



RIDGE

RYEBANK, CHORLTON ENVIRONMENTAL STANDARDS STATEMENT

23/12/2024

RYEBANK, CHORLTON

DECEMBER 2024

Prepared for

STEP PLACES
Unit 4
Royal Mill
17 Redhill Street
Ancoats
Manchester
M4 5BA

Prepared by

Ridge and Partners LLP
2nd Floor
100 Embankment
Cathedral Approach
Manchester
M3 7FA
Tel: 0161 833 9579

VERSION CONTROL

VERSION	DATE	DESCRIPTION	CREATED BY	REVIEWED BY
1.0	04.12.2024	Draft for comment	KR	SS
1.1	17.12.2024	Update in line with Asteer comments	KR	SS
1.2	23.12.2024	Update in line with final information	KR	SS

CONTENTS

1. INTRODUCTION **4**

2. DEVELOPMENT PROPOSALS **4**

2.1. Site Overview and Development proposals 4

3. POLICY CONTEXT **4**

3.1. National Planning Policy Framework 4

3.2. Places For Everyone Joint Development Plan 5

3.3. Manchester Core Strategy (2012 – 2027) 11

3.4. Guide to Development in Manchester Supplementary Planning Document 15

4. RESPONSE TO CLIMATE CHANGE **15**

4.1. Introduction 15

4.2. Carbon Reduction 15

4.3. Climate Change Adaptation 25

5. OTHER AREAS OF ENVIRONMENTAL & SUSTAINABILITY PERFORMANCE **27**

5.1. Introduction 27

5.2. Materials and Waste Reduction 27

5.3. Biodiversity 27

5.4. Air Quality 29

5.5. Noise Pollution 30

6. CONCLUSION **31**

APPENDIX A: SITE BOUNDARY

APPENDIX B: ENERGY STATEMENT

APPENDIX C: PASSIVHAUS VERIFICATION REPORT

1. INTRODUCTION

This Environmental Standards Statement has been prepared by Ridge & Partners LLP on behalf of Step Places, Southway Housing Trust and Manchester Metropolitan University ('the Applicants') in support of a full planning application for a residential development on land at Ryebank Fields, Chorlton. The Statement demonstrates how the development of the proposed energy and sustainability strategy takes into consideration and responds to the requirements of local planning policy and the 2022 Building Regulations.

The primary objective of this report is to contribute to the development of a low carbon and sustainable strategy for the site which will be carried through to detailed design, construction, and operation.

2. DEVELOPMENT PROPOSALS

2.1. Site Overview and Development proposals

Located in Chorlton-cum-Hardy, the proposed site is situated adjacent to Longford Park, approximately 1.2km east of Stretford, Old Trafford. The existing site is predominantly grassland with trees and a small area of hardstanding to the south.

The land use to the north, south and east comprises residential development. To the west lies Longford Park, within which lies the Trafford Athletic Club. To the southeast of the site lies the St Johns RC Primary School. Access to the site is provided by Ryebank Road.

The proposed design will allow for the construction of a residential development comprising 120 dwellings (including a mix of housing types and tenures) together with open spaces, landscaping, sustainable drainage features, access arrangements, cycleway and pedestrian linkages, vehicular accesses and highways, parking provision and other associated works.

Please refer to drawings 5PA-MP-XX-DR-A-000001 Rev A "Existing Site Location Plan Red Line Boundary" and 5PA-MP-XX-DR-A-000200 "Proposed Site Plan Illustrative Masterplan" in Appendix A for further details regarding the site boundary.

3. POLICY CONTEXT

3.1. National Planning Policy Framework

The Government's planning policies for England are set out in the National Planning Policy Framework (NPPF). Section 2 of the NPPF highlights sustainability as a critical issue which underpins all planning polices, stating that "the purpose of the planning system is to contribute to the achievement of sustainable development".

Aligning with the U.N. definition, the NPPF defines sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs", and outlines the three pillars of sustainability which must be pursued in tandem to ensure developments are truly sustainable:

- An **economic objective**, to help build a strong, responsive, and competitive economy, by ensuring that sufficient land of the right types is available in the right places, and at the right time to support growth, innovation, and improved productivity; and by identifying and coordinating the provision of infrastructure.

- A **social objective**, to support strong, vibrant, and healthy communities by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations, and

by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural wellbeing.

- An **environmental objective**, to contribute to protecting and enhancing our natural, built, and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

3.2. Places For Everyone Joint Development Plan

The Places for Everyone Joint Development Plan (2024) of Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, and Wigan Councils sits at the foundations of proposals to improve employment opportunities for local communities, build the right homes in the right places, rejuvenate green spaces and reshape town centres. As a long-term plan for jobs, new homes, and sustainable growth, it will enable the region to tackle the inequalities experienced by many communities.

This section of the report summarises the policies within the Plan relevant to climate change and environmental sustainability, and to the proposed development site.

Policy JP-Strat9: Southern Areas

The economic competitiveness, distinctive local neighbourhood character and environmental attractiveness of the southern areas will be protected and enhanced. There will be a strong emphasis on making as much use as possible of suitable previously developed (brownfield) land and promoting the roles of the areas' town centres and its other key assets, including education and training facilities enabling people to gain access to employment opportunities. There will be an emphasis on improving transport connections and accessibility by public transport, cycling and walking, ensuring access to key employment opportunities in this area.

Policy JP-S1: Sustainable Development

Development should aim to maximise economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives. In preparing plans, authorities should make as much use as possible of suitable previously developed (brownfield) land and vacant buildings to meet development needs. In bringing forward previously developed sites for development, particular attention will be paid to tackling land contamination and stability issues, ensuring that appropriate mitigation and remediation is implemented to enable sites to be brought back into use effectively.

Policy JP-S2: Carbon and Energy

The aim of Policy JP-S2 is to deliver a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions. This will be supported through a range of measures, including:

- Promoting retrofitting of existing buildings with measures to improve energy efficiency and generating renewable and low carbon energy, heating and cooling.
- Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured.
- Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet, the needs of local communities.
- Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree-planting and natural flood management techniques.
- An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable:

- Be net zero carbon which applies:
  - From adoption: to regulated operational carbon emissions
  - From 2028: to all emissions 'in construction'.

  Starting from 2025, it will also be expected that carbon emissions from unregulated energy sources will be quantified and minimised. Reported through a energy statement, development proposals will be required to set out how this has been achieved in accordance with the energy hierarchy, which, in order of importance, seeks to:
  i. Minimise energy demand
  ii. Maximise energy efficiency
  iii. Use renewable energy
  iv. Use low carbon energy
  v. Utilise other energy sources

  Furthermore, from 2025, any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund. As an interim measure, development should be consistent with the 2022 Part L Building Regulations, unless superseded by changes to building regulations and/or national or local planning policies.

- Incorporate adequate electric vehicle charging points in line with Part S of the Building Regulations, unless superseded by relevant Local Plan policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site.

- Where practicable, prioritise connection to a renewable energy/heating/cooling network or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date.

- In residential developments, achieve energy demand reductions in terms of space heat demand; hot water energy demand and the delivery of on-site renewable energy generation, in accordance with Table 5.1 of the Plan. In summary, this requires houses to meet the following best practice thresholds from 2025:
  - Space heating demand of 30kWh/m^2 (houses) or 25kWh/m^2 (flats)
  - At least 20% energy demand reduction in the total heat required for hot water heating
  - Photovoltaic installation to equal at least 40% of ground floorspace

  With regards to renewable energy generation, priority should be given to photovoltaic (PV) installation, where technically feasible. Alternative technologies will also be considered appropriate where the equivalent generation is evidenced.

- For non-residential developments, achieve at least BREEAM Excellent standard (or equivalent) for issue Energy 01 "Reduction of energy use and carbon emissions", rising to 'BREEAM Outstanding equivalent from 2028 (for issue Energy 01).

- Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post occupancy evaluation. Whole life cycle emissions should be considered where possible. Districts may set out specific carbon emission reduction and energy demand targets within Local Plans.

Please note that the June 2022 release revision of "Approved Building Regulations Part L 2021" will be referred to as "Part L 2022" throughout this report, in accordance with the naming convention used in Policy JP-S-2.

Policy JP-S3: Heat and Energy Networks

The provision of decentralised energy infrastructure is critical to the delivery of the objectives for low carbon growth, carbon reductions, and an increase in local energy generation. The following measures will assist in achieving this:

1. Delivery of renewable and low carbon energy schemes will be supported, with particular emphasis on the use of decentralised energy networks in areas identified as "Heat and Energy Network Opportunity Areas". These have been identified where:
    a. Existing heat/energy networks are operational or have been commissioned;
    b. Proposals for new heat networks/energy networks are being progressed, or future opportunities have been identified in city-region master planning;
    c. Sufficient density of existing heat demand occurs; and
    d. Significant future development is proposed at the strategic development locations.
2. Within the identified "Heat and Energy Network Opportunity Areas", unless it can be demonstrated that there are more effective alternatives for minimising carbon emissions or such connection is not practicable or financially viable, it is expected that:
    a. New residential developments that are '10 dwellings or more' or other developments over 1,000m^2 floorspace shall:
        i. Connect to an existing or planned heat/energy network or be designed to enable future connection (where within 500m of such a network); and/or
        ii. Install a site-wide or communal heat/energy network solution.
    b. An expectation that new industrial development will demonstrate that opportunities for using waste heat locally have been fully examined, and included in proposals;
    c. An expectation that where publicly owned buildings and assets adjoin new major development sites, opportunities for these buildings and assets to connect to site-wide proposals will be considered; and
    d. An expectation that any site-wide networks will be designed so as to enable future expansion to adjoining buildings or assets as appropriate.

Policy JP-S4: Flood Risk and the Water Environment

An integrated catchment-based approach will be taken to protect the quantity and quality of water bodies with reference to the North West River Basin Management Plan and managing flood risk, by:

1. Returning rivers to a more natural state, where practicable;
2. Working with natural processes and adopting a natural flood management approach to slow the speed of water drainage and intercept water pollutants;
3. Locating and designing development so as to minimise the impacts of current and future flood risk, including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;
4. Expecting developments to manage surface water run-off through sustainable drainage systems and as close to source as possible. Development should achieve greenfield run-off rates unless it is demonstrated to be impracticable. District local plans should consider setting more detailed surface water drainage policies to reflect local circumstances, including alternative surface water discharge rates, such as in areas with critical drainage issues;
5. Ensuring that sustainable drainage systems:
    a. Are designed to provide multifunctional benefits wherever possible, including for water quality, nature conservation and recreation;

   b. Avoid adverse impacts on water quality and any possibility of discharging hazardous substances to ground;
   c. Are delivered in a holistic and integrated manner, including on larger sites split into different phases; and
   d. Are managed and maintained appropriately to ensure their proper functioning over the lifetime of the development.
6. Securing the remediation of contaminated land and the careful design of developments to minimise the potential for urban diffuse pollution to affect the water environment; and
7. As a minimum, residential development should meet the mandatory water efficiency standard of 125 litres/person/day as set out in Building Regulations. District local plans may and should consider setting a tighter water efficiency standard of 110 litres/person/day where there is a clear local need with reference to national guidance on housing optional technical standards.

Policy JP-S5: Clean Air

A comprehensive range of measures will be taken to support improvements in air quality, focusing particularly on locations where people live, where children learn and play, where there are impacts on the green infrastructure network and where air quality targets are not being met, including:

- Locating and designing development, and focusing transport investment, so as to reduce reliance on forms of transport that generate air pollution;
- Determining planning applications having regard to the most recent development and planning control guidance published jointly by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK), and the most recent IAQM Guidance on the Assessment of Dust from Demolition and Construction, or relevant successor guidance, including the requirement for developers to submit construction management plans as appropriate;
- Requiring applications for developments that could have an adverse impact on air quality to submit relevant air pollution data so that adverse impacts on air quality can be fully assessed and development only permitted where they are acceptable and/or suitable mitigation can be provided;
- Restricting developments that would generate significant point source pollution such as some types of industrial activity and energy generation;
- Significantly expanding the existing commercial network of electric vehicle charging points, both for public and private use, including as part of new developments;
- Implementing the Clean Air Plan and associated measures;
- Facilitating the more sustainable distribution of goods within the urban area, including through accommodating urban consolidation centres and urban distribution centres that use ultra-low-emission vehicles, and local delivery facilities to reduce repeat delivery attempts;
- Designing streets to avoid trapping air pollution at ground level, including through the appropriate location and scale of buildings and trees;
- Controlling traffic and parking within and around schools, early years sites and other locations that are particularly sensitive to air quality;
- Promoting actions that help remove pollutants from the air, such as enhancing the green infrastructure network and using innovative building materials that capture air pollutants; and
- Development should be located in areas that maximise the use of sustainable travel modes and be designed to minimise exposure to high levels of air pollution, particularly for vulnerable users.

Policy JP-S6: Resource Efficiency

The achievement of a circular economy and a zero-waste economy will play a key role in meeting Greater Manchester's ambition of becoming a leading green city region by 2038. Application of the following measures will help achieve this:

- Development and implementation of the Zero Waste Strategy for Greater Manchester which promotes overall reduction in the levels of waste produced and supports resource efficiency within the Plan area in order to gain the maximum value from the things we produce;
- Recognition of the role of existing infrastructure in managing our waste and protecting such facilities to ensure adequate waste management capacity is maintained; and
- Using sustainable design and construction techniques to reduce carbon emissions, adapt and future proof to the impact of climate change, reduce and recycle waste and minimise water use.

Policy JP-G6: Urban Green Space
To ensure there is an appropriate scale, type, quality and distribution of accessible urban green space that can support a high quality of life and other important green infrastructure functions:

- Existing urban green space will be protected and enhanced in balance with other considerations;
- We will work with developers and other stakeholders to deliver new high quality urban green spaces.

Development should be designed to support the positive use of nearby green spaces, such as by offering a high-quality setting, providing natural surveillance, and facilitating easy access by walking and cycling.

Policy JP-G8: A Net Enhancement of Biodiversity and Geodiversity
Through local planning and associated activities, a net enhancement of biodiversity resources will be sought, including, where relevant, by:

1. Increasing the quality, quantity, extent and diversity of habitats, particularly priority habitats identified in national or local biodiversity action plans and those that support priority species;
2. Improving connections between habitats, to protect and enhance the provision of corridors, ecological networks (including Nature Recovery Networks) and steppingstones that enable the movement of species, especially as the climate changes;
3. Enhancing the management of existing habitats, including through habitat restoration, avoiding habitat fragmentation and combating invasive species;
4. Protecting sites designated for their nature conservation and/or geological importance, with the highest level of protection given to international and then national designations;
5. Facilitating greater access to nature, particularly within urban areas;
6. Supporting the development and implementation of the Great Manchester Wetlands Nature Recovery Network; and
7. Safeguarding, restoring and sustainably managing our most valuable soil resources, tackling soil degradation/erosion and recovering soil fertility, particularly to ensure protection of peat-based soils and safeguard 'best and most versatile' agricultural land.

Development will be expected to:

a. Follow the mitigation hierarchy of:
   i. Avoiding significant harm to biodiversity, particularly where it is irreplaceable, through consideration of alternative sites with less harmful impacts, then
   ii. Adequately mitigating any harm to biodiversity, then
   iii. Adequately compensating for any remaining harm to biodiversity
b. Avoid fragmenting or severing connectivity between habitats;
c. Achieve a measurable net gain in biodiversity of no less than 10%
d. Make appropriate provision for long-term management of habitats and geological features connected to the development;
e. Where appropriate, development should: mitigate air pollution impacts on Manchester Mosses SAC; mitigate urban edge, functionally linked land and recreation disturbance impacts

on the South Pennine Moors SAC/SPAs; and assess and potentially mitigate boat movement, water pollution, and light spillage and shading impacts on the Rochdale Canal SAC; and

f. Development proposals should be informed by the findings and recommendations of the appropriate biodiversity/ecological assessment(s) in the PfE evidence base and/or any updated or appropriate biodiversity/ecological assessments submitted as part of the planning application process.

