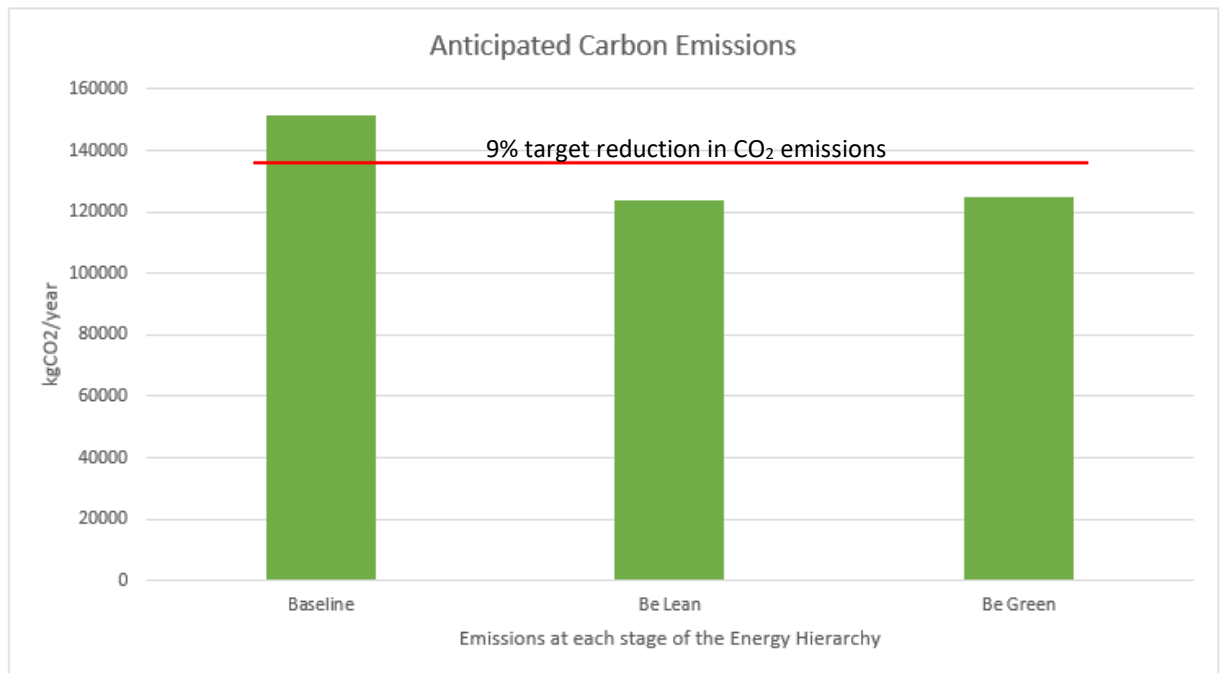


Figure 1: Carbon Emissions at each stage of the Energy Hierarchy

In addition to this, the development is targeting certification under the Association for Environment Conscious Buildings (AECB) standards, which requires significant improvements over the policy requirements listed in the Core Strategy. This also exceeds the Manchester Roadmap to Net Zero Carbon, which sets an Energy Use Intensity (i.e. how much energy is consumed by the development per square meter of floor space) target of <60 kWh/m²/year, as the AECB standard requires a 33% improvement beyond this to <40 kWh/m²/year. Compliance with this standard is being assessed as an ongoing exercise.

Flood Risk

The proposed development site is located within Flood Zone 1. This indicates that the development is at low risk of flooding from rivers or the sea as shown on the Government Flood Map for Planning.

Green and Blue Infrastructure

By incorporating Sustainable Drainage Systems, flood risk can be managed and mitigated, and a full design of the proposed drainage strategy is being provided by others as part of the planning application submission. Alongside drainage attenuation, techniques being considered for use in the development include permeable paving and rain gardens.

Careful consideration has been given to opportunities to preserve existing trees, in order to minimise negative impacts resulting from the development. The tree belt along the eastern side of the site will largely be retained, and will benefit from additional planting and a new footpath through the landscape. 45 trees of varying quality that currently sit on the site will need to be removed in order to facilitate the delivery of the development. However, 132 trees will be planted in their place (aiming for as close as possible to a ratio of a 3:1 replacement).

A preliminary ecological survey has been produced, and the site is considered to be of limited ecological value. A bat roost assessment has demonstrated that all trees to be removed have a low or negligible potential for roosting bats. A biodiversity net gain calculation has shown that the scheme will not result in a loss of biodiversity units.

Internal Water Efficiency

All new dwellings are required to achieve an internal water consumption of no more than 110 litres/person/day. Proposed fittings will therefore have low flow rates and low flush volumes where possible.

Waste Management

The Proposed Development will aim to minimise the waste produced from the site during the construction phase through the implementation of a Site Waste Management Plan.

All dwellings will be provided with sufficient waste storage areas, with space available for general waste and recycling. Food waste collection is also anticipated to be provided.

Materials

The development will aim to use materials with a low life cycle impact, and responsibly sourced materials will be preferred, both for the main building

elements and the internal finishes. Preference will be given to local manufacturers who can meet these requirements where possible.

Material Life Cycle Carbon analysis is being undertaken for the development as part of the wider sustainability aspirations for the scheme, looking to consider embodied carbon associated with the construction of the development.

Pollution Control

Careful consideration of noise impacts has informed the design, with the aim being to maintain a comfortable internal noise level for occupants of the new properties, and to limit noise breakout from the development.

Air quality will be managed through avoidance of combustion fuels on-site, with careful consideration of air pollution during the construction stages.

Light Pollution will be minimised where possible through the careful specification and positioning of external lighting around the proposed development.

Health and Wellbeing

A full daylight and sunlight analysis has been carried out for the proposed development, and has identified that there will be a good standard of daylighting to occupied spaces. Energy-efficient Mechanical Ventilation with Heat Recovery (MVHR) units will help maintain a continuous source of fresh air to help maintain good internal air quality, reducing the potential for dwellings to feel stale.

Thermal comfort modelling has also been undertaken, in order to demonstrate that no spaces will overheat during the design climate scenario.

Sustainable Transport

The site is located in proximity to the city core, and good access to public transport creates a highly sustainable location. Secure cycle storage spaces will also be provided to encourage sustainable travel locally.

Renewable and Low Carbon Technologies Options Appraisal

A review of possible renewable and low carbon technologies has been carried out to identify the suitability of select renewable technologies as part of this scheme. The findings are detailed in this report.

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1 Environmental Standards Statement

The following Environment Standards statement relates to the proposed residential development located at Land to the west of Rodney Street, Manchester.

1.1 The Site

The site is located in the 'Back of Ancoats', as identified in the Poland Street Zone NDF (Neighbourhood Development Framework), an inner city area of Manchester close to the city centre situated between the Rochdale Canal and Oldham Road.

The application site is part of the wider Back of Ancoats regeneration masterplan and one of the first sites to be brought forward as part of this redevelopment. The proposal will serve as a distinct marker, helping signpost visitors and residents alike to the wider city and beyond.