Policy JP-P1 Sustainable Places

Greater Manchester aims to become one of the most liveable city regions in the world, consisting of a series of beautiful, healthy and varied places, each having the following key attributes that all development, wherever appropriate, should be consistent with:

1. Distinctive, with a clear identity that:
    a. Conserves and enhances the natural environment, landscape features, historic environment and local history and culture;
    b. Enables a clear understanding of how the place has developed; and
    c. Respects and acknowledges the character and identity of the locality in terms of design, siting, size, scale and materials used
2. Visually stimulating, creating interesting and imaginative environments which raise the human spirit through the use of green space, public art and quality design
3. Socially inclusive:
    a. Responding to the needs of all parts of society;
    b. Enabling everyone to participate equally and independently;
    c. Providing opportunities for social contact and support; and
    d. Promoting a sense of community
4. Resilient, capable of dealing with major environmental events
5. Adaptable, able to respond easily to varied and changing needs and technologies
6. Durable, being built to last and using robust materials that reflect local character, weather well and are easily maintained
7. Resource-efficient with:
    a. A low carbon footprint;
    b. Efficient use of land;
    c. Minimised use of new materials;
    d. High levels of recycling
8. Safe, including by designing out crime and terrorism, reducing opportunities for anti-social behaviour and by ensuring that developments make appropriate provision for response and evacuation in the case of an emergency or disaster.
9. Supported by critical infrastructure, such as energy, water and drainage and green spaces
10. Functional and convenient, enabling people and uses to act efficiently with minimal effort, and responding to needs relating to servicing, recycling facilities, refuse collection and storage
11. Incorporating inclusive design within all spaces with support for tackling inequality and poverty to form part of creating sustainable places
12. Legible, being easy to understand and navigate, with the protection and enhancement of key views and new development well-integrated into the place
13. Easy to move around for those of all mobility levels, particularly by walking and cycling, with enjoyable routes free from obstacles and disorienting stimuli, and with places to rest
14. Well-connected to other places, particularly by public transport and digital infrastructure enabling everyone to take advantage of the employment, cultural and leisure opportunities across Greater Manchester and beyond
15. Comfortable and inviting, with indoor and outdoor environments:
    a. Offering a high level of amenity that minimises exposure to pollution; and

b. Addressing microclimate issues such as sunlight, indoor air quality, overheating, shade, wind and shelter

16. Incorporating high quality and well managed green infrastructure and quality public realm, with:
    a. Opportunities for recreation and outdoor play for children, and interaction between the generations;
    b. Public and private spaces clearly distinguished;
    c. Development clearly defining, and promoting activity within, public spaces;
    d. High quality landscaping with schemes
17. Well-served by local shops, services and amenities, including education and health facilities.

3.3. Manchester Core Strategy (2012 – 2027)

Adopted in 2012, the Manchester Core Strategy is a key document within the wider Manchester Local Plan. It sets the out the long-term strategic policies for Manchester's future development forms the framework that planning applications are assessed against. A summary of key policies relevant to the development are provided within this section.

CS Policy DM 1: Development Management
All development should have regard to a number of development principles for which more detailed guidance may be given within a supplementary planning document. It also states that, "subject to scheme viability, developers will be required to demonstrate that new non-domestic development to achieve a BREEAM Rating of 'Very Good' or for domestic development to achieve the Code for Sustainable Homes standard".

Policy EN4: Reducing CO2 Emissions by Enabling Low and Zero Carbon Development
It must be demonstrated that the energy hierarchy has been applied to:

- Reduce the need for energy through design features that provide passive heating, natural lighting and cooling.
- Reduce the need for energy through energy efficient features such as improved insulation and glazing.
- Meet residual energy requirements through the use of low or zero carbon energy generating technologies.

(Note: That the above section of Policy EN 4 is now replaced by Places for Everyone (PfE) Policy JP-S2)

Furthermore, the following is also required:

- Wherever possible, new development and retrofit projects, including energy generation plant, must be located, and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies.
- Where possible, new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings.
- Where appropriate, new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes.
- The use of building materials with low embodied carbon in new development and refurbishment schemes must be considered.

Policy EN5: Strategic Areas for Low and Zero Carbon Decentralised Energy Infrastructure
This policy sets a requirement for key developments to consider being part of or providing an anchor to a new local energy network.

Within specific strategic areas (including the Oxford Street corridor) new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans. The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities, and other public sector bodies, as appropriate, to bring forward such plans.

Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO2 reduction funded by contributions.

Policy EN 6: Target Framework for CO2 Reductions from Low or Zero Carbon Energy Supplies
Residential developments of 10 or more units will be expected to achieve a minimum performance target as shown in the table below, 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 CO_2 emissions for all phases of the development'.

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

(Note: Most of Policy EN 6 is now replaced by PfE Policy JP-S2)

Policy EN 8 Adaptation to Climate Change
All new development will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water permeability.
- Reduction in urban heat island effect through the use of Green Infrastructure such as green roofs, green walls, increased tree cover and waterways.
- The need to control overheating of buildings through passive design.
- The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation.

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 under Policy EN6, subject to sufficient evidence to quantify their contribution to compliance.

(Note: The first and fourth bullet points of Policy EN 8 are now replaced by PfE Policies JP-S2, JP-S4 and JP-G8)

Policy EN 14 Flood Risk

The following requirements are stated within Policy EN 14:

- In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).
- In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.
- All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure. Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.
- Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.
- The City of Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

(Note: The third bullet point of Policy EN 14 is now replaced by PfE Policy JP-S4)

Policy EN 15 Biodiversity and Geological Conservation

The Council will seek to maintain or enhance sites of biodiversity and geological value throughout the City. Particular consideration will be given to:

- sites with international or national designations for their biodiversity value. Manchester contains one Site of Special Scientific Interest (SSSI) (Cotteril Clough); there is a Special Area of Conservation (SAC) and an SSSI just over the border in Oldham (both on the Rochdale Canal within Oldham).
- other sites of biodiversity value, including Sites of Biological Importance (SBIs) and Local Nature Reserves (LNRs); Manchester currently has 35 SBIs (including the Rochdale and Ashton Canals) and 7 LNRs; priority habitats found within Manchester, as listed in the Manchester Biodiversity Strategy, and included in the Greater Manchester Biodiversity Action Plan (GM BAP).
- protected and priority species, as listed in the Manchester Biodiversity Strategy and included in the Greater Manchester Biodiversity Action Plan (GM BAP).
- sites that are recognised for their geological importance;
- the Council's objective to protect and conserve the City's existing trees and woodlands and the aim for a net increase in trees across the City.

Developers will be expected to identify and implement reasonable opportunities to enhance, restore or create new biodiversity, either on-site or adjacent to the site, contributing to linkages between valuable or potentially valuable habitat areas where appropriate, with reference to:

- the Manchester Biodiversity Strategy, which provides further details of priority habitats within Manchester and opportunities for biodiversity enhancement including corridors such as the Mersey, Medlock and Irk River valleys, the canals and disused railway lines and areas of managed greenspace particularly in parks.

- the Green Infrastructure Framework for Greater Manchester, which encompasses an ecological framework that seeks to guide and inform habitat creation and repair, including identifying large 'biodiversity opportunity areas' including the Moston Brook Corridor and Nutsford Vale;
- the Open Space, Sport & Recreation Study, which identifies areas where there is a deficit of natural and semi-natural greenspace, opportunities for green corridors and other linkages.
- Manchester's Climate Change Action Plan.
- the Strategic Flood Risk Assessment (SFRA) for Manchester.
- the Habitats Regulations Assessment (HRA) for Manchester, which gives detailed consideration to Special Areas of Conservation (SACs), including the Rochdale Canal SAC just outside the district boundary.
- the River Basin Management Plan for the Northwest.
- the Manchester Tree Strategy.

Any adverse impacts on biodiversity will need to be justified against the wider benefits of the proposal, assessed against other LDF policies. Where adverse impacts are unavoidable, developers will be required to provide appropriate mitigation and/or compensation.

Development should wherever possible seek to maintain, enhance, or restore existing geology.

(Note: "Either on-site or adjacent to the site" in the second paragraph and the last sentence of Policy EN 15 are now replaced by PfE Policy JP-G8)

Policy EN 16 Air Quality
The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

When assessing the appropriateness of locations for new development the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas.

(Note: "and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport" from first sentence of Policy EN 16 is now replaced by PfE Policy JP-S5)

Policy EN 19 Waste
The Council will:

- Require all developers, including those of new waste management facilities within the District, to demonstrate the proposal's consistency with the principles of the waste hierarchy (prevention, reduction, re-use, recycling/composting, energy recovery, final disposal)
- Require all developers to submit a waste management plan to demonstrate how both construction and demolition waste will be minimised and recycled on site wherever possible and how the sustainable waste management needs of the end user will be met.
- Promote the development of innovation and technological advancement within the sustainable waste management industry, aiming to achieve a closed-loop waste management system.
- Require waste management practices to have full regard to the environmental, social & economic impacts of such development and encourage long-term benefits in improving the environment, the regeneration of areas in need of investment and co-location with other employment uses where appropriate.
- Encourage communities to take responsibility for the waste created by provision of accessible facilities.

3.4. Guide to Development in Manchester Supplementary Planning Document

Adopted in 2017, the Guide to Development in Manchester Supplementary Planning Document (SPD) is a material planning consideration for applications. That said, it is not part of the Development Plan. Whilst it references policies from the old Local Plan (UDP), which have been superseded, it is still useful as a general guide to development. It includes a section on environmental standards, with sub sections on energy efficiency, renewable energy, environmental design, water management and weather resilience, waste management, construction management, biodiversity, and waterways.

4. RESPONSE TO CLIMATE CHANGE

4.1. Introduction

This section of the report summarises the proposed design response to potential climate change impacts, in line with Manchester City Council's policies identified in Chapter 3, notably the Places for Everyone Plan policy JP-S2 and Manchester Core Strategy policies EN4, EN6 and EN8.

4.2. Carbon Reduction

Carbon reduction is key to tackling climate change. The term "carbon", in relation to climate change, covers all greenhouse gas emissions, and is measured in terms of CO_2 equivalent. The carbon emissions associated with the development include embodied carbon, construction related carbon, and operational carbon. Operational carbon is associated with the energy used to heat, cool, light and ventilate the building, known are "regulated energy", and also the energy associated with unregulated systems, such as plug-in equipment. A further, and indirect, source of operational carbon emissions are associated with people's transport to, from and within the development. In addition, there are also significant carbon emissions associated with the construction of the building, including embodied carbon within the materials used for construction.

This section outlines the steps taken to reduce construction and operational emissions.

4.2.1. Construction Carbon Emissions

An assessment of the embodied carbon associated with the key building types has been undertaken by Phi Low Carbon, and reported within their Passivhaus Verification Summary Report. A copy of this report can be found in Appendix C. The assessment has been carried out using the PHRibbin plug in (for PHPP), and in line with best practice methodology using the RICS Whole Life Carbon Assessment version 2.

The LETI Climate Emergency Design Guide sets targets using this methodology for both the upfront embodied carbon (RICS modules A1-A3) and Cradle to Grave embodied carbon (modules A1-A5, B1-B5, C1- C4), and uses an A**-G rating scale. Achieving a B rating is considered good practice, whilst an A** rating represents best practice. An F/G rating represents the current average design.

The Concept Stage assessment, which assumes a 15% contingency, concludes that the results are generally achieving a B rating. This is primarily achieved through the use of a timber framed superstructure, for all buildings, and using bio-based cellulose insulation. The other key driver is the compact form factor of the buildings, which means that more floor area is provided for less external fabric. The following have been excluded from the assessment:

- Renewables: The embodied carbon content of photovoltaic (PV) panels is high. Including hem in the assessment would skew the results, whilst not capturing the benefits they provide from reducing emissions associated with operational energy.
- Non fixed FFE: To avoid difficulties in comparing buildings that are fitted out with those that are not, this element has been excluded.
- External works: Materials associated with external works are excluded to allow buildings to be compared against each other without confusion over the extent of their surroundings.

A sitewide summary is provided in Appendix A of the Phi Low Carbon Summary Report, whilst a summary sheet for each of the block types is provided in Appendix B of their report.

4.2.2. Operational Carbon Emissions

Operational CO_2 emissions associated with the day-to-day running of the development will be minimised in line with the energy hierarchy, thus conforming to the requirements of Manchester Core Strategy Policy EN 4 "Reducing CO2 Emissions by Enabling Low & Zero Carbon Development" and the Places for Everyone Framework Policy JP-S2 (summarised in Sections 3.2 and 3.3). Ridge's Energy Strategy Report, dated 27.11.24, provides full details of how this is achieved. This is further supported by the Passivhaus modelling and summary report provided by Phi Low Carbon consultants, where 6 block types which represent the typical proposed building types across the site have been modelled:

- Age friendly apartments – southern block (20 dwellings)
- Age friendly apartments - northern block (22 dwellings)
- Southern Terrace HT1A&B (10 dwellings)
- A semi-detached villa HT (2 dwellings)
- A northern terrace HT4 (7 dwellings)
- Co-housing apartments (12 dwellings)

A summary of both reports is provided within this section of the Statement. For full details, please refer to the Energy Strategy Report in Appendix B, and the Passivhaus Verification summary report in Appendix C.

Please note that the June 2022 release revision of "Approved Building Regulations Part L 2021" will be referred to as "Part L 2022" throughout this report in accordance with the naming convention used in Policy JP-S-2.

This design strategy has been developed in line with the energy hierarchy, as outlined below:

- Be Lean: Reduce energy demand through passive measures and construction techniques.
- Be Clean: Supply energy cleaning and efficiently through the incorporation of high efficiency systems and effective controls.
- Be Green: Incorporate renewable and low carbon energy sources to meet any residual energy demand.

It must be noted that the residential elements are being designed to Passivhaus standards.

Further details are provided in the following sections.

4.2.2.1. Passive Design Measures ("Be Lean")

A number of measures have been applied to reduce the energy demand associated with the development. In the first instance, the Passivhaus specialists (Phi Low Carbon) undertook a modelling exercise to set the building forms and orientations, and to advise on PSI and U-values.

U-values and air permeability targets will be delivered in accordance with Passivhaus standards, noting that these far exceed Building Regulations Part L performance. For a standard / typical house type, it is thought that the Passivhaus standard is approximately 15 times more onerous than UK Building Regulations. A summary of U-values and air permeability targets applied to residential units is provided in Tables 1 and 2.

Table 1: Proposed U-values (residences)

BUILDING FABRIC ELEMENT	PART L LIMITING U-VALUE (W/M^2K)	MINIMUM PASSIVHAUS TARGET U-VALUE (W/M^2K)	% BETTERMENT
Walls	0.26	0.11	57%
Floors	0.18	0.15	17%
Roof (flat)	0.16	0.15	7%
Windows	1.6	0.8	43%

Table 2: Proposed air permeability target (residences)

AIR PERMEABILITY	TARGET AIR PERMEABILITY
at 50 Pa	0.6ach

Glazing with a G-value of 0.4 is also specified to limit the amount of unwanted solar gain to avoid habitable rooms from overheating.

In addition to these measures, the following is also proposed:

- Without compromising Passivhaus principles, natural ventilation is maximised, where possible, through openable panels, to reduce the reliance on mechanical ventilation.
- Passive solar control is provided via orientation, layout, form, glazing percentages and G-Values, to reduce heat gains and reduce / eliminate the need for artificial cooling.
- Sufficient glazing will be installed to ensure natural daylight targets are achieved, and to reduce reliance on artificial lighting.