The site is bounded by Wadeford Close to the West, Rodney Street to the East, and Jersey Street to the South. Site access is via Wadeford Close, and the site is predominately flat with dense vegetation, including several mature trees and a central grass clearing.

The site is approximately 0.76 hectares in size.

1.2 Proposed Development

The development consists of the construction of a new-build residential development to provide a total of 128no new dwellings and associated communal amenity spaces, comprising 118no apartments and 10no townhouses.



Figure 2: Proposed Site Layout (Buttress)

1.3 Relevant Policies and Guidance

1.3.1 *Local Planning Policy*

1.3.1.1 **Manchester Core Strategy**

Adopted in July 2012, the Manchester Core Strategy is the key development plan document which is to guide the assessment in this report.

CS Policy DM 1 - Development Management: States that all new developments need to consider several principles which are relevant to sustainable development in the area. These include: biodiversity, green infrastructure, flood risk, designing for health and waste management. It is also important to note that, subject to the scheme being assessed, the developer must be able to demonstrate that any new non-domestic development will achieve a 'Very Good' rating under the BRE's BREEAM assessment. Domestic developments must also be able to achieve the Code for Sustainable Homes Standard.

CS Policy EN 4 – Reducing CO₂ Emissions: Aims to reduce CO₂ emissions by following the principles set out by the energy hierarchy, whereby initially energy demand can be lowered through the use of efficient design measures (i.e. improving the building fabric efficiency). Following this, clean energy is to be implemented (i.e. from the development's connection to a district heat network). Finally, low or zero carbon and renewable technologies should be implemented (i.e. solar power or air source heat pumps).

CS Policy EN 6 - Target Framework for CO₂ Reductions from Low or Zero Carbon Energy Supplies: Requires any electricity-intense residential development of 10 or more units to, as a minimum, meet a 15% reduction in domestic CO₂ emissions of over Part L building Regulations 2010, unless proven to not be viable. As Part L 2013 of the Building Regulations represents a 6% improvement on 2010 levels, this target is subsequently equivalent to a 9% improvement in CO₂ emissions over Part L 2013. Section 2.3 provides evidence of how this target is achieved.

CS Policy EN 8 – Adaptation to Climate Change: All new developments, no matter their purpose, should be able to effectively adapt to climate change and associated impacts, in terms of building (and associated space) function, layout, design, and siting.

CS Policy EN 9 – Green Infrastructure: In accordance with Green Infrastructure Strategies, to improve the quantity and quality of green infrastructure, improve linkages between areas of green infrastructure and to improve the performance of

any green infrastructure functionality. Any existing green infrastructure should also be maintained.

CS Policy EN 14 – Flood Risk: All new developments are expected to minimise any surface water run-off by incorporating SUDs and Green Infrastructure wherever feasible.

CS Policy EN 15 – Biodiversity and Geological Enhancement: Developers are expected to enhance the quality and quantity of any areas which have been identified as having potential to improve biodiversity or create new areas of biological value.

CS Policy T 1 – Sustainable Transport: To deliver high quality and integrated sustainable transport systems in order to encourage building users to move away from private vehicles to public transport, cycling and walking.

1.3.1.2 Guide to Development in Manchester, Supplementary Planning Document 2007

The Development Guide in Manchester Supplementary Planning Documents (SPD) aims to guide the development of Manchester by setting out principles for those involved in construction and development within the city. The Manchester Core Strategy (above) states that all new residential developments should comply with the guidance in the SPD. This includes the following environmental standards relevant to this report: energy strategy, water consumption, drainage management, weather resilience, waste management, construction management, biodiversity, and waterways.

1.3.1.3 Manchester Residential Quality Guide 2017

The Manchester Residential Quality Guide has been produced to manage the synthesis of new developments across of the communities of Manchester. The guide outlines the considerations, qualities, and opportunities which will aid the delivery of residential developments of high quality, as part of sustainable neighbourhoods in the Manchester area. The guidance includes the following nine components:

Make it Manchester – developers must understand the city’s unique character, heritage old and new, density and scale in various parts of the city and appreciate how new homes will fit in to what is already there.

Make it bring people together – new homes must encourage a sense of community and neighbourliness, offering a mix of tenures to promote a mix of people.

Make it animate streets and spaces – understand the relationship between new homes and their environment and create public space.

Make it easy to get around – make sure developments have good transport links, along with good walking and cycling provision.

Make work with the landscape – development should improve the connection with the local environment with improved biodiversity, as well as greening and water schemes.

Make it practical – dealing with waste, car parking, bike storage and visitors should be made as easy as possible.

Make it future proof – design must anticipate the impacts of climate change and extreme weather with efficient design and adaptability.

Make it a home – sufficient space, natural light, privacy and storage are essential for people to settle down and flourish.

Make it happen – ensuring proposals are delivered, to a high quality, with high design standards and high sustainability.

1.3.1.4 Manchester's Great Outdoors 2015-2025

The Green and Blue Infrastructure Strategy for Manchester looks to invest in the city's green and blue infrastructure over a ten year period (which ends in 2025). Four objectives have been offered to enable the policy to achieve its aims:

1. Improve the quality and function of existing green and blue Infrastructure, to maximize the benefits it delivers.
2. Use appropriate green and blue infrastructure as a key component of new developments to help create successful neighbourhoods and support the city's growth.
3. Improve connectivity and accessibility to green and blue infrastructure within the city and beyond.
4. Improve and promote a wider understanding and awareness of the benefits that green and blue infrastructure provides to residents, the economy, and the local environment.

1.3.1.5 Manchester's Climate Framework 2020 – 2025

After its declaration of a climate emergency in 2019, Manchester City Council adopted its climate framework in order to provide a comprehensive strategy to operate alongside the Draft Manchester Zero Carbon Framework 2020-38, which was produced in 2019. The framework will continuously develop as time progresses until its redundancy in 2025. These changes will incorporate progression in areas such as climate science and rate of progress. The framework has set out four objectives to facilitate this:

Objective 1 – Staying within our carbon budgets.

- Direct CO₂ emissions: staying within the council's 15-million-ton carbon budget for 2018-2100, including reducing the CO₂ emitted from homes, workplaces and ground transport by at least 50% during 2020-25.
- Indirect CO₂ emissions: understanding and taking action on the things that are consumed, and which generate greenhouse gases through their production, transportation and disposal.

Objective 2 – Climate adaptation and resilience

- Increase the amount of urban green infrastructure cover, aiming for a 10% increase by 2038 from 2018 levels, in line with the Greater Manchester aim.
- Respond to these risks by incorporating adaptation and resilience within plans and strategies, and acting to make necessary changes to buildings, infrastructure and natural environment.