4.2.2.2. Energy Efficient Services ("Be Clean")

The following efficiency measures and services are proposed:

- High efficiency LED lighting will be installed throughout the development. Lights within communal areas will be coupled with daylight dimming and absence / presence detection, where appropriate, to reduce the energy consumption and CO_2 emissions associated with lighting. Absence/ presence detection will not be installed within the individual apartments.
- Energy efficient plant and white goods will be installed to reduce unregulated energy loads.
- Integrating variable speed pumps and fans will assist in reducing operational energy demand during off-peak hours.
- High efficiency fans with low specific fan powers (SFPs) will be selected to reduce the energy consumption of the ventilation systems.
- Highly efficient heat recovery on mechanical ventilation equipment will reduce fresh air heating and cooling loads. Where fresh air is supplied, and stale warm air extracted by mechanical ventilation, heat recovery will be used to recycle a minimum of 85% of the heat from the extracted air to warm the

incoming air. The re-use of waste heat in the mechanical ventilation systems provides a significant step towards reducing CO_2 emissions. Mechanical ventilation with heat recovery (MVHR) units also work to pre-cool warm fresh air during summer months to reduce the cooling energy required in air-conditioned spaces. MVHR units will be installed within all apartments and communal spaces.

- Occupancy controls will be provided on equipment to landlord areas to reduce off-peak energy loads.
- Smart controls of primary plant and plant within landlord areas will be installed to optimise performance and match energy use with demand.
- Energy monitoring of landlord areas and primary plant will allow for the development of a real-life picture of energy use and carbon emissions.
- Power, lighting, major plant and separate areas will be individually metered to allow energy consumption to be monitored and reviewed. Baseline and target consumption levels will also be set to help reduce energy use.
- A battery storage system will be incorporated to serve each individual house and a Sol Share system designed to serve the co-housing building.
- The mechanical systems shall also be controlled via a Building Management System.

4.2.2.3. Meeting Demand Efficiently ("Be Green")

The final step in the energy hierarchy is to establish how any remaining energy demand can be addressed via low carbon or renewable sources.

A high-level appraisal of low and zero carbon technologies has been undertaken, as reported in the Ridge Energy Statement. The following two technologies are identified as appropriate and feasible for the site:

- Air source heat pumps (ASHPs): The ASHP system offers an attractive solution in terms of the de-carbonisation of the grid and the omission of natural gas to the site. The average CoP of ASHPs is around 2.5 – 4, although some systems may produce a greater rate of efficiency. This means that for every 1 kW of electric power the heat pumps use, 2.5-4 kW of heat energy is generated. Ultimately, this reduces operational energy and subsequent carbon emissions. Following the appraisal exercise, ASHPs have been selected as the preferred low carbon technology for the houses, and will be used to generate heating and hot water, and cooling, if necessary. Houses will be served by localised Air Source Heat Pump hot water cylinders to meet hot water needs*.
- Photovoltaic (PV) panels: A PV array system with battery storage will be provided to serve the development, to assist with meeting the relatively high anticipated daytime electricity demand.

*Hot water demand for the flats will be met through a simpler direct electric heating solution with hot water storage via a cylinder or heat battery. This avoids the requirement for large equipment and long pipe runs which would lead to increased internal heat gains. Whilst, operationally, this may be less efficient than a heat pump solution, it is less complex and easier to maintain.

By including heat pumps and PVs into the development, this ensures compliance with policies EN 4 "Reducing CO_2 Emissions by Enabling Low and Zero Carbon Development" and EN 6" Target Framework for CO_2 Reductions from Low or Zero Carbon Energy Supplies".

4.2.2.4. Operational Carbon Emissions (Results)

The SAP and BRUKL results relate to a RIBA Stage 2 design and will be subject to a design development at the next stages to meet the planning requirements of Manchester City Council. The SAP and BRUKL results can be found in Appendix 1 and Appendix 2 of the Energy Strategy Report, appended to this report.

4.2.2.4.1. Residential Areas (SAP Results)

A sample number of apartment types have been assessed to provide an indication of the emission rate, the energy rate and the fabric energy efficiency results.

Apartment 1B 2P:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	14.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.6	
Target primary energy rate (DPER), $kgCO_2/m^2$	77.74	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	16.29	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	41.5	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.9	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 3P:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.91	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.5	
Target primary energy rate (DPER), $kgCO_2/m^2$	67.61	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	15.2	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.9	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.2	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 4P:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.11	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.19	
Target primary energy rate (DPER), $kgCO_2/m^2$	63.27	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	11.95	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	39.3	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.5	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 5:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.6	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.28	
Target primary energy rate (DPER), $kgCO_2/m^2$	49.87	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-19.31	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	30.8	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.0	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6A:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	10.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.01	
Target primary energy rate (DPER), $kgCO_2/m^2$	56.15	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.52	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.6	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.8	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6B:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.43	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.03	
Target primary energy rate (DPER), $kgCO_2/m^2$	48.95	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.69	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	31.1	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.4	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 7:

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.86	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-3.81	
Target primary energy rate (DPER), $kgCO_2/m^2$	51.46	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-9.67	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.7	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.1	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

4.2.2.4.2. Co-Housing Amenity (BRUKL Results)

Target CO_2 emission rate (TER), $kgCO_2/m^2$. annum	3.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	2.23	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	42.41	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	24.28	
Do the buildings emission and primary energy rates exceed the targets?	BER = < TER	BPER = < TPER

As the current proposals all pass Approved Building Regulations Part L 2021, they will more than exceed the MCC Core Strategy Policy EN6 of passing Part L 2010 by 15%.

As a result of the design strategy implemented, the proposed Ryebank Chorlton development also complies with planning policy EN4. The Energy Strategy Report also identifies that the scheme is compliant with Part L 2022, and therefore the scheme complies with the interim measure set out within the Places for Everyone Framework Policy JP-S2.

4.2.2.4.3. Passivhaus

PHPP Analysis:

Based on the agreed strategy, the Passivhaus Planning Package (PHPP) modelling confirms that the 6 block types, modelled by Phi Low Carbon, meet the Passivhaus performance requirements listed below:

- An annual space heating demand <=15KWh/m² annum
  Or
- A peak heating load <= 10W/m²
  And
- Overheating < 10% annum
- A Primary Energy Renewable (PER) <=60KWh/m² annum

The Passivhaus criteria for space heating demand is in line with the guidance in Places for Everyone for flats and an improvement on the target for houses.

Summer overheating strategy

Summer overheating was also assessed as part of the Passivhaus modelling exercise. Summer overheating is a key consideration within PHPP and considers the risk of overheating to the whole block. Phi Low Carbon have advised that the frequency of overheating should be brought down to at least 2% within the PHPP calculations to allow for extraordinary situations.

The PHPP includes a stress test of these extraordinary situations. The stress test includes reduced window ventilation, removal of any temporary shading, increased occupancy and increased external temperatures.

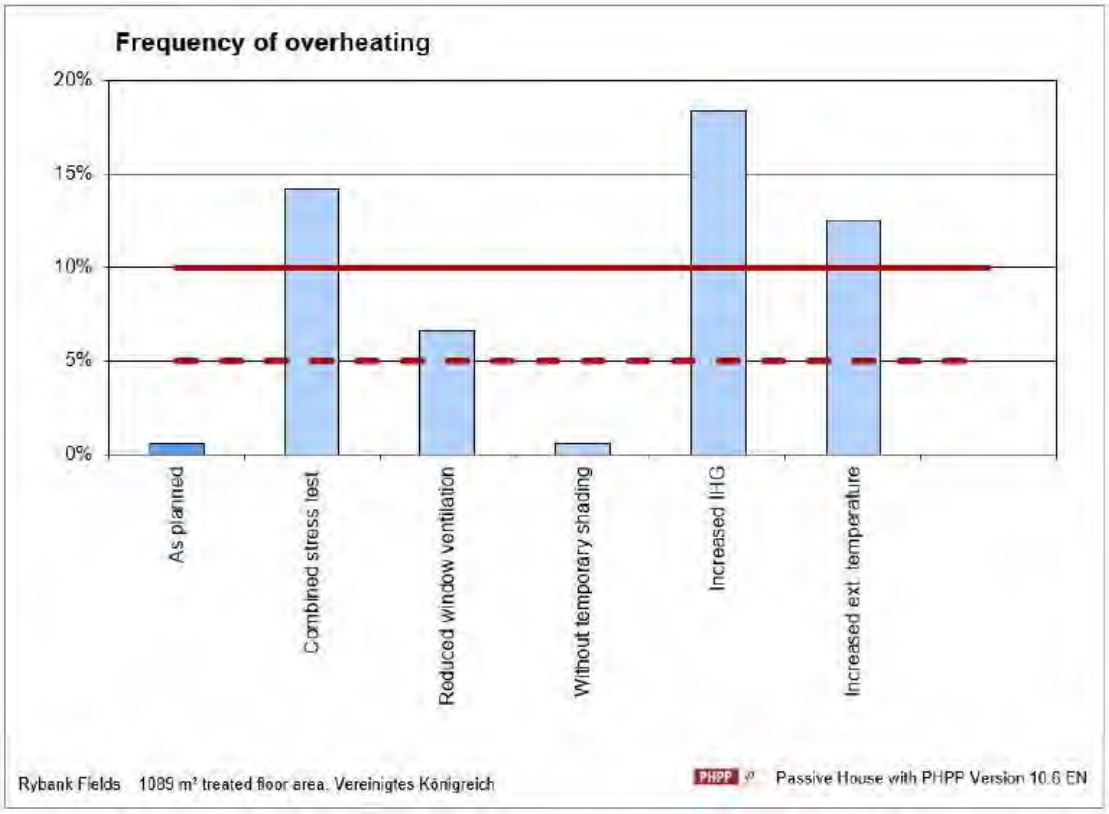


Figure 1: Summer stress test results (source: Phi Low Carbon Passivhaus Verification Summary Report)

The baseline summer strategy assumes that, for reasons of security, windows cannot be opened during daytime hours and that, as per CIBSE TM59 guidance, internal blinds cannot be relied upon to be drawn during the daytime.

It is, however, assumed that, overnight, a small amount of natural ventilation can be provided through windows on tilt only. For the apartment blocks, opening the ground floor windows at night might not be possible, due to security reasons. As such, a strategy for secure opening vents should be incorporated.

The MHVR system operates at its normal rate during the day but is boosted overnight to increase the air change rate and benefit from the cooler nighttime temperatures.

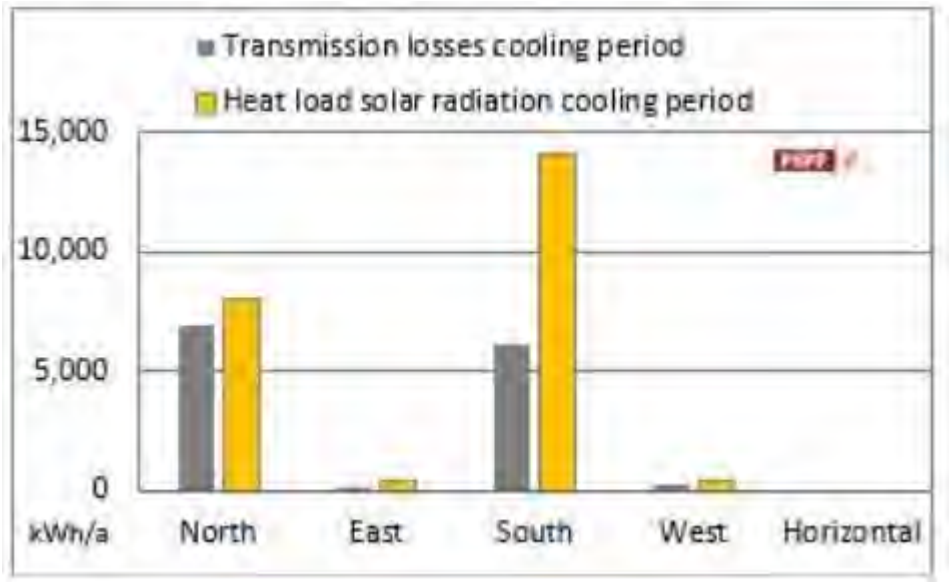


Figure 2: Summer solar gains and heat losses through windows (source: Phi Low Carbon Passivhaus Verification Summary Report)

As the PHPP calculations are an analysis of the whole block, individual rooms or houses may be susceptible to overheating due to their orientation and shading and these will need more specific dynamic modelling.

LETI Operational Energy Benchmarks

Predicted energy use intensity (EUI) values have been generated through the PHPP, based on occupancy, and including the following information:

- Household electricity
- Domestic hot water generation
- Space Heating
- Cooling and dehumidification

The predicted EUIs have then been benchmarked against the LETI operational EUI target of 35KWh/m² annum. At Concept Design Stage, a 15% contingency has been added to the total figures, in accordance with RICS Whole Life Carbon assessment procedures.

The houses, for which ASHPs are proposed for both the heating and hot water, achieve the benchmark EUI. The flats, where, for simplicity and maintenance, direct electric heating and hot water is specified, do not currently meet the benchmark. However, sitewide, these two strategies are balancing each other out. A sitewide summary is provided in Appendix A of the Phi Passivhaus Verification Summary Report (in Appendix C of this Statement), whilst a summary sheet for each of the block types in Appendix B of their Summary Report.

LETI Benchmarks for Renewable Energy

LETI guidance is that 100% of the energy demand for houses should be matched by the PV yield. For flats, the guidance recommends that 70% of the roof area be covered with PV.

There are certain house types within the current design which cannot meet this benchmark due to lack of sufficient roof area, namely the villas, which will result in a relatively low annual yield. However, other house types, such as the terraces with their south facing roofs, achieve a higher yield than 100%, balancing this out.

Demand Response

Smart metering and battery storage will be provided to houses, to make full use of variable rate tariffs, and to draw electricity when it is at its cheapest and producing lower carbon emissions.

With regards to the flats, the use of either a direct electric cylinder or heat battery will allow occupants to heat and store their hot water when electricity is at its cheapest.

4.2.3. Transport

The Transport Assessment and Framework Travel Plan, prepared by SK Transport Planning Ltd (document references 241129/SK22351/FTP01(-01) and 241129/SK22386/TA01(-01), dated November 2024) and submitted as part of this planning application, provide an overview of the existing transport conditions associated with the site, and outline the sustainable transport measures considered to reduce transport-related emissions associated with the new development.

4.2.3.1. Public Transport

The site is well served by existing public transport routes (busses and the Metrolink), connecting the site to amenities and centres of employment in the City Centre, Trafford and Salford. The closest tram / Metrolink stop is Firswood (circa 750m from the centre of the site). The Metrolink tram services connect the site to other areas of the City Centre, Altrincham, Eccles, East Didsbury, Media City, Ashton, the Airport, Rochdale, Bury, Salford Quays and the Trafford Centre. The nearest bus route corridor to the site is located on Edge Lane. The bus stops have shelters, seating, timetable information, and boarding facilities. An uncontrolled crossing is in place to provide access to westbound services. Details of the bus services stopping at the nearest bus stops are provided within the transport assessment report.

The site achieves a Greater Manchester Accessibility Level (GMAL) score of 5 – 6. The GMAL score is calculated using an interactive tool managed and maintained by Transport for Greater Manchester (TfGM). The tool measures accessibility by public transport of a point of interest and provides a score between 1 and 8, where 1 is a low level of accessibility and 8 is the highest level of accessibility. As such, the site is considered to have a good level of accessibility within a suburban area.

4.2.3.2. Amenities

The site is considered to be well connected to a number of amenities. It is situated within a 10 minute walk from Chorlton District Centre and a 15 minute walk from Stretford District Centre, and is therefore within easy access of all the shopping, leisure and cultural amenities each offer. A selection of local shops, convenience stores and amenities are located in closer proximity at The Quadrant, and along Warwick Road South, close to Firswood tram stop.

The neighbouring area also contains a number of primary schools. Furthermore, the site is located directly adjacent to Longford Park, which falls within the administrative boundary of the Borough of Trafford. The park's leisure offering and services are therefore fully accessible from the site, making these two assets part of the South Manchester Green Infrastructure that support easy walking or cycling to many other green/open spaces along the Mersey Valley such as Sale and Chorlton Waterparks. Access to a selection of amenities is summarised in the Transport Assessment, as per Table 3 (taken from the Transport Assessment report).

Table 3: Examples of local amenities accessible from the site

UPPERCASE	DISTANCE (M)	WALK TIME (MINS)
Table text		
Longford Park	200	3
St Johns Primary School	420	5
Oswald Road Primary School	700	9
St Teresa's Primary School	600	8
Stretford Grammar School	1200	15
Chorlton Library	820	10
Chorlton Health Centre	900	11
Chorlton District Centre	800	10

4.2.3.3. Active Travel and Pedestrian and Cyclist Networks

The landscape strategy creates a pleasant and inviting environment to encourage people to travel actively and linger. The layout has been designed based on people-first principles with appropriate provision for active modes to ensure the site is fully permeable. Vehicle routes are designed to encourage slow speeds to create a suitable environment for all active travel modes and people of all ages and mobility levels. Traffic calming measures are incorporated across the site, including raised table treatments to reduce vehicle speeds and assist pedestrian crossings.

A 3m wide traffic free segregated footway / cycleway link is provided on the western edge of the site, to allow a connection from Longford Road to Rye Bank Road. Connections between the residential areas of the site are provided at regular intervals to allow residents and the wider community to move around. Localised improvements to existing pedestrian routes are also proposed.

Suitable levels of cycle parking will be provided for residents. Bike storage is provided in curtilage for each of the houses. The age friendly apartments will be provided with bike storage space for each apartment and the autism friendly apartments will be provided with eight bike parking spaces in covered location. Visitor cycle parking is provided at the Longford Road junction and at the Longford Community Garden

4.2.3.4. Private Car Parking

The parking provision at the development is based on market evidence and research and has been agreed with Manchester City Council. It will provide sufficient parking to meet resident needs and to allow for other occasional visitors without encouraging over car use.

4.2.3.5. Travel Plan

A framework travel plan has been produced by SK Transport Planning (document ref: 241129/SK22351/FTP01(-01)) to support the planning application, and also to encourage sustainable transport practices and reduce transport emissions associated with the development. As confirmed in the report, the objectives of this document are:

- To raise awareness of the travel choices available.
- To provide travel information packs to new households.
- To investigate measures to promote the use of alternative modes of travel.
- To periodically evaluate the transport needs of residents.

- To periodically update residents to make sure they have all relevant travel information.
- To reduce single occupancy car trips and increase sustainable trip making.

The plan proposes a number of further measures to be implemented after handover.

4.3. Climate Change Adaptation

As the scheme develops, further consideration will be given to designing in mitigation features to protect the development against the effects of climate change, as directed by Manchester Core Policy EN8 "Adaptation to Climate Change". Mitigation features will apply to the external envelope and building services, and future proofing will be considered, where appropriate. An assessment of the effects of climate change on the scheme has been undertaken as part of the Climate Change Chapter of the EIA.

The potential impacts of climate change considered include:

- Increased flood risk
- Increased frequency of extreme weather events
- Wetter winters, including increased moisture and driving rain
- Hotter summers, including increased solar radiation

An early-stage climate resilience workshop was undertaken with the design team to examine the climate resilience assessment, required as part of the EIA, and to identify inherent and additional mitigation measures. The mitigation measures discussed, and confirmed by further design reports, are outlined in the following sections.

4.3.1. Flood Risk

Rising sea levels and increases in average winter precipitation, as well as a general increase in the frequency, duration and intensity of rainfall, may result in an increased risk of flooding. This is considered as part of the Flood Risk Assessment (FRA) report produced by Renaissance (document reference RBM-REN-XX-XX-RP-C-00001 P01, dated November 2024), which accounts for climate change scenarios. The FRA summarises the risk of flooding from the following sources:

- Fluvial: Low (the site is in Flood Zone 1)
- Sewers: Low
- Reservoirs: Low
- Groundwater: Medium
- Pluvial: High

With regards to pluvial flooding, there is a high risk across the centre of the site and along the northern and eastern boundaries. The risk on site coincides with the location of the Nico Ditch which, from site visits (by Renaissance) does not appear to have a positive outfall and therefore water ponds in this location. The risk area identified in Longford Park appears to be related to the Longford Brook for which improvements are planned as part of another planning application. From the site investigation, it is known that the site is underlain by deep lenses of impermeable clay which will limit natural infiltration. As part of the proposed drainage strategy, this flooding will be addressed with a new drainage system that will collect the run-off from site and provide a positive outfall. Similarly, groundwater flooding events, identified as medium risk, will be mitigated by the proposed drainage strategy and levels.

The drainage strategy takes into account the increases in the storm intensities of 40% and 45% for the 1 in 30 year and 1 in 100 year events respectively, which is consistent with the effects of climate change for a development with a design life of 100 years, as outlined in NPPF. Further mitigation will be embedded within the scheme through the application of nature-based SuDs and soft landscaping, in addition to the retention of trees over the site and street tree planting. The proposed SuDs solutions include:

- A pond
- Permeable paving
- Sub-base paving attenuation
- Rain gardens

This demonstrates compliance with policies EN 8 Adaptation to Climate Change and EN 14 Flood Risk.

4.3.2. Increased Frequency of Extreme Weather Events

The frequency of extreme weather events such as storms, droughts, heatwaves and cold spells are likely to increase as a result of climate change. As part of the EIA Climate Resilience Assessment, the following mitigation measures have been confirmed:

- Increased likelihood of storms (including high winds):
  - The design of the buildings and roofs will be in line with the relevant Eurocodes to mitigate against the potential impacts of high winds, which can result in a risk of structural damage to buildings and reduction of mechanical ventilation capacity.
  - Intake and exhaust positions will be protected from direct wind impact, where possible.

- Increased likelihood of heatwaves and cold spells, and warmer summers and wetter winters:
  - An early stage overheating analysis has been completed to assist in designing out the risk of overheating in occupied space. The project is designed to 2020 medium scenarios.
  - The retained and newly planted trees will provide localised cooling / reduce the urban heat island effect.
  - Soft landscaping, tree canopies and reduced use of asphalt will support the mitigation of extreme external temperatures which could impact users of the public realm.
  - To mitigate against damage to external building elements and materials from increased solar radiation, robustness and durability will be a key consideration when selecting materials. Furthermore, the design life of the buildings is 60 years, with the roof and external wall materials having a minimum service of 40 years.
  - The planting scheme will be developed to include species that thrive across extreme temperature and precipitation events.
  - To mitigate against potential damage to fabric and services resulting from increased moisture and rain, the external fabric will be designed as a weathertight structure. Roof and external wall materials will have a design life of a minimum of 40 years. Furthermore, rainwater goods will be designed to appropriate standards, and intake and exhaust positions will be designed to prevent water ingress, where possible.
  - Additional surface water runoff will be dealt with through an appropriately designed drainage system, and a selection of SuDs, as described in Section 4.3.1.

- Increased likelihood of droughts, including reduced summer rainfall:
  - To decrease the amount of potable water required during these periods for watering plants etc., space provision will be made to allow residents to install water butts.
  - Low water consuming sanitaryware and appliances will be specified.
  - Pulsed water meters will be installed on the water supply to allow occupants to monitor water consumption.
  - The drying of soils can result in structural damage to buildings. The foundation design will take ground shrinkage into consideration, to mitigate against potential damage.
  - The planting scheme will be developed to include species that thrive across extreme temperature and precipitation events.

It is thought that extreme weather events may occur as a result of climate change, including storms, high winds, cold events, and heatwaves. The confidence level in predictions for these is low and there are a number of diverging projections. However, it is important to ensure the development is designed so that it will be resilient against future extreme weather wherever possible. This will be taken into consideration when specifying materials and structural detailing.

5. OTHER AREAS OF ENVIRONMENTAL & SUSTAINABILITY PERFORMANCE

5.1. Introduction

The wider sustainability measures to be incorporated into the project, in line with the requirements of national, regional, and local planning policy, are summarised within this section of the report.

5.2. Materials and Waste Reduction

As described in Section 4.2.1 Construction Carbon Emissions, key to achieving a LETI embodied carbon rating of B, considered "good practice", is the use of timber frame construction and biobased cellulose insulation. In addition to this, examples of sustainable material selection include the use of timber for landscape furniture. Some cycle storage will also comprise a mixture of secure brick and timber structures.

Low carbon and sustainable materials will be considered further in the design process, where the use of materials with Environment Product Declarations (EPDs) will help drive the specifications. EPDs communicate the environmental performance of products, allowing specifiers to make informed decisions regarding materials from both a performance and environmental perspective.

Material efficiencies, and subsequent waste reductions, are also considered within the current design. These include, for example, the compact form factor, meaning that more floor area is provided for less external fabric, and, as per Section 4.2.2.1, the maximisation of natural ventilation, thus reducing the materials associated with ventilation plant and services.

To assist in the reduction of waste associated with the construction stage, a high-level Construction Waste Management Plan has been produced by the Client for submission with the Planning application.

To encourage the recycling of operational waste, each dwelling will be provided with appropriately sized and segregated recycling bins.

5.3. Biodiversity

An Ecological Impact Assessment (EcIA) and an Arboricultural Impact Assessment (AIA) have been undertaken, by Urban Green, to assess the existing ecological and arboricultural assets associated with the site. The assessments conclude that the existing site comprises a mix of habitats, including other neutral grassland, modified grassland, bramble scrub, broadleaved woodland, mixed scrub, lines of trees, ditches, and individual trees. These provide potential roosting, nesting, and foraging opportunities for various fauna. As confirmed by the aforementioned reports, and within the Ecology Environmental Statement Chapter, the remaining site baseline conditions are as follows:

- Two statutory sites of national importance are present within 10km, the closest being Brookheys Covert Site of Special Scientific Interest (SSSI), located approximately 7.8km to the southwest of the site. The closest statutory sites of local importance are Chorlton Ess and Ivy Green Local Nature Reserve, located approximately 1.1km southwest of the site.
- The arboricultural survey concluded that 2 individual trees, 3 tree groups, and 4 woodlands are categorised as 'High Quality' Retention Category 'A', 21 individual trees and 17 tree groups as 'Moderate Quality'

Retention Category 'B', and 4 individual trees and 6 tree groups as BS 5837: 2012 'Low Quality' Retention Category 'C'.

- The site has a baseline biodiversity value of 37.73 for area habitats, 0.91 for linear hedgerow habitats, and 0.29 for watercourse habitats, assessed as part of the Biodiversity Net Gain (BNG) Feasibility-Stage report.
- A suite of night-time bat walkover and automated static deployment surveys have been undertaken. Five bat species were recorded utilising the site extent, however bat activity was dominated by common pipistrelle (*Pipistrellus pipistrellus*), with only occasional occurrences of soprano pipistrelle (*Pipistrellus pygmaeus*).
- A total of 6 active badger setts were recorded on site. Two disused setts were also identified on site.
- Two species of invasive non-native plant species were recorded on site.

With regards to mitigation of ecological impacts, as well as seeking to retain high value habitats, where feasible, the following has been advised:

- Badgers: A licence from Natural England will be obtained to legally proceed with the works whilst safeguarding badgers. Mitigation measures will be required to minimize disturbance during both construction and operation.
- Bats: Potential roosting sites and foraging areas may be affected by tree and woodland parcel clearance. Pre-construction ground level tree assessments have been advised, to be conducted in advance of any proposed felling works, with mitigation measures for bats, and the installation of bat boxes to enhance foraging resources implemented.
- Birds: The site offers optimal nesting habitats for common bird species. Vegetation clearance will be scheduled outside the nesting season (March to August). If clearance during this period is unavoidable, an Ecological Clerk of Works will supervise to protect active nests.
- Tree loss: The AIA identified the need to remove some high-quality trees for access and development. To mitigate this, a soft landscaping scheme will need to be developed to compensate for tree loss and enhance biodiversity. An Arboricultural Method Statement (AMS) will be prepared to protect the root systems of retained trees and woodland parcels during construction.
- Invasive species: An Invasive Non-Native Species contractor will be appointed to safely remove invasive plant species on site.

In addition to the aforementioned mitigation measures for protected species and habitats and invasive species, the following additional reports were assessed as required, based on the results of the Ecology Environmental Statement Chapter produced for the development:

- Biodiversity Net Gain: A BNG Design-Stage report will provide specific recommendations to compensate for any habitat loss, aiming for a minimum 10% net gain in biodiversity, as per Natural England's guidelines. As reported in the Design and Access Statement (DAS), to meet the BNG trading rules, there are several key points that will impact the planting strategy:
  - There is limited scope to improve the linear tree lines, therefore the proposals should seek to create 10% net gain of linear hedgerows (approximately 30 linear metres). Native species such as hawthorn, blackthorn, holly, dogwood and beech will be considered.
  - The existing ditch will be lost, therefore new watercourse opportunities will need to be sought. Watercourses should contain water all year and be planted with water tolerant native species, e.g. common reed.
  - Some existing scrub will be lost due to the development, therefore additional scrub units will be needed. This can be achieved by enhancing any retained scrub, by thinning existing scrub and adding supplementary planting with additional native species such as goat willow, blackthorn and holly.
  - Large areas of neutral grassland will be lost and there is limited opportunity on-site to create areas of new neutral grassland, opportunities to introduce wild-flower meadows would assist with creating new areas of alternative neutral grassland.

  - Tree planting will provide habitat units. Native species, native cultivars, tree species on-site and trees known to be attractive to wildlife will be proposed. e.g. birch, English oak, hornbeam and fruiting species such as rowan, wild cherry and crab apple.
- Wildlife Protection: A Construction Environmental Management Plan (CEMP) will outline measures to avoid impacts on wildlife, including timing of works, ECoW supervision, and sensitive lighting strategies.

As concluded within the Ecology Environmental Statement Chapter, when assessing the proposed effects of the proposed development on ecological and arboricultural features, embedded mitigation measures successfully nullified the majority of adverse impacts (ranging from major to minor) at a local scale. Notwithstanding this, realistic and achievable 'additional' mitigation measure have been incorporated, as required, such that any residual adverse impacts can be rendered negligible, with some residual effects assessed a minorly beneficial in the long term at the local level.

Given the relatively small scale (120 dwellings) of the proposed development, it is unsurprising that only modest additional mitigation is required to nullify the proposed effects. Notwithstanding this, it should be highlighted that applicant has taken the disciplines of ecology and arboriculture seriously, evidenced by the early appointment of specialist in these fields, and the subsequent commission of surveys and technical reports to inform baseline conditions. Moreover, the applicant has incorporated the results and recommendations of the aforementioned technical reports to inform the design. Most notably, the applicant has actively chosen to retain the largest and most valuable habitat on site (woodland parcels) as well as badger setts. This is considered embedded mitigation, but is also considered avoidance within the mitigation hierarchy and is a key reason why only minor levels of mitigation are required.

5.4. Air Quality

As detailed within the air quality assessment report, produced by Redmore Environmental Ltd (report reference 8551r3, dated 2nd December 2024) and submitted as part of this Planning application, the proposals have the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future residents to any existing air quality issues at the site. As such, the air quality assessment was undertaken to determine baseline conditions, consider location suitability for the proposed end-use, and assess potential effects as a result of the scheme:

- **Construction phase:** During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Site-specific dust control measures were subsequently determined based on the identified risk ratings. Subject to implementation, potential air quality impacts from dust generated by earthworks, construction and track out activities are predicted to be not significant.