Objective 3 – Health and wellbeing

- Adapt the city's built and natural environment and prepare our residents to become more resilient to these changes. Increasing the amount and quality of green space to enable residents to benefit from the improved physical and mental health that will come as a result.
- Improving the energy efficiency of the city's homes and providing access to affordable, secure supplies of renewable energy are essential help get 38,000 Manchester households out of fuel poverty.

Objective 4 – Inclusive, zero carbon and climate resilient economy

- Ensure that Manchester establishes an inclusive, zero carbon and climate resilient economy where everyone can benefit from playing an active role in decarbonising and adapting the city to the changing climate.

1.3.2 Roadmap to Net Zero Carbon

The Manchester Roadmap to Net Zero Carbon sets out that new domestic buildings in Manchester should achieve an Energy Use Intensity of no more than 60 kWh/m²/year for operational energy use, not including renewable energy generation. This also sets out a strict space heating energy demand requirement of 15-20 kWh/m²/year. Compliance with this is required to be achieved through PHPP modelling.

This roadmap also sets out embodied carbon targets for upfront embodied carbon (covering RICS modules A1-A5) from 2023.

New developments should not use any combustion of fossil fuels on site.

1.3.3 National Planning Policy - NPPF

The National Planning Policy Framework (NPPF) was published on 27 March 2012 with updates in June 2019 and more recently, July 2021. This document sets the overarching policies for development in England and states that:

‘So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development.’ (NPPF, 2021). Paragraph 11 states, ‘... promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects’.

The NPPF also references the 17 UN Sustainable Development Goals, which are illustrated below:



Key points within the NPPF of relevance and which have therefore been considered as part of this proposal are:

- Promoting sustainable transport;
- Making effective use of land;
- Achieving well-designed places;
- Meeting the challenge of climate change and flooding;
- Conserving and enhancing the natural environment.

2 Sustainable Design Strategy

2.1 Energy and Carbon Emissions

In response to the policy requirements and climate change plan targets set out in section 2.2, developments should aim to assist and achieve the following carbon reduction targets:

- Achieve a minimum of 15% CO₂ reduction over the Part L 2010 Target Emission Rate (TER), as per Target 2 (Electricity intense buildings) in Table 12.1 of Policy EN6.
- Assist in achieving carbon neutrality by 2038.

To achieve the most accurate calculations and estimates, the proposed units have been modelled using SAP 2012, the Government's Standard Assessment Procedure for residential dwellings. Additionally, in order to achieve the target of Association for Environment Conscious Buildings (AECB) certification, the development has been assessed using the Passivhaus Planning Package. For the purposes of this statement, only the SAP results will be used to demonstrate compliance with these requirements.

The first stage of addressing the Energy Hierarchy is to establish the baseline energy demand and carbon emissions.

This strategy is based on upon Stage 3 SAP calculations undertaken on all dwellings within the development, to provide the most informed energy demand and carbon emission figures at this stage.

A baseline calculation of CO₂ emissions using the Target Emissions Rate for the new dwellings has been conducted, and forms the basis of the energy and carbon savings detailed in this report.

2.2 Establishing Baseline CO₂ Emissions

As discussed above, this report establishes a baseline assessment of the energy demands and associated CO₂ emissions for the proposed development.

2.2.1 *Domestic Emissions*

As previously described, all residential units have been measured for the purposes of this report. Stroma FSAP 2012 software Version 1.0.5.51 has been used to model each of the dwellings.

The geometry of the dwellings has been modelled based on the Stage 3 drawing package by Buttress.

2.2.2 Baseline Emissions Methodology

In order to establish the baseline carbon emissions and energy demand for the development, the Target Emissions Rate as calculated in SAP has been used to model a 'base case scenario' for each dwelling. The notional building fabric from Part L1A has been used as a performance standard.

A summary of the baseline emissions is shown in Table 1.

	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	CO ₂ saving achieved (%)
Domestic Baseline	629,180		151,568	

Table 1: Baseline CO₂ Emissions

2.3 Be Lean – Use Less Energy

2.3.1 Domestic Fabric Standards

In order to ensure that the sustainable aspirations of the development are met, the design team are aiming to significantly improve the fabric of the Notional Building. This will also ensure compliance with Part L1A of the Building Regulations 2013. The target U-values for the project are listed in Table 2, and in order to minimise heat loss through thermal bridging, careful consideration will be given to limiting heat loss through linear thermal junctions. In line with AECB standards, the development is targeting a thermal bridge-free design, with a target ψ value of 0.04 (Building Regulations assumes 0.15).

Element	Limiting 2013 U-value (W/m ² /K)	Notional 2013 U-value (W/m ² /K)	Target U-value (W/m ² /K)
Exposed Floor	0.25	0.13	0.15
Walls	0.30	0.18	0.18
Corridor Walls	0.30	0.18	0.20
Party Walls	0.20	0.00	0.00
Roof	0.20	0.13	0.18
Windows	2.0	1.4	0.88
Doors	1.8	1.2	1.00
	Limiting m ³ /h/m ²	Notional m ³ /h/m ²	Target m ³ /h/m ²
Air Permeability	10	5	1

Table 2: U-values for typical building elements

2.4 System Description (Building Services)

The dwellings are proposed to be mechanically ventilated via high-efficiency Mechanical Ventilation with Heat Recovery (MVHR) units, with a Specific Fan Power of 0.62, and a heat recovery efficiency of 91%.

In order to establish energy savings from efficient services, a communal gas boiler equivalent to that of the Notional Building has been selected in the calculations for the Be Lean stage, though it should be noted that later in this report the development will switch to all-electric, as this is the proposed approach. The communal boilers are assumed to be 90% efficient, and the system is assumed to provide each dwelling's heating and hot water demand.

Lighting in all spaces is assumed to be 100% low energy fittings.

2.5 Demand Reduction Results

As a result of the above energy-efficient measures and building elements, the development is anticipated to achieve a significant reduction in energy demand over the notional building. Table 3 summarises the results of energy efficiency measures in the design.

	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on Baseline CO ₂ emissions (%)
Baseline (Part L TER)	629,180		151,568	
After Energy Efficiency Measures	430,744	31.5% Against Baseline	123,918	18.2% Against Baseline
Total savings over Baseline emissions			27,650	18.2%

Table 3: Sitewide Energy Efficiency Stage summary table

As shown in Table 3, through the use of good U-values, air tightness, MVHR, and consideration of thermal bridging, the development is anticipated to reduce regulated energy demand by 31.5% over Part L 2013, and regulated CO₂ emissions by 18.2%.

2.6 Be Clean – Supply Energy Efficiently

Policy EN6 requires that developments consider the use of district heating and combined heat and power (CHP) as part of their feasibility studies. Where not feasible, a specific target of improved CO₂ savings is set.

In this instance, no local district heat networks are within close proximity to the Rodney Street development, and provision of a new heat network to serve as a hub for a new district is not viable for this development.

Use of CHP has been considered, but was discounted due to the limited real-world carbon savings that were anticipated (using SAP 10.2 carbon factors, gas-fired CHP is less energy efficient than direct electric heating alone).