- **Operational phase:** The development has the potential to impact on existing air quality in the vicinity of the site and expose future residents to elevated pollution levels during operation. Dispersion modelling was undertaken to predict pollutant concentrations at sensitive locations, which will result from emissions from the local highway network, both with and without the development in place. Results were subsequently verified using local monitoring data. Review of the dispersion modelling results indicated that impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations resulting from traffic generated by the development were predicted to be negligible at all receptor locations. The results of the dispersion modelling assessment also indicated that predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were below the relevant air quality objectives (set within the DEFRA Air Quality Strategy, relevant to maximum ambient pollution concentrations) and interim target, relevant to $PM_{2.5}$ exposure, at the development. The site is therefore considered suitable for the proposed use from an air quality perspective.

In summary, it is not anticipated that any significant adverse impacts on local air quality will occur from the construction phase or operational phase of the project, and the proposed development is considered to be compliant with the NPPF and MCC planning policies EN 16 Air Quality and JP-S5: Clean Air.

5.5. Noise Pollution

As well as causing disruption to wildlife, noise pollution can have detrimental impacts on the physical and mental wellbeing of residents and building users. To ensure the new development does not significantly contribute to noise pollution, a noise impact assessment has been undertaken by Philip Dunbavin Acoustics (report reference J005178-8158-RDC-02).

As confirmed in the report, existing noise levels at the site consist of noise from distant road traffic and occasional aircraft with additional local noise from Longford Road to the South. Noise levels are generally low indicating that the site is suitable for residential development.

Construction noise pollution

There is likely to be limited impact from the construction activities on the nearest noise sensitive properties to the site, in the form of some noise during the daytime, although this will be limited by means of limiting the duration and times of noisier activities to the least sensitive times during the day. Due to the distance from the proposed buildings to those surrounding the site, the impact is likely to be relatively low without the need for significant mitigation.

In terms of vibration, the only significant sources of vibration during construction are usually those associated with piling. Due to the distance between the proposed buildings and the existing houses surrounding the site, it is very unlikely that there will be any significant impact in terms of vibration on the existing dwellings, but this should be further assessed and submitted as part of the Section 61 prior approval when the methodology of any required piling has been finalised.

Noise pollution during operation

Once the development comes into use, there are unlikely to be any significant noise sources other than noise due to people going about their normal lives. For this size of development, the impact of road traffic noise is expected to be low and is unlikely to have a significant impact. Similarly, normal residential building services (heating and ventilation) are not likely to generate any significant noise at the distance between the proposed residences and the surrounding houses.

Regarding the noise of people themselves going about their daily lives, this is not expected to be any different, or greater than the sound from the existing residences surrounding the site, the existing school or the existing leisure use of the site currently (i.e. people walking on the paths across the site) or of the nearby Longford Park.

In terms of individual residences and noise / internal acoustic comfort, mitigation is proposed to the building envelope to ensure that internal noise levels within habitable areas are suitable for resting and sleeping and are in accordance with the requirements of the NPPF and BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings". Noise mitigation advice for the proposed residential facades is given in Section 7.0 of the noise impact assessment report, in the form of treatment to the glazing and ventilation.

Additionally, the assessment suggests that, in accordance with The Building Regulations Approved Document O, open windows are suitable as a means to mitigate against overheating with regard to limiting noise ingress to acceptable levels.

6. CONCLUSION

Sustainability is a key driver for the design and delivery of the Ryebank Chorlton development, with consideration given to national and local planning policy throughout all stages.

- **Construction carbon emissions (embodied carbon):** An assessment of the embodied carbon associated with the RIBA Stage 2 Concept Design of the dwellings, undertaken in line with the RICS best practice methodology, concludes a LETI rating of B will be achieved which considering RICS modules A1-A3, and also A1-A5, B1-B5 and C1-C4. This represents good practice.

- **Operational carbon:** The energy strategy has been developed in line with the energy hierarchy:
  - Be Lean: Energy demand has been reduced through careful orientation and consideration of building form, as well the application of Passivhaus standard U-values and air permeability targets. Natural ventilation has also been maximised, and glazing carefully considered to reduce heat gains whilst also delivering sufficient daylight.
  - Be Clean: Numerous "Be Clean" measures and energy efficiency measures will be applied to reduce energy consumption, as summarised in Section 4.2.2.2. Examples include the use of MVHR in apartments and communal spaces, highly efficient LED lighting, with daylight dimming and absence / presence detection in communal areas, and the integration of variable speed pumps and fans to assist with reducing operational energy demand during off-peak hours.
  - Be Green: To assist in meeting any remaining energy demand, energy will be supplied through "green" sources, namely ASHPs (appliable to houses only) and PVs.

  Through application of the energy hierarchy, the development will be delivered to Passivhaus standards. Furthermore, it will support compliance with Part L 2022, and therefore the interim measures set out within the Places for Everyone Framework Policy JP-S2.

  Furthermore, the Passivhaus analysis and PHPP modelling of the 6 block types listed below, confirms that:
  - The Passivhaus performance requirements will be met.
  - The Passivhaus criteria for space heating demand is in line with the guidance in Places for Everyone for flats and an improvement on the target for houses.
  - The LETI operational energy benchmark (EUI) of 35KWh/m² annum is met for the houses, for which ASHPs are proposed for both the heating and hot water, but not the flats, where, for simplicity and maintenance, direct electric heating and hot water is specified. However, sitewide, these two strategies balance each other out.
  - The LETI benchmark for renewable energy requires that 100% of the energy demand for houses be matched by the PV yield. For flats, the guidance recommends that 70% of the roof area be covered with PV. There are certain house types within the current design which cannot meet this benchmark due to lack of sufficient roof area, namely the villas, which will result in a relatively low annual yield. However, other house types, such as the terraces with their south facing roofs, achieve a higher yield than 100%, balancing this out.
  - With regards to demand response, smart metering and battery storage will be provided to houses, to make full use of variable rate tariffs, and to draw electricity when it is at its cheapest and producing lower carbon emissions. For the flats, the use of either a direct electric cylinder or heat battery will allow occupants to heat and store their hot water when electricity is at its cheapest.

- **Transport:** The Transport Assessment and Framework Travel Plan, prepared by SK Transport Planning Ltd (document references 241129/SK22351/FTP01(-01) and 241129/SK22386/TA01(-01), dated November 2024) have been produced to support the provision of sustainable transport measures, and reduce transport-related carbon emissions. The assessment confirms that the site is well connected to public transport links and local amenities, and active travel will be encouraged through high quality public

realm design, traffic calming measures, and appropriate levels of cycle parking provision. Sufficient car parking is to be provided, without encouraging over car use.

- **Climate change:** In line with Manchester Core Policy EN8 "Adaptation to Climate Change", careful consideration has been given to ensuring climate change mitigation and adaptation measures are embedded within the scheme. Pluvial flood risk, identified as a high risk, will be dealt with via the new drainage system that will collect the run-off from site and provide a positive outfall, and a selection of SuDs solutions including a pond, permeable paving, sub-base paving attenuation, and rain gardens. Numerous additional features to combat the impacts of increased extreme weather events and seasonal changes (hotter summers and wetter winters) will also be incorporated into the design, as outlined in Section 4.3.

- **Materials and waste:** Key to achieving a LETI embodied carbon rating of B, considered "good practice", is the use of timber frame construction and biobased cellulose insulation. In addition to this, examples of sustainable material selection include the use of timber for landscape furniture. Some cycle storage will also comprise a mixture of secure brick and timber structures. Further sustainable material selection will be informed through reviews of EPDs prior to specification.

  Material efficiencies, and subsequent waste reductions, are also considered within the current design. These include, for example, the compact form factor, meaning that more floor area is provided for less external fabric, and, as per Section 4.2.2.1, the maximisation of natural ventilation, thus reducing the materials associated with ventilation plant and services.

  To assist in the reduction of waste associated with the construction stage, a high-level Construction Waste Management Plan has been produced by the Client for submission with the Planning application. To encourage the recycling of operational waste, each dwelling will be provided with appropriately sized and segregated recycling bins.

- **Biodiversity:** A number of measures are proposed to mitigate the potential adverse impacts identified as part of the Ecological Impact Assessment and Arboricultural Impact Assessment:
  - Badgers: A licence from Natural England will be obtained to legally proceed with the works whilst safeguarding badgers. Mitigation measures will be required to minimize disturbance during both construction and operation.
  - Bats: Potential roosting sites and foraging areas may be affected by tree and woodland parcel clearance. Pre-construction ground level tree assessments have been advised, to be conducted in advance of any proposed felling works, with mitigation measures for bats, and the installation of bat boxes to enhance foraging resources implemented.
  - Birds: The site offers optimal nesting habitats for common bird species. Vegetation clearance will be scheduled outside the nesting season (March to August). If clearance during this period is unavoidable, an Ecological Clerk of Works will supervise to protect active nests.
  - Tree loss: The AIA identified the need to remove some high-quality trees for access and development. To mitigate this, a soft landscaping scheme will need to be developed to compensate for tree loss and enhance biodiversity. An Arboricultural Method Statement (AMS) will be prepared to protect the root systems of retained trees and woodland parcels during construction.
  - Invasive species: An Invasive Non-Native Species contractor will be appointed to safely remove invasive plant species on site.

  In addition to the aforementioned mitigation measures for protected species and habitats and invasive species, the following additional reports were assessed as required, based on the results of the Ecology Environmental Statement Chapter produced for the development:

- Biodiversity Net Gain: A BNG Design-Stage report will provide specific recommendations to compensate for any habitat loss, aiming for a minimum 10% net gain in biodiversity, as per Natural England's guidelines.
- Wildlife Protection: A Construction Environmental Management Plan (CEMP) will outline measures to avoid impacts on wildlife, including timing of works, ECoW supervision, and sensitive lighting strategies.

As concluded within the Ecology Environmental Statement Chapter, when assessing the proposed effects of the proposed development on ecological and arboricultural features, embedded mitigation measures successfully nullified the majority of adverse impacts at a local scale. Notwithstanding this, realistic and achievable 'additional' mitigation measure have been incorporated, as required, such that any residual adverse impacts can be rendered negligible, with some residual effects assessed a minorly beneficial in the long term at the local level.

- **Air quality:** In line with the air quality assessment report, produced by Redmore Environmental Ltd (report reference 8551r3, dated 2nd December 2024) and submitted as part of this Planning application, it is not anticipated that any significant adverse impacts on local air quality will occur from the construction phase or operational phase of the project, and the proposed development is considered to be compliant with the NPPF and MCC planning policies EN 16 Air Quality and JP-S5: Clean Air.

- **Noise pollution:** As confirmed in the noise impact assessment report (report reference J005178-8158-RDC-01), produced by Philip Dunbavin Acoustics, existing noise levels at the site consist of noise from distant road traffic and occasional aircraft with additional local noise from Longford Road to the South. Noise levels are generally low indicating that the site is suitable for residential development. Noise pollution occurring from construction or the development in operation has been deemed as not significant. With regards to dwellings and noise impacts / internal acoustic comfort, mitigation is proposed to the building envelope to ensure that internal noise levels within habitable areas are suitable for resting and sleeping, and are in accordance with the requirements of the NPPF and BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings". Noise mitigation advice for the proposed residential facades is given in Section 7.0 of the noise impact assessment report, in the form of treatment to the glazing and ventilation. Additionally, the assessment suggests that, in accordance with The Building Regulations Approved Document O, open windows are suitable as a means to mitigate against overheating with regard to limiting noise ingress to acceptable levels.

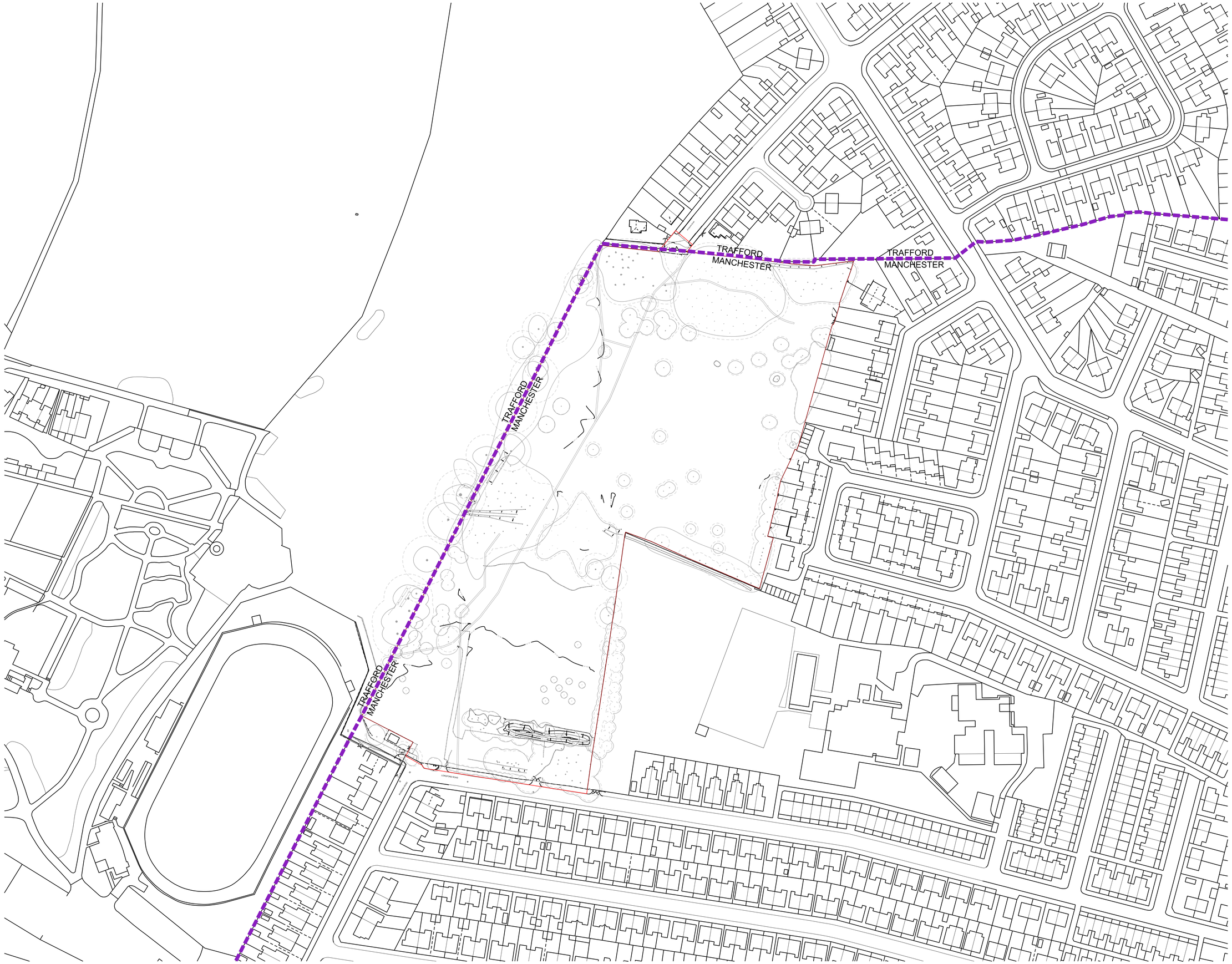
APPENDIX A: SITE BOUNDARY

Copyright of this drawing is vested in 5plus Architect and it must not be copied or reproduced without written consent.
Figured dimensions only are to be taken from this drawing. DO NOT SCALE OFF THIS DRAWING ____ IF IN DOUBT ASK.

All contractors must visit the site and be responsible for taking and checking all dimensions relative to their work. 5plus architects are to be advised of any variation between drawings and site conditions.