As such, the higher carbon savings target is proposed to be followed.

No savings are therefore anticipated at this stage of the energy hierarchy, as summarised in Table 4.

	Energy demand (kWh pa)	Total Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on Baseline CO ₂ emissions (%)
Baseline (Part L TER)	629,180		151,568	
After Energy Efficiency Measures	430,744		123,918	
After Supplying Energy Efficiently	430,744	31.5%	123,918	18.2%
Total savings over Baseline emissions			27,650	18.2%

Table 4: Sitewide energy strategy summary table

2.7 Be Green – Use Renewable Energy

The next stage of the Energy Hierarchy is to Be Green – i.e. to use renewable energy.

A full breakdown of considered renewable and low carbon technologies is covered later in this statement, but a summary of the proposed technology is included here.

2.7.1 Choice and Impact of Renewable Technology

As a first step of implementing the proposed renewable technology, the development proposes to be served by electric heating, with high-quality electric panel heaters in each treated room within dwellings. Under the changes to Part L due later this year, the carbon factor for grid electricity has been updated to closer reflect the current carbon factor of the national grid, dropping significantly from 0.519 kgCO₂/kWh to 0.136 kgCO₂/kWh. Whilst this change is not reflected in the current Building Regulations at the time of producing this report, the real-world carbon savings would be significant over that of a gas-served development.

This change to an electrically heated scheme creates the opportunity for the implementation of individual-scale renewables within each dwelling. To further improve upon real world carbon savings, domestic hot water is proposed to be provided via individual hot water-only heat pumps, which are integrated into hot water cylinders within each dwelling. These systems provide high seasonal Coefficients of Performance (sCOP), which significantly reduces the energy drawn from the grid in order to provide the hot water demand. In modern developments with high quality insulation, domestic hot water demand is often the largest source

of regulated energy consumption. Through use of these cylinder-integrated heat pumps, the consumption of energy for domestic hot water can be significantly reduced.

These cylinder-integrated heat pumps require dedicated service voids and short ductwork runs to external elevations in order to access external air, but through careful consideration of locations within dwellings, and acoustic dampening on ductwork and utility cupboards, these systems can be installed with minimal noise impact to occupants, and take up the same footprint of a standard hot water cylinder.

The anticipated energy and carbon savings associated with switching to direct electric space heating and the hot water-only air source heat pumps are summarised in Table 5 below.

	Energy demand (kWh pa)	Total Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on Baseline CO ₂ emissions (%)
Baseline (Part L TER)	629,180		151,568	
After Energy Efficiency Measures	430,744		123,918	
After Supplying Energy Efficiently	430,744		123,918	
After Renewable Energy Measures	240,914	61.7%	125,027	17.5%
Total savings over Baseline emissions (>9% for EN6)			26,541	17.5%

Table 5: Sitewide Energy and Carbon Performance

As shown in Table 5, there is a slight increase in carbon emissions under Part L 2013 once electric heating has been incorporated, though the regulated CO₂ emissions would be significantly reduced using SAP 10.2 carbon factors, resulting in further real-world savings.

Energy demand is reduced significantly to the effect of a 61.7% improvement over the baseline scheme, saving 388,266 kWh/yr as a result of energy-efficient design, and use of electric heating and hot water-only ASHPs.

This exceeds the target of a 9% improvement over Part L 2013 (equivalent to a 15% improvement over Part L 2010 as listed in Policy EN6), and is therefore deemed to significantly improve over the policy requirement.