Electronic data/ drawings issued as 'read only' and should not be interrogated for measurement.
All dimensions and levels should be 'read only' from those values stated in text, on the drawings

KEY PLAN:



K E Y

Red Line Application boundary

Trafford/Manchester Boundary

Base drawing comprised of OS and Topo information.

REV:	DATE:	DETAILS:
B	25/11/24	Draft Planning Issue
A	19/09/24	Update to the red line boundary and indication of Manchester & Trafford Council boundary line.

NORTH

5plus architects

4th Floor
The Hive
47 Lever Street
Manchester
M1 1FN

+44 (0)161 228 0211

www.5plusarchitects.com

PROJECT:

TITLE:
Existing Site Location Plan
Red Line Boundary

SCALE:	ORIGIN DATE:	DRAWN:	CHECKED:
1:1000 @ A1	05/03/24	RK	PD

STATUS:
For Information

PROJECT	DRAWING NO:	REV:
	5PA-MP-XX-DR-A-000001	A

Copyright of this drawing is vested in 5plus Architect and it must not be copied or reproduced without written consent.
Figured dimensions only are to be taken from this drawing. DO NOT SCALE OFF THIS DRAWING ..... IF IN DOUBT ASK

All contractors must visit the site and be responsible for taking and checking all dimensions relative to their work. 5plus architects are to be advised of any variation between drawings and site conditions.

Electronic data/ drawings issued as 'read only' and should not be interrogated for measurement.
All dimensions and levels should be 'read only' from those values stated in text, on the drawings

KEY PLAN:

Area in abeyance.

Revision.

NOTE:

Drawing based on survey information by others.

Drawing to read in conjunction with Landscape (TPM) information and Transport (SK) information .

(Please print in colour)

REV:	DATE:	DETAILS:
E	05/12/24	Draft Planning Issue
D	25/11/24	Draft Planning Issue
C	12/11/24	Revised layout to incorperate planners comments on the landscaping and highways. Adjustment to Northern Affordable building to reflect change in brief. All external bin/bikes store reviewed and updated.
B	17/09/24	External bike & bin store included within masterplan location adjusted
A	05/09/24	Landscaping layout updated and external bike & bin store included within masterplan

NORTH

4th Floor
The Hive
47 Lever Street
Manchester
M1 1FN

+44 (0)161 228 0211

www.5plusarchitects.com

5plus architects

PROJECT:
Ryebank Road
Chorlton

TITLE:
Proposed Site Plan
Illustrative Masterplan

SCALE:	ORIGIN DATE:	DRAWN:	CHECKED:
1:500 @ A1	22/08/24	FP	RK

STATUS:
For Information

PROJECT	DRAWING NO:	REV:
05476	5PA-MP-XX-DR-A-000200	E

Architecture I Masterplanning I Interiors I Graphics I Branding

APPENDIX B: ENERGY STATEMENT



RIDGE

ENERGY STRATEGY REPORT
RYEBANK CHORLTON

RYEBANK CHORLTON
STEP PLACES, SOUTHWAY HOUSING TRUST AND MANCHESTER METROPOLITAN UNIVERSITY

Prepared for

STEP PLACES
SOUTHWAY HOUSING TRUST
MANCHESTER METROPOLITAN UNIVERSITY

Prepared by

Ridge and Partners LLP
2nd Floor, 100 Embankment
Cathedral Approach
Manchester
M3 7FA
Tel: 0161 833 9579

Contact

Ben Pritchard
Building Services Engineer
bpritchard@ridge.co.uk
07813 697 333

VERSION CONTROL

VERSION	DATE	DESCRIPTION	CREATED BY	REVIEWED BY
1.0	06.11.2024	Stage 2 Issue	PD	XXX
2.0	21.11.2024	BRUKL and SAP results included	BP	PD
3.0	10.12.2024	Updates in line with ASTEER comment	BP	PD
4.0	19.12.2024	General Update	BP	PD

CONTENTS

1. EXECUTIVE SUMMARY 6
1.1. Overview 6
1.2. Design Strategy 6
1.3. Results 7
1.3.1. Residential Areas (SAP Results) 7
1.3.2. Co-Housing Amenity (BRUKL Results) 8
2. INTRODUCTION 9
3. DEVELOPMENT PROPOSALS 10
3.1. Description of Development Site 10
3.2. Development proposals 10
4. ENERGY HIERARCHY 11
4.1. Decarbonisation of the Electricity Grid 11
5. GOVERNMENT REVIEW POLICY 13
5.1. National Planning Policy Framework 13
5.2. The Greater Manchester Combined Authority (GMCA) 13
5.3. Manchester Core Strategy 14
5.3.1. Policy EN 4: Reducing CO2 Emissions by Enabling Low and Zero Carbon Development 14
5.3.2. Policy EN5: Strategic Areas for low and zero carbon decentralised energy infrastructure 15
5.3.3. Policy EN 6: Target Framework for CO2 reduction from low or zero carbon energy supplies 16
5.3.4. Policy EN8: Adaptation to Climate Change 17
5.4. Places for Everyone Joint Development Plan 18
5.4.1. Policy JP-S1: Sustainable Development 18
5.4.2. Policy JP-S2: Carbon and Energy 18
5.4.3. Policy JP-S3: Heat and Energy Networks 19
6. REGULATORY FRAMEWORK 21
6.1. Building Regulations 21
7. APPRAISAL OF SOLUTIONS 23
7.1. Summary 23
7.2. Passive Design Measures – (Be Lean) 25
7.2.1. Passive Design Measures 26
7.3. Meeting Demand Efficiently - (Be Clean) 28
7.3.1. Meeting Demand Efficiently 28
7.4. Low Zero Carbon Technologies - (Be Green) 30
7.4.1. Low Zero Carbon Technologies 30
8. PROPOSALS 33
8.1. Residential 33
8.1.1. Passive Measures (Be Lean) 33
8.1.2. Energy Efficiency Measures (Be Mean) 34
8.1.3. Renewable and Low Carbon Technologies (Be Green) 35

9. PREDICTED CARBON EMISSIONS AND OPERATIONAL ENERGY SAVINGS 36

9.1. Residential (SAP Results) 36

9.2. Co-Housing Amenity (BRUKL Results) 37

10. CONCLUSION 38

11. APPENDIX 1- RESIDENTIAL (SAP RESULTS) 39

12. APPENDIX 2- CO-HOUSING AMENITY (BRUKL RESULTS) 46

1. EXECUTIVE SUMMARY

1.1. Overview

Ridge & Partners LLP have been appointed to provide an Energy Strategy Report to align with National Planning Policy Framework (NPPF), Manchester County Council (MCC) Core Strategy and Places for Everyone Joint Development Plan. As part of this energy Strategy Report an Energy Modelling Calculation has been completed to assure compliance with Building Regulations Part L.

1.2. Design Strategy

As part of the low carbon design strategy, the following design initiatives were adopted to reduce the operational energy demand of the building as much as possible. This design strategy has been developed in line with the Energy Hierarchy which has been outlined in section 4.

Be Lean

- Improved thermal fabric performance and air permeability far exceeding the Part L minimum U-Values to reduce heat losses.
- Maximising natural ventilation through openable panels to reduce the reliance on mechanical ventilation.
- Passive solar control through orientation, layout, form, glazing percentages and G-Values to reduce heat gains and mitigate artificial cooling.
- Providing sufficient glazing to ensure natural daylighting targets are achieved and reduce the reliance on artificial lighting.

Be Clean

- Efficient LED lighting.
- Energy efficient plant and white good to reduce unregulated energy load.
- Integrating variable speed pumps and fans to reduce operational energy demand during off-peak hours.
- Highly efficient heat recovery on mechanical ventilation equipment to reduce fresh air heating and cooling loads.
- Occupancy controls to landlord areas on equipment to reduce off-peak energy loads.
- Smart controls of primary plant and plant within landlord areas to optimise performance and match energy usage with demand.
- Energy monitoring of landlord areas and primary plant to develop a real-life picture of energy use and carbon emissions.

Be Green

- Low carbon technologies such as Air Source Heat Pumps for heating, cooling and hot water.

1.3. Results

As a result of the design strategy implemented, the proposed Ryebank Chorlton Development **complies with planning policy EN4.**

The SAP and BRUKL results relate to a RIBA Stage 2 design and will be subject to a design development at the next stages in order to meet the planning requirements of Manchester City Council. The SAP results are shown in Appendix 1. The BRUKL results are shown in Appendix 2.

1.3.1. Residential Areas (SAP Results)

A sample number of apartment types have been assessed to provide an indication of the emission rate, the energy rate and the fabric energy efficiency.

Apartment 1B 2P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	14.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.6	
Target primary energy rate (DPER), $kgCO_2/m^2$	77.74	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	16.29	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	41.5	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.9	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 3P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.91	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.5	
Target primary energy rate (DPER), $kgCO_2/m^2$	67.61	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	15.2	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.9	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.2	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 4P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.11	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.19	
Target primary energy rate (DPER), $kgCO_2/m^2$	63.27	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	11.95	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	39.3	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.5	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 5

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.6
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.28
Target primary energy rate (DPER), $kgCO_2/m^2$	49.87

Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-19.31	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	30.8	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.0	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6A

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	10.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.01	
Target primary energy rate (DPER), $kgCO_2/m^2$	56.15	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.52	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.6	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.8	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6B

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.43	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.03	
Target primary energy rate (DPER), $kgCO_2/m^2$	48.95	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.69	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	31.1	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.4	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 7

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.86	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-3.81	
Target primary energy rate (DPER), $kgCO_2/m^2$	51.46	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-9.67	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.7	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.1	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

1.3.2. Co-Housing Amenity (BRUKL Results)

Target CO_2 emission rate (TER), $kgCO_2/m^2$. annum	3.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	2.23	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	42.41	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	24.28	
Do the buildings emission and primary energy rates exceed the targets?	BER = < TER	BPER = < TPER

2. INTRODUCTION

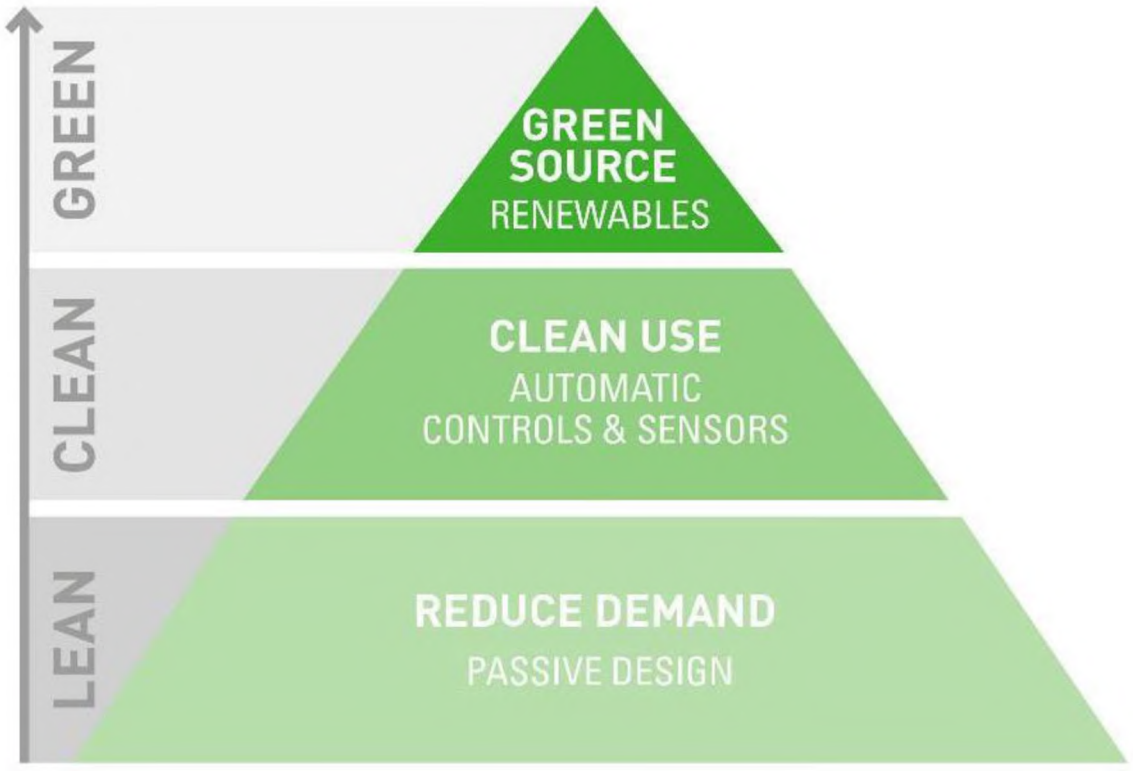
As Low Carbon Design Consultants, Ridge & Partners LLP have been appointed by Step Places, Southway Housing Trust and Manchester Metropolitan University to provide a statement for the purposes of submitting a full planning application for Ryebank Chorlton.

The purpose of the statement is to summarise the relevant policies both National and Local and demonstrate the methods Ridge & Partners have reviewed various options to promote policies set out in this report and subsequent design.

The document presented below outlines a preliminary low carbon design philosophy followed to develop an energy strategy for the proposed works. The "Energy Hierarchy" methodology provides a design framework which was used to develop the proposed low carbon energy strategy. The approach described by this methodology provides a staged process: LEAN, CLEAN and GREEN (Illustrated below) to assess design measures.

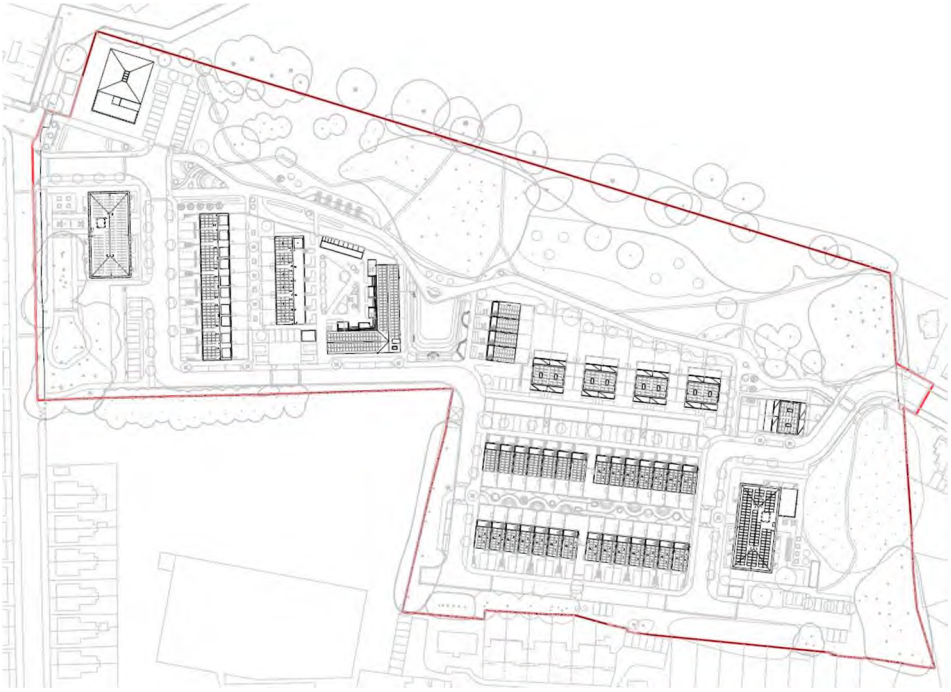
Each stage would focus on the following:

- Lean – Main aim is to reduce the buildings energy demand through "passive measures".
- Clean – Meet the reduced energy demand in the most efficient way possible using "active measures".
- Green – Assess the technical feasibility of incorporating a low or zero carbon technology to further reduce the CO2 emissions.