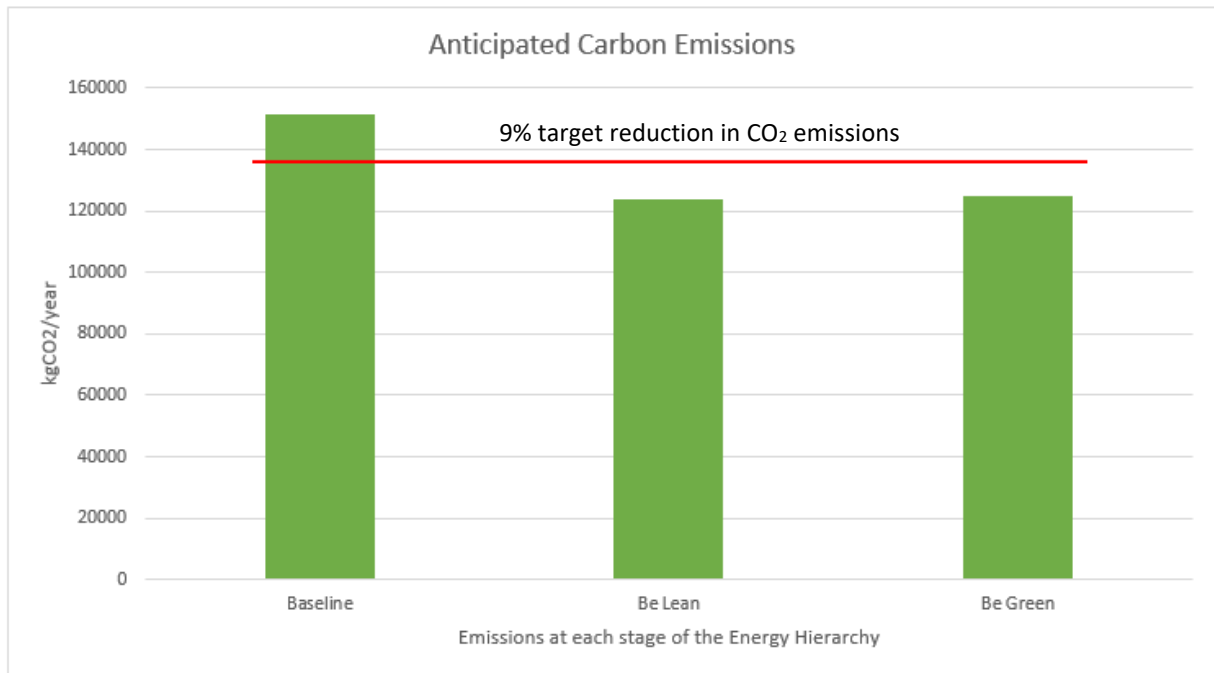


Figure 3: Carbon Emissions at each stage of the Energy Hierarchy

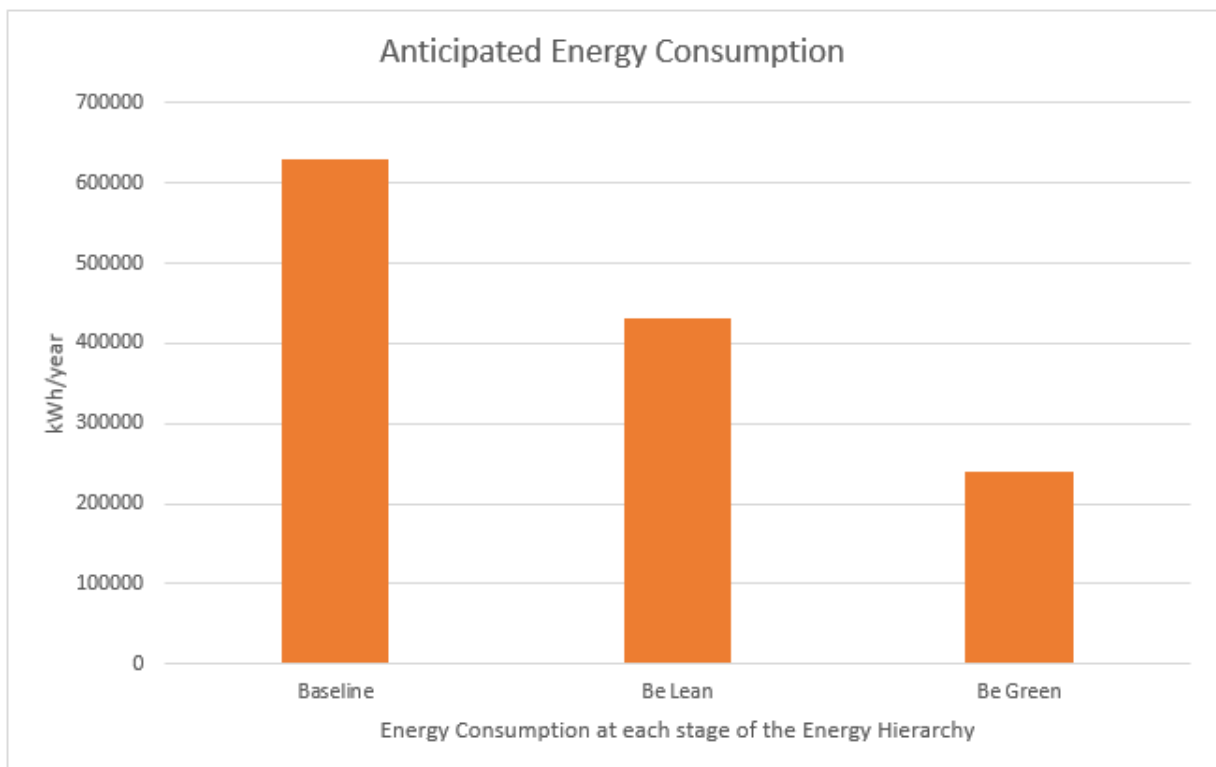


Figure 4: Energy Consumption

2.7.2 Roadmap to Net Zero Carbon

Whilst SAP 2012 has been used to obtain the above results, the Passivhaus Planning Package (PHPP) has been completed by others to demonstrate the requirement for an Energy Use Intensity of <60 kWh/m²/year, and a space heating demand of 15-20 kWh/m²/year. Currently, results from this modelling suggest that the development will exceed these targets, in addition to achieving compliance with the AECB standards (which require <40 kWh/m²/year).

3 Adaption to Climate Change

Whilst the issues of carbon emissions and energy demand have been addressed in earlier sections of this statement, there are several other key factors to consider in regard to climate change. By preparing for more severe climate scenarios, the development seeks to be resilient and robust against increasing temperatures and harsher weather conditions, and seeks to minimise the development's impact on the local environment. This is in line with Manchester's goals to become a carbon neutral and clean city.

3.1 Flood Risk

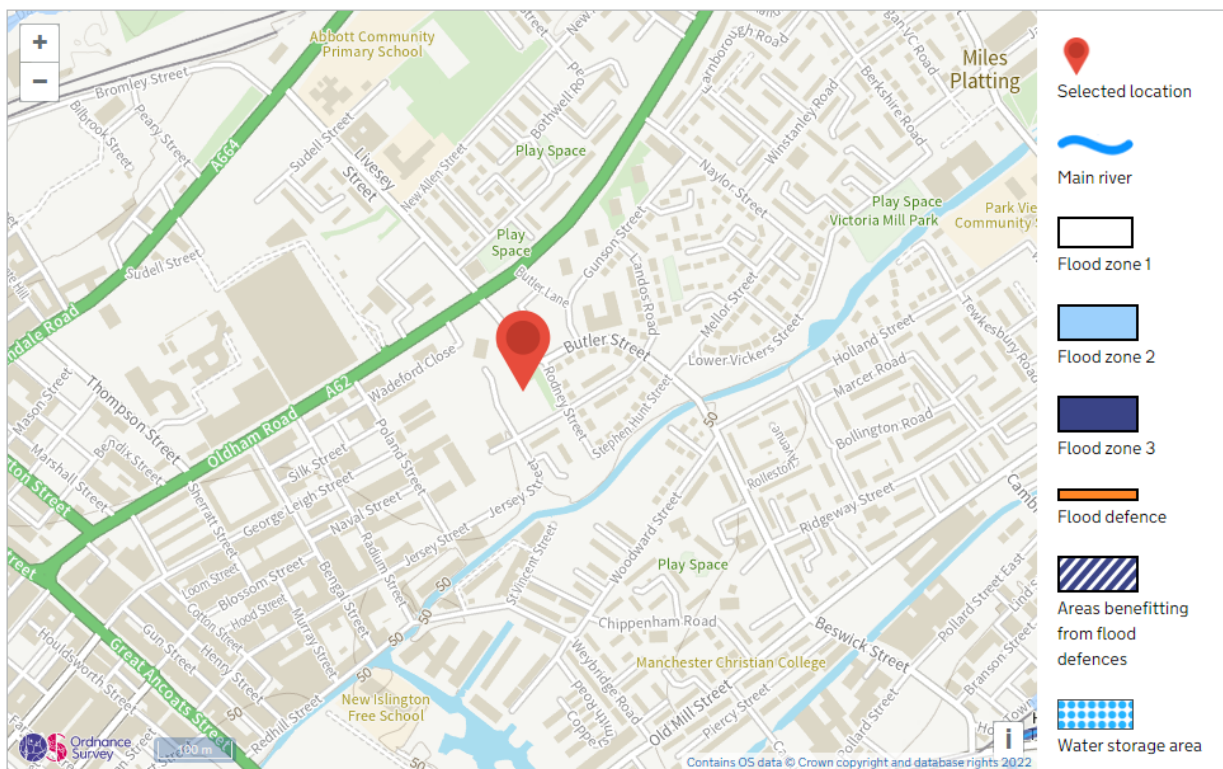


Figure 5: EA Flood Map

As shown in Figure 2, the proposed development site is located within Flood Zone 1. This indicates that the development is at low risk of flooding from rivers or the sea as shown on the Government Flood Map for Planning.

A full Flood Risk Assessment is provided by others as part of this planning application.

3.2 Green and Blue Infrastructure

3.2.1 Sustainable Drainage Systems (SUDs)

In order to avoid negative impacts to site neighbours resulting from increased surface water runoff, a robust drainage strategy is required and this is submitted by others as part of this planning application.

By incorporating SuDs, flood risk can be managed and mitigated, and alongside drainage attenuation techniques being considered for use include permeable paving and rain gardens.

3.2.2 Biodiversity

Despite the historic uses of the site, it is currently largely vegetation with several mature trees around the edge. Careful consideration has been given to opportunities to preserve existing trees in order to minimise negative impacts resulting from the development.

The tree belt along the eastern side of the site will largely be retained and will benefit from additional planting and a new footpath through the landscape. 45 trees of varying quality that currently sit on the site will need to be removed in order to facilitate the delivery of the development. 132 trees will be planted in their place (aiming for as close as possible to a ratio of 3:1 replacement).

The proposed tree planting will include a range of sizes and species, to promote a sense of maturity across the site and increase biodiversity. Biodiversity will also be improved at the site through the introduction of new hedgerows and native and ornamental planting.

A preliminary ecological survey has been produced, and the site is considered to be of limited ecological value. A bat roost assessment has demonstrated that all trees to be removed have a low or negligible potential for roosting bats. A biodiversity net gain calculation has shown that the scheme will not result in a loss of biodiversity units.

3.3 Internal Water Efficiency

All new dwellings are required to achieve an internal water consumption of no more than 110 litres/person/day. Proposed fittings will therefore have low flow rates and low flush volumes where possible.

An example of compliant flow rates/flush volumes is as below:

- WCs: 4/2.6 litre dual flush
- Basin taps: 5 litres/minute
- Showers: 8 litres/minute
- Baths: 170 litres
- Kitchen taps: 6 litres/minute
- Dishwasher: 1.25 litres/place setting
- Washing machine: 8.17 litres/kg

The above fitting options would achieve a total internal water consumption of 106.31 litres/person/day, which is an improvement over the minimum standards of Part G.

3.4 Waste Management

3.4.1 Construction Waste

The Proposed Development will aim to minimise the waste produced from the site during the construction phase through the implementation of a Site Waste Management Plan.

The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Where waste needs to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor.

Careful review of materials is to be undertaken in order to reduce over-ordering and minimise waste.

3.4.2 Operational Waste

All dwellings will be provided with sufficient waste storage areas, with space available for general waste and recycling.

Food waste collection is also anticipated to be provided.

3.5 Materials

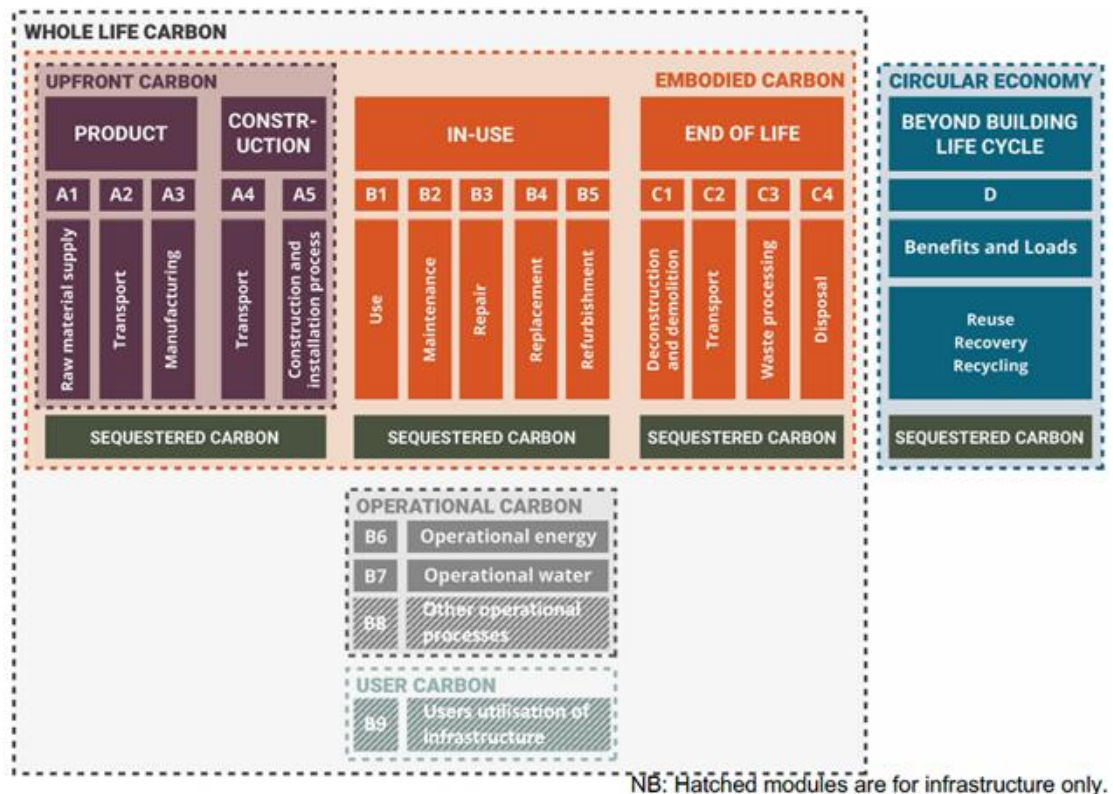
The development will aim to use materials with a low life cycle impact, seeking to follow the Green Guide to Specification and incorporate A or A+ rated construction materials where possible. The exact specification of constructions is yet to be determined, and this will be reviewed in more detail as the design progresses. Materials will be durable and resilient, and the main contractor is recommended to follow a sustainable procurement plan.

In addition, responsibly sourced materials will be preferred, both for the main building elements and the internal finishes. Preference will be given to local manufacturers who can meet these requirements where possible.

All timber and timber-based products used on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Development's effect on global Climate Change.

Material Life Cycle Carbon analysis is being undertaken for the development as part of the wider sustainability aspirations for the scheme, with a target of <500 kgCO₂/m² for modules A1-A5, covering upfront carbon until practical completion.



Reference Diagram showing the Life Cycle Modules adapted from BS EN 15978 and PAS2080 (for Infrastructure). It shows the modules used in assessing all carbon emissions over an asset's entire lifecycle and the various terms that are used.

Figure 6: Life Cycle Carbon Stages

3.6 Pollution Control

3.6.1 Noise

Dwellings are proposed to be mechanically ventilated with MVHR. These generally do not require noise dampening, though ductwork will be specified such that internal noise levels are minimised. Additionally, the heating solution of electric panel heaters results in limited to no noise associated with providing space heating. Hot water plant will be situated in utility cupboards, and will be appropriately dampened both on intake and exhaust ductwork for the heat pump, as well as within the utility cupboard itself. Some small condensers may be provided on the roof area for the amenity spaces, but noise breakout from this plant will be limited in line with the recommendations in the Acoustic planning report submitted as part of the planning application.

The development will be highly insulated, limiting any noise from inside the building affecting the streetscape, whilst also minimising the impact of environmental noise on the quality of life of occupants of the new properties.