3. DEVELOPMENT PROPOSALS

3.1. Description of Development Site



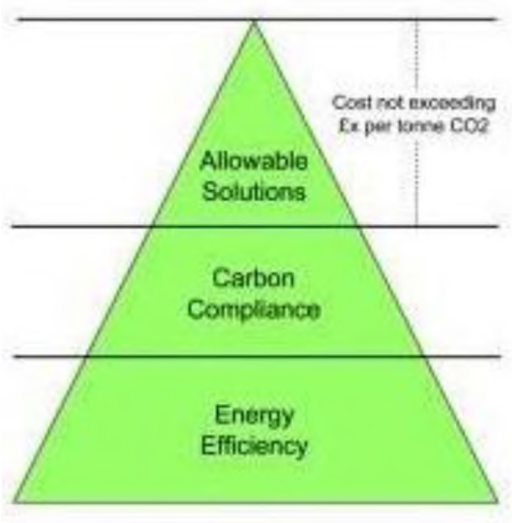
The Site is located in Chorlton-cum-Hardy. It is bounded by Longford Park to the West, Great Stone Road to the north, and Longford Road to the south.

3.2. Development proposals

Construction of a residential development comprising 120 dwellings (including a mix of housing types and tenures) together with open spaces, landscaping, sustainable drainage features, access arrangements, cycleway and pedestrian linkages, vehicular accesses and highways, parking provision and other associated works."

4. ENERGY HIERARCHY

In line with the draft definition of zero carbon an energy hierarchy has been created. Under Policy EN4 developers will initially be expected to secure high levels of energy efficiency and low energy demand. This is followed by the incorporation of on-site measures where these exist, such as low or zero carbon energy technologies and directly connected heat (not necessarily on-site).



Energy Hierarchy

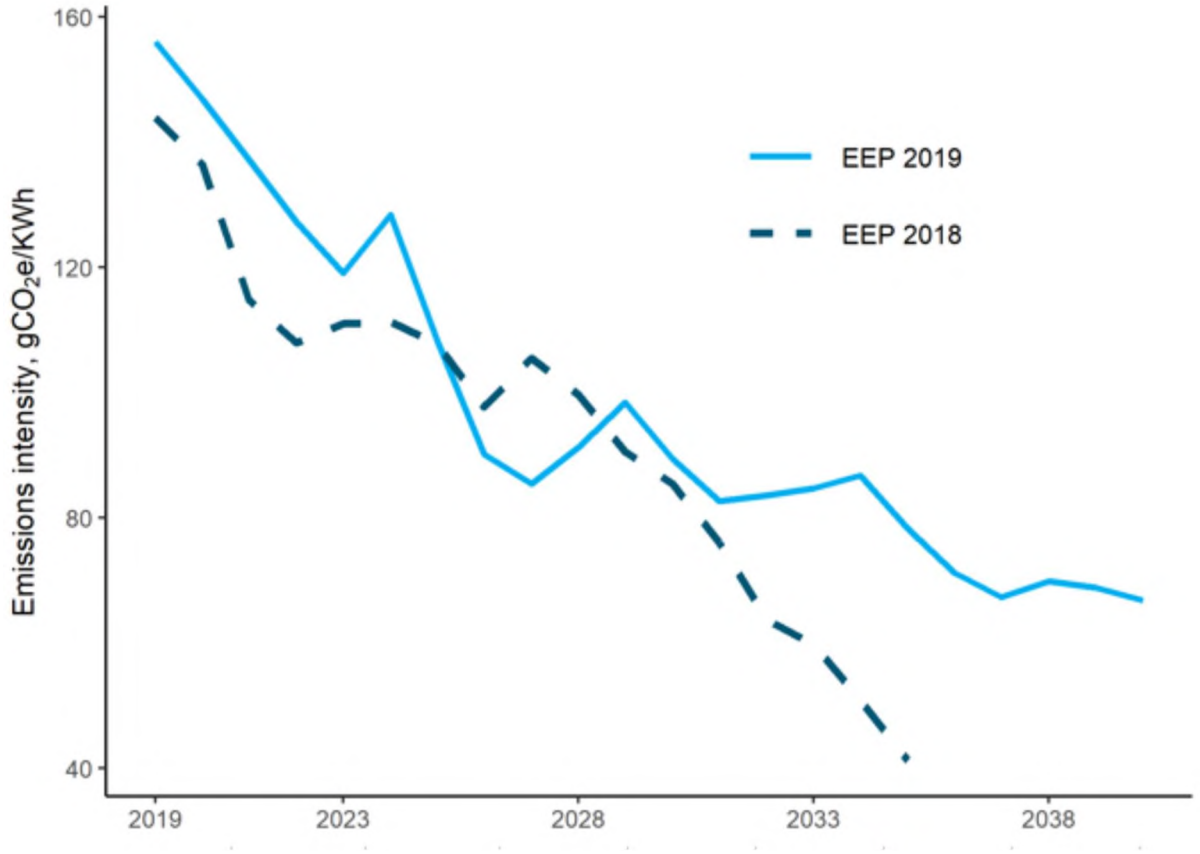
However, in order to achieve the highest level of carbon reductions it is intended that developers will be able to contribute to or co-ordinate investment in near or off-site infrastructure. This could include, for example, the connection of buildings to district heating networks and investment in low or zero carbon technologies on buildings owned by the city or by public and community institutions. Further guidance on these 'allowable solutions', possibly in the form of a Supplementary Planning Document (SPD), will be given following further national guidance on this matter expected from the Local Planning Authority.

4.1. Decarbonisation of the Electricity Grid

The National Grid in the UK is decarbonising rapidly. This permits the electrification of heat and heralds the end to combustion of fossil fuels as the main source of heating. The attractive alternative to combustion is heat transfer using heat pumps linked to ground source or air source energy.

The carbon factor of grid electricity was 495 grams of CO2 for each kWh of electricity generated in 2014 according to Defra. This fell by 6.5% to 462 grams in 2015, and by a further 10.8% to 412 in 2016.

The Department for Business, Energy and Industrial Strategy (BEIS) published its Energy and Emissions Projection (EEP) in October 2020 showing the projected Grid Carbon Factor falling dramatically from 156 grams in 2019 to just 67 grams in 2040.



Predicted Reduction in Grid Carbon Factor

Furthermore, the UK Government has passed laws that require the country to reduce all greenhouse gas emissions to net zero by 2050 and the phasing out of natural gas as a source of heating with gas heating to be banned from 2025.

5. GOVERNMENT REVIEW POLICY

5.1. National Planning Policy Framework

A revised National Planning Policy Framework (NPPF) was updated and published in December 2023 which sets out the Government's planning policies for England and how they are expected to be applied. This framework replaces that published in July 2021. This framework states the purpose of Sustainable development that:

> *'The purpose of the planning system is to contribute to the achievement of sustainable development.'*

This highlights sustainability as a critical issue that runs throughout all the planning policies. The National Planning Policy Framework (NPPF) defines sustainable development in agreement with the U.N. definition of "meeting the needs of the present without compromising the ability of future generations to meet their own needs." The NPPF outlines how three overarching objectives need to be pursued in mutually supportive ways to achieve sustainable development. These objectives are outlined below.

The environmental objective of this framework is to:

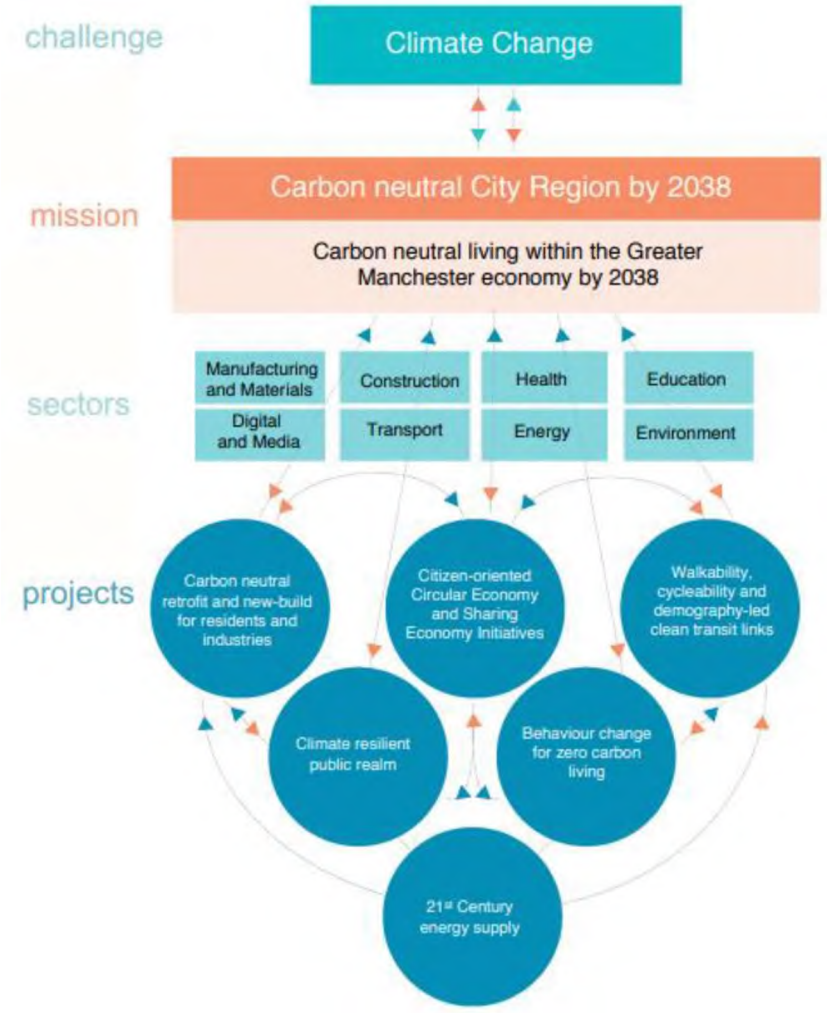
> *Contribute to protecting and enhancing our natural, built, and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

At the heart of the Framework is a 'presumption in favour of sustainable development.' Section 14 of the National Planning Policy Framework (NPPF) specifically addresses the challenge of climate change. It states that: 'New development should be planned for in ways that:

> *(a) Avoid increased vulnerability to the range of impacts arising from climate change. When new developments are 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 (b) can help to reduce greenhouse gas 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 standard Local Plan and supplementary guidance.'*

5.2. The Greater Manchester Combined Authority (GMCA)

The GMCA declared a climate emergency in July 2019 and launched a plan in March 2020 following 12 months collaboration and consultation with representatives from areas across the city region. The plan omits the actions needed to achieve a 50% reduction in CO_2 emissions between 2020 and 2025 and actions to support the city to be carbon neutral by 2038.



Potential components of a Greater Manchester clean growth mission

5.3. Manchester Core Strategy

This is the principal document of Manchester City Council as the local planning authority's Development Plan of which the following policies are of most relevance:

5.3.1. Policy EN 4: Reducing CO2 Emissions by Enabling Low and Zero Carbon Development

The council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO2 emissions, and rising fossil fuel prices, through the following actions:

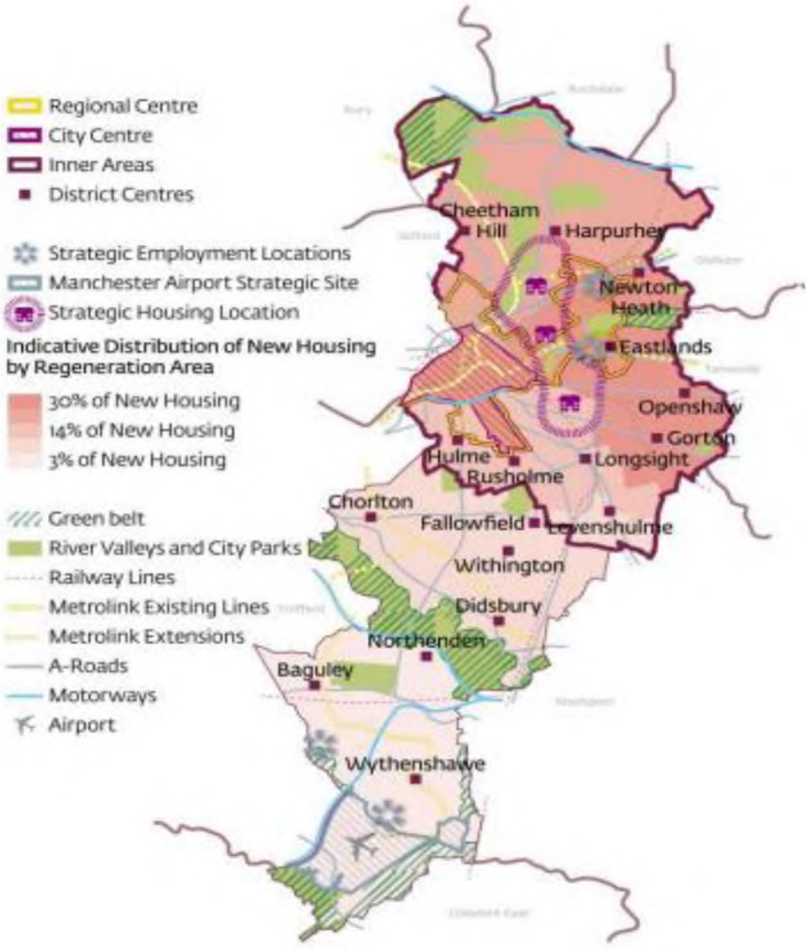
- All development must follow the principal of the Energy Hierarchy, being designed:
  - To reduce the need for energy through design features that provide passive heating, natural light and cooling
  - To reduce the need for energy through energy efficient features such as improved insulation and glazing

  - To meet residual energy requirements through the use of low or zero carbon energy generating technologies
- Wherever possible new development and retrofit projects, including energy generation plant, must be located, and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies
- Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings
- Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy scheme and/or to incorporate provision to enable future connection to any existing/potential decentralised energy schemes
- The use of building material with low embodied carbon in new development and refurbishment

5.3.2. Policy EN5: Strategic Areas for low and zero carbon decentralised energy infrastructure

Within Manchester it is considered that the following strategic areas, indicated on the key diagram, will have a major role to play in achieving an increase in the level of decentralised, low and zero carbon energy supplies available:

- The Regional Centre, which also includes the Oxford Road Corridor and Eastlands
- District Centres and associated major development sites
- Airport Strategic Site
- Strategic housing location
- Strategic employment locations



Within these areas new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans. The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans.

Where investment or development is being undertaken into or adjacent to a public building / asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO2 reduction funded by contributions.

5.3.3. Policy EN 6: Target Framework for CO2 reduction from low or zero carbon energy supplies

Application 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 plots 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: location where 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

Table 12.2 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 (Applies to commercial uses with high proportion of emissions from electricity use (>45 kg CO2/m2)	10% increase on Part L 2010
Target 3: Micro generation area	+ 15% increase on Part L 2010

Non-domestic CO2 emissions reduction targets

Where the CO2 emissions reduction required under any future revision to Part L of the building regulations becomes greater that 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 CO_2 mitigation, subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

Guidance on what the energy statement should contain and how to decide which target applies to a development proposal is given in Appendix A of 'Manchester's Local Development Framework, Core Strategy Development Plan Document, Adopted 11th July 2012'.

5.3.4. Policy EN8: Adaptation to Climate Change

All new development will be expected to be adaptable to climate change in terms of the design, layout, sitting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rainwater permeability
- Reduction in urban heat island effect through the use of Green Infrastructure such as green roofs, green walls, increased tree cover and waterways
- The need to control overheating of buildings through passive design
- The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation

Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO_2 mitigation under Policy EN6, subject to evidence to quantify their contribution to compliance.