As part of the thermal comfort strategy, south-facing dwellings will likely need to leave windows open overnight in order to help cool the spaces and minimise the risk of overheating. During the day, increased levels of mechanical ventilation may be required where external noise levels are a concern.

All dwellings will meet and exceed the requirements of Building Regulations Part E, to minimise the transmission of sound between dwellings – enhancing quality of life.

3.6.2 *Air*

As electric heating is to be used for all spaces, and as the hot water demand for the residential aspect of the development is provided via the integrated heat pumps, no on-site air pollution from combustion gases is expected. A prioritisation of sustainable transport will help reduce the movement of cars around the development, which will help reduce emissions from vehicles. All on-site parking spaces will also be fitted with electric vehicle charging infrastructure.

The impacts of construction on air quality are being considered, such as the movement of vehicles to and from site, any generators used for site electricity/lighting, and any potential dust from excavations. Construction impacts and mitigation are considered further in the Air Quality Assessment submitted with the planning application.

3.6.3 *Light*

Light Pollution will be minimised where possible through the careful specification and positioning of external lighting around the proposed development, ensuring minimal light pollution or overspill from the site. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled. No external lit signage is anticipated at this stage.

3.7 Health and Wellbeing

A full daylight and sunlight analysis has been carried out for the proposed development, and this has identified that there will be a good standard of daylighting to occupied spaces.

Energy-efficient MVHR units will help maintain a continuous source of fresh air to help maintain good internal air quality, reducing the potential for dwellings to feel stale. Use of MVHR and an airtight construction will help to improve occupant comfort, supplying fresh, filtered air to living spaces, and extracting moisture from bathrooms, WCs and kitchens.

Noise pollution will be minimised through effective design measures, helping improve occupant comfort as set out above.

Thermal comfort modelling has also been undertaken, in order to demonstrate that no spaces will overheat during the design climate scenario.

3.8 Sustainable Transport

A total of 118no. secure cycle storage spaces will be provided to the apartments, with the townhouses having private space suitable for cycle storage. This is to encourage sustainable travel locally.

The site is located in proximity to the city core and good access to public transport creates a highly sustainable location. The site is in close proximity to several local bus stops on Oldham Road and Butler Street, and within walking distance of city centre train stations and further bus connections, providing car-free travel options.

Local amenities within a short walk of the site include an ALDI supermarket, several parks and recreation grounds, and a small number of convenience stores with access to cash.

Due to its close proximity to central Manchester via suitable pedestrian, cycle, and public transport routes, the site is also within reach of a significant number of facilities catering for any needs of the occupants.

3.9 Renewable and Low Carbon Technologies Options Appraisal

The following review of possible technologies has been carried out to identify the suitability of select renewable and low carbon technologies in this application.

3.10 Discounted Technologies

3.10.1 Air Source Heat Pumps



Typical Air Source Heat Pump for both Heating and DHW

A heat pump uses the same ‘vapour compression’ technology that is used in a domestic refrigerator but the cycle can be reversed to provide both heating and cooling to internal spaces. A heat pump uses electricity to transfer heat from one source to another rather than actually generating energy, with most of the energy coming from the ambient ground or water to which it is connected. The coefficient of performance (COP) is the ratio of the heat output to the electricity input. With most modern equipment the Seasonal COP will typically range from 3 to 5, i.e. for 1 kW of electrical input up to 5 kW of heating or cooling can be achieved.

It should be noted that because of the higher CO₂ emissions associated with the grid electricity supply, COPs have to be better than 2.5 before there is any reduction in CO₂ emissions compared to heating via gas fired condensing boilers. However, if the electricity is generated from renewable energy sources then heat pumps can be part of a carbon neutral servicing strategy for providing both heating and cooling to buildings.

Heat pumps are characterised depending on the source of the heat and the sink used for the heat. In the heating mode, energy can be extracted from the air, water or from the ground and delivered to the space via fan powered air supply or a water circuit (such as underfloor heating or radiators). It should be noted that high COPs are generally only obtained when the flow temperature of the heating circuit to the building is relatively low so they are often used with underfloor heating.

3.10.2 Suitability of heat pumps for the proposed development

Whilst individual integrated hot water heat pumps are proposed, communal heat pumps (both air and ground source) have been discounted due to the increased risk of overheating in communal areas, resulting from the circulation of hot water throughout the development.

Communal systems can typically provide good carbon and energy savings, but in this instance, the financial viability of the scheme and the potential risk for overheating are too severely impacted by the use of such a heating strategy. As such, communal heat pumps have been discounted.

3.10.3 Photovoltaics

Solar energy can be converted to electricity using the photo-electric effect. Simply, Photo Voltaic (PV) cells use the energy from the sun to induce a current in a circuit. The cells are encapsulated between a sheet of toughened glass at the front and a moisture sealing membrane on the back to make them weatherproof.



In the UK PV panels are usually installed on roofs of buildings. The optimum position is facing south with a tilt angle of around 30°. PV cells can be purchased in the form of Building Integrated PV (BIPV) products such as roof tiles and glazing products. PV is potentially the easiest of all renewable energy technologies to embed into the built environment.

3.10.4 Suitability of Photovoltaics for the Proposed Development

The development is to have flat roof areas, with a large amount of surface area creating the potential for incorporation of PV panels. However, roof space is required for plant, such as lift overruns, and condensers for the amenity spaces, and is overlooked by the remainder of the development and the existing Tribe building just north of the proposed site. This increases the risk of glare to on site and neighbouring properties.

Furthermore, PV arrays on communal developments such as this tend not to be able to supply the generated energy to individual dwellings, due to the dramatic cost uplift involved in this distribution. There would therefore be limited benefits in the installation of solar PV, and so this technology has been discounted.

3.10.5 Solar Hot Water Heating

There are two common types of solar collector that are used to provide hot water and space heating in domestic and commercial situations: flat plate collectors and evacuated tube collectors.

In flat plate collectors, the working fluid (typically a water/glycol mixture) is directly heated as it circulates through pipework within the collector. The absorber plate and associated pipe work usually sits below a glass cover within a heavily insulated enclosure to reduce heat loss.



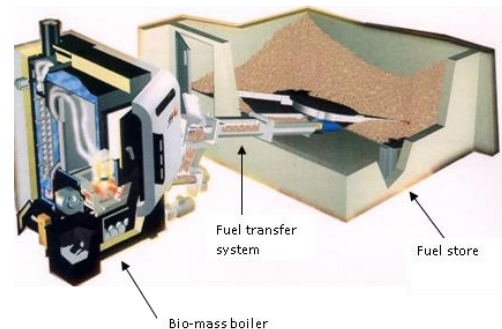
Evacuated tube collectors increase the efficiency of the system by enclosing the absorber plate in a near vacuum. This dramatically reduces the heat loss by convection from the absorber surface. The fabrication of the glass tube is expensive and leads to a collector that will perform better, but at higher cost. Flat plate collectors are generally used on residential buildings and evacuated tube collectors on larger commercial buildings.

3.10.6 Suitability of Solar Hot Water Heating for the Proposed Development

Solar hot water heating arrays are associated with increased costs over traditional PV units, and require additional pipework and storage tanks for hot water. Despite the fact that these can be used year-round, such arrays typically require additional heating to provide adequate hot water during winter months. Due to the significant additional cost of a solar hot water heating array, the reduced feasibility of piping hot water to each dwelling, and the need for additional structural reinforcement of the roof, the technology is not considered appropriate for this development.

3.10.7 Biomass Heating

Biomass refers to burning natural, vegetative matter to produce heat. This heat can be used both to temper the building, and to meet the hot water requirements. The fuel used for the boiler is typically wood, which comes in the form of either chips or pellets. The CO₂ released when burning this matter is equivalent to the CO₂ the trees have absorbed in their lifetime. Thus, the whole process becomes almost carbon neutral. The only additional emissions will be from processing and transportation of the fuel to the site.



Biomass, like any solid fuel, requires storage on site, and to minimise the frequency of deliveries, significant space needs to be allowed for storage of fuel on site and associated access for delivery. Wood pellets have a higher energy density and more consistent size, shape and moisture content so are better suited to smaller boiler installations and where fuel delivery access is restricted.

Currently the cost of woodchips is slightly cheaper than the cost of natural gas, whereas the cost of wood pellets is similar to that of oil. However, the price of natural gas and oil has been very volatile in recent years and for many customers has doubled in price since 2002. In contrast the price of wood fuel has been much more stable, and it is thought that this is likely to remain the case in the medium to long term.

3.10.8 Suitability of Biomass for the Proposed Development

As the development does not incorporate any suitable ground floor plant areas beyond those required for provision of water storage, and the incoming electricity supply, there is no space on the site for a large-scale communal biomass heating system.

Further issues arise from the circulation of hot water in communal areas as previously described, which increases the overheating risk in corridors and dwellings. There are also issues of air quality, as biomass is a combustion process which will emit particulates from use.

Individual biomass boilers are not suitable for apartments due to the storage space required for fuel. As a result of these issues, the use of biomass has been discounted.

3.10.9 Wind Turbines

Wind turbines use energy from the wind to produce electricity. This electricity can be used on site or sold back to the national grid. The suitability of installing wind turbines is largely dependent on local wind speeds. Accurately estimating the energy available from wind at a specific site is a complex task and requires knowledge of the long-term wind speeds at height, taking into account climatic variations, the effect of topological features and ground friction factors. Average wind speeds of 7 m/s or above are required for large scale wind turbines, although average speeds in the region of 4-6m/s can be sufficient to make smaller turbines viable.



Turbines are rated by the power generated at a specific wind speed. At very low wind speeds turbines do not operate. When they reach their critical cut-in wind speed they generate at a lower level than the rating, and finally once the rated wind speed is reached the turbine is designed to maintain a fairly constant power output. As a turbine is not generating all of the time, and sometimes at part load, a good approximation of annual output is 20-30% of that expected if the turbine was operating continuously at its rated level throughout the year. This percentage is known as the capacity factor.

3.10.10 Suitability of Wind Turbines for the Proposed Development

Initial investigations suggest that the site is not well suited to a wind turbine, due to the urban location and associated likely local planning issues. Based on typical wind speed data from the RenSMART Wind Model (data available online), the average wind speed at the site (at a height of 25m) is 5.3m/s. At this wind speed, the energy generated by a suitably sized wind turbine is likely to be sufficient to meet a reasonable proportion of the energy demand. However, it is unlikely to be financially and spatially viable, and would also have a dramatic effect on the appearance of the local area, as well as significant noise impacts on occupants and site neighbours. For these reasons, the technology has been discounted from the analysis.

3.10.11 Combined Heat and Power (CHP)

Combined Heat and Power (CHP) machines are in effect mini power stations. When a power station burns gas, coal or oil to generate electricity, large amounts of heat are given off as a by-product. Large power stations waste this heat (via large cooling towers – it is simply emitted to the atmosphere). A CHP unit aims to make use of this waste heat by putting it into a hot water cylinder or heating system when it generates electricity. The electricity can either be used within the building or sold back to the national grid if output exceeds demand.



A 5.5kWe output and 12.5t CHP Machine

The sizing of a CHP unit is complex and requires accurate analysis of the likely thermal and electrical loads within a building. As a guide, a CHP unit will also be financially viable if it can usefully run for more than 4,500 hours per year.

3.10.12 Suitability of CHP for the Proposed Development

Real-world CHP performance is typically significantly lower than Part L 2013 calculations currently suggest, due to the high carbon factor of electricity used in the calculations. As a result, gas-fired CHP actually increases carbon emissions over simply using grid electricity per kWh delivered. However, the use of gas-fired CHP can provide a small discount to electricity supplied to occupants. Of further issue is the high maintenance requirements for CHP, which typically offset any savings made in energy costs.

As a result of this real world disparity, and increased costs, CHP has been discounted as a suitable technology.

3.11 LZO Options Summary

As a result of the provision of cylinder-integrated hot water heat pumps, no additional low and zero carbon technologies are deemed to be required as part of this development, and potential energy and carbon savings from alternative technologies are not thought to be significant or cost-effective.

4 Conclusion

This Environmental Standards Statement has assessed the proposed residential development at Land to the west of Rodney Street against the relevant climate change and sustainability policies and targets listed in the Manchester Local Plan, and supplementary planning documents.

The development has adopted a fabric-first approach, using highly efficient triple glazing, a thermal bridge-free design aspiration, and significantly low air permeability, served with high-efficiency MVHR. This approach results in an 18.2% reduction in regulated carbon emissions alone, with a 31.5% reduction in regulated energy demand over a notional Part L 2013 development, when using a gas heated baseline for comparison.

The change to electric heating with individual cylinder-integrated air source heat pumps results in a slight increase in carbon emissions when assessed under Part L 2013 of the Building Regulations, but real-world carbon emissions will be significantly reduced beyond this due to the lower carbon factor of the national grid. An overall regulated carbon emission saving of 17.5% is therefore anticipated in Part L 2013, when compared to a gas baseline, with a 61.7% reduction in energy consumption over the notional building. These exceed the requirement for a 9% improvement over Part L 2013 (as compared to a 15% reduction against Part L 2010).

Use of MVHR and an airtight construction will help to improve occupant comfort, supplying fresh, filtered air to living spaces, and extracting moisture from bathrooms, WCs and kitchens.

Further wider sustainability measures are also incorporated into the development in order to aid in adapting to climate change, including: the use of sustainable drainage measures, reducing and addressing sources of noise, air, and light pollution, protecting / replacing existing trees and biodiversity, reduction of water demand, and implementation of a suitable number of secure cycle storage spaces for residents.

As a result of the above measures, the proposed strategy allows the development to demonstrate compliance with and exceedance of Manchester City Council's planning policy requirements.



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