5.4. Places for Everyone Joint Development Plan

The Places for Everyone sets out how the nine Greater Manchester boroughs should develop until 2039.

The plan states that *"Collectively our plans are focused on delivering the ambitions in the Greater Manchester Strategy: a good start in life for everyone; good opportunities for our young people to equip them for life; good work and the best jobs in a valuable, productive, zero carbon economy; safe, secure housing in inclusive and diverse communities; a good cultural and leisure offer for everyone; a green city-region; good health and support for people to live fulfilling lives, with quality care for those who need it; to be a good place to grow older and to be a place where everyone is connected – socially, digitally and by a clean, integrated and accessible transport system."*

Relevant policies from this document include:

5.4.1. Policy JP-S1: Sustainable Development

To help tackle climate change, development should aim to maximise its economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives.

In preparing plans, authorities should make as much use as possible of suitable previously developed (brownfield) land and vacant buildings to meet development needs.

In bringing forward previously developed sites for development, particular attention will be paid to tackling land contamination and stability issues, ensuring that appropriate mitigation and remediation is implemented to enable sites to be brought back into use effectively.

5.4.2. Policy JP-S2: Carbon and Energy

The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including:

1. *Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling;*
2. *Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured;*
3. *Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities;*
4. *Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree planting and natural flood management techniques;*
5. *An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable;*
    a. *Be net zero carbon(29) which applies:*
        i. *from adoption – to regulated operational carbon emissions;*
        ii. *from 2028 – to all emissions 'in construction'.*

        From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions.

        Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance seeks to:

i. *Minimise energy demand;*
ii. *Maximise energy efficiency*
iii. *Use renewable energy;*
iv. *Use low carbon energy; and*
v. *Utilise other energy sources.*

From 2025 any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund. As an interim measure, development should be consistent with the 2022 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies

b. *Incorporate adequate electric vehicle charging points, in line with Part S of the Building Regulations, unless superseded by relevant Local Plan policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site;*
c. *Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date;*
d. *In residential developments, achieve energy demand reductions in terms of space heat demand; hot water energy demand and the delivery of on-site renewable energy generation, in accordance with Table 5.1*

For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced

e. *For non-residential developments, achieve at least BREEAM excellent standard (or equivalent) for the 'Ene 01 – reduction of energy use and carbon emissions' category rising to 'BREEAM outstanding' equivalent for ENE 01 from 2028.*
f. *Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post occupancy evaluation. Whole life cycle emissions should be considered where possible. Districts may set out specific carbon emission reduction and energy demand targets within Local Plans*

5.4.3. Policy JP-S3: Heat and Energy Networks

The provision of decentralised energy infrastructure is critical to the delivery of our objectives for low carbon growth, carbon reductions and an increase in local energy generation. The following measures will help to achieve this:

1. *Delivery of renewable and low carbon energy schemes will be supported with particular emphasis on the use of decentralised energy networks in areas identified as "Heat and Energy Network Opportunity Areas". These have been identified where:*
    a. *Existing heat/energy networks are operational or have been commissioned;*
    b. *Proposals for new heat networks/energy networks are being progressed, or future opportunities have been identified in city-region master planning;*
    c. *Sufficient density of existing heat demand occurs; and*
    d. *Significant future development is proposed at the strategic development locations.*
2. *Within the identified "Heat and Energy Network Opportunity Areas", unless it can be demonstrated that there are more effective alternatives for minimising carbon emissions or such connection is not practicable or financially viable, it is expected that:*

a. *New residential developments that are '10 dwellings or more' or other developments over 1,000 m2 floorspace shall:*
    i. *Connect to an existing or planned heat/energy network or be designed to enable future connection (where within 500m of such a network); and/or*
    ii. *Install a site-wide or communal heat/energy network solution.*
b. *An expectation that new industrial development will demonstrate that opportunities for using waste heat locally have been fully examined, and included in proposals; Places for Everyone Joint Development Plan 2022 to 2039 Adopted with effect from 21 March 2024 94*
c. *An expectation that where publicly-owned buildings and assets adjoin new major development sites, opportunities for these buildings and assets to connect to site-wide proposals will be considered; and*
d. *An expectation that any site-wide networks will be designed so as to enable future expansion to adjoining buildings or assets as appropriate*

To comply with policy JP-S3, heat and energy network assessments will be required as part of an energy statement to support planning applications for new developments within the identified "Heat and Energy Network Opportunity Areas" to demonstrate compliance with PfE energy policies. To ensure consistency of approach and to aid the decision-making process, decentralised heat/energy network assessments are required to demonstrate consideration and analysis of:

a) Identification of existing and proposed heat/energy loads;
b) Identification of heat/energy supply sources;
c) Identification of opportunities to utilise renewable and low carbon energy sources;
d) Identification of opportunities to utilise waste and secondary heat sources;
e) Impact of proposals and technology choices on local air quality;
f) Design according to national best practice in relation to efficient heat network design (e.g. CIBSE CP1 Heat Networks: Code of Practice for the UK35, or equivalent); and
g) Adopting appropriate consumer protection standards (e.g. Heat Trust36 or equivalent).

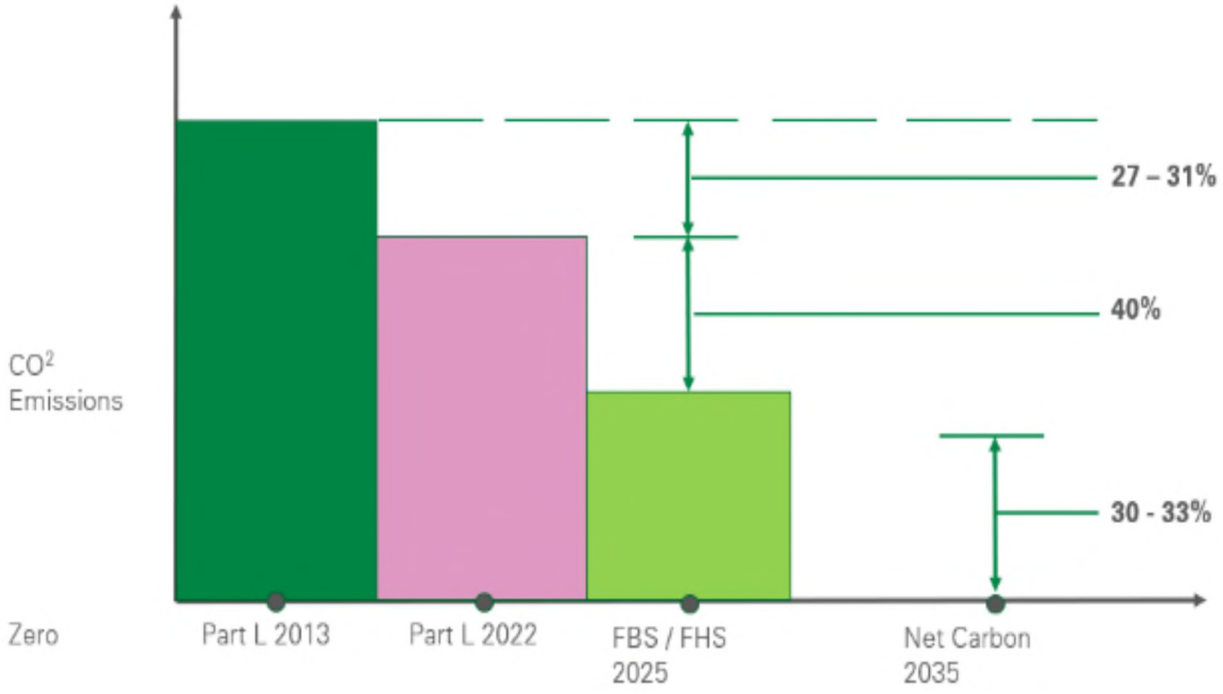
6. REGULATORY FRAMEWORK

6.1. Building Regulations

The Part L 2021 building regulations came into effect in June 2022 with a transitional period of 12 months and has acted as an uplift to help the construction industry adapt to changing regulations and low carbon heating.

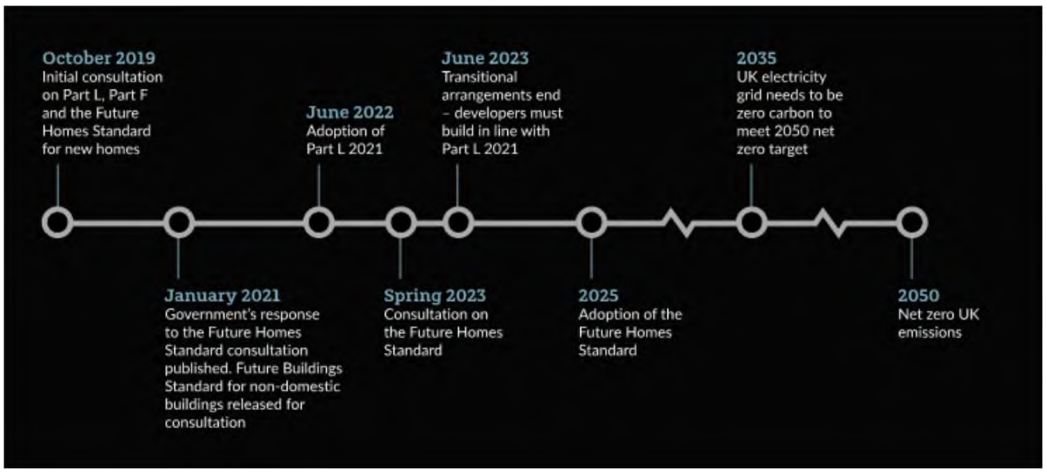
The graph below shows the projected target reductions in CO2 emissions compared against the previous and current versions of Part L and the proposed future iterations to the Regulations.

Approved Building Regulations Part L 2021 display a 27%-31% reduction in CO_2 emissions compared to the previous 2013 Part L iteration for domestic buildings and non-domestic buildings respectively.



Building Regulations Part L changes

The future building standards which will come into effect in 2025 will require CO2 emissions to be further decreased by 40% in comparison to current figures. The timeline for the future buildings standards is displayed in figure 8:



Future Homes Standard

Part L 2021 Volume 1 Key Changes (Domestic buildings)

- Part L 2021 Volume 1 has a CO2 reduction of 31% compared to 2013 regulations.
- No ban on use of gas boilers.
- Local planning authorities will retain powers to set higher energy efficiency targets than building regulations.
- All new builds to be air tightness tested and reducing unwanted air infiltration in existing dwellings.
- Improve accuracy of as built energy calculations

Part L 2021 Volume 2 Key Changes (Non-Domestic buildings)

- Part L 2021 Volume 2 has a CO2 reduction of 27% compared to 2013 regulations.
- Encourage use of low carbon systems and high levels of building fabric.
- Uplift in the efficiencies of building services.
- Update to SBEM and NCM modelling guide.
- Uplift to limiting U-values and air permeability.
- Air tightness in existing buildings – reducing unwanted air filtration.
- Maximum flow temperature of 55°C in wet space heating systems.

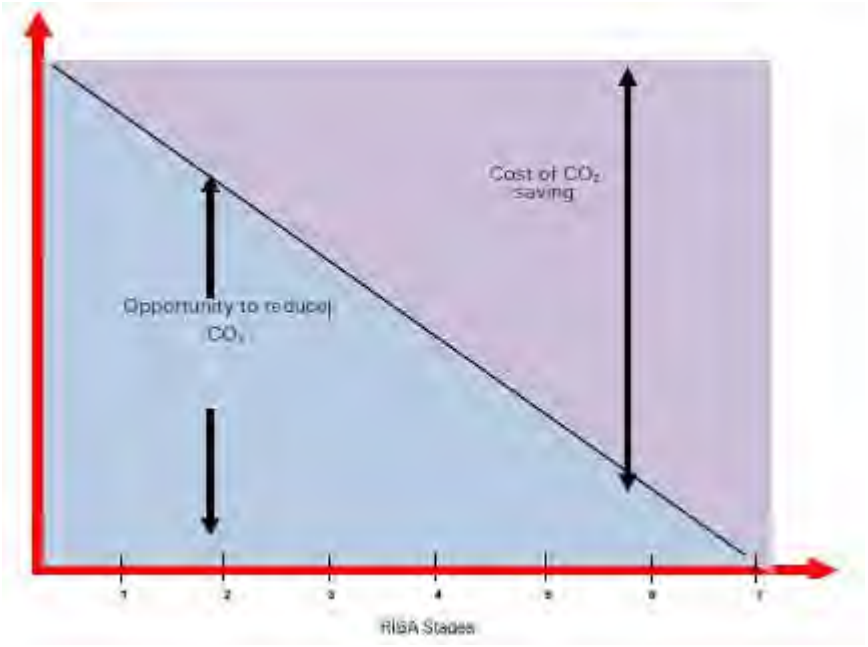
A new performance metric has also been ushered in; primary energy has become the principal measure replacing CO_2 emissions as the main metric. CO_2 emissions are now less effective as a measure of energy performance as the electricity grid becomes decarbonised. If this was not addressed, this could result in a dwelling with low CO_2 emissions complying with regulations, despite having excessively high energy consumption. Consequently, the Primary Energy metric has been introduced to ensure that energy efficiency is directly measured rather than assuming it is linked to CO_2 emissions.

7. APPRAISAL OF SOLUTIONS

7.1. Summary

The strategic approach outlined, follows a specific appraisal of technologies at each stage of design and to achieve the overall goal of CO_2 reduction.

As on the whole it becomes more expensive to implement carbon reduction measures the further along the design process as the opportunities to reduce demand diminish.



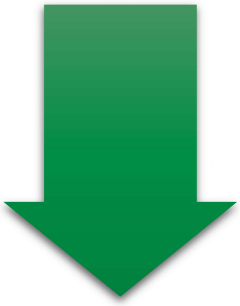
Costs of implementing design measures at each RIBA Stage

In this first instance it is therefore essential that the buildings 'passive measures' are optimised and the design teamwork in close collaboration with the user team to consider the future fit out demands.

The next stage is to adopt 'efficient technologies' such as heat recovery and variable speed drives etc. to meet the demand efficiency with the final approach of applying 'renewable and low carbon' technologies accordingly.

Our approach has followed the following route:

Reduce Demand



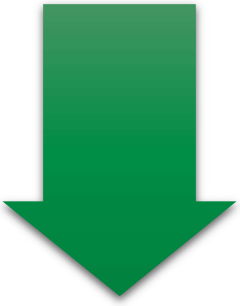
Passive design:

- Thermal insulation
- Natural ventilation
- Natural daylight
- Thermal mass
- Air tightness
- Solar shading/Glass Specification
- A Rated White Goods

LEAN

Reduce Energy Demand

Meet demand efficiently

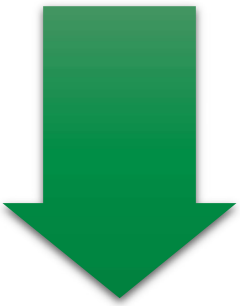


- Low energy fit out
- Heat recovery
- Mixed mode ventilation
- Low energy lighting (LED)
- Power management
- Variable speed drives
- Demand Operated Systems
- Low Specific Fan Power
- Wastewater Heat Recovery

MEAN

Supply Energy Cleanly and Efficiently

Supply energy from low and zero carbon technology



- Combined heat power/tri-generation
- Biomass/biofuels
- Solar thermal hot water
- Ground source heat pumps (GSHP)
  - Open loop
  - Closed loop
- Photovoltaics
- Fuel cells
- Air source heat pumps (ASHP)
- Wind
- Hydro

GREEN

Incorporate Renewable Energy

7.2. Passive Design Measures – (Be Lean)

This section looks at the proposed measures that will ensure the initial demand for energy within the Ryebank Chorlton development is low from the outset when utilising passive measures.

The **site location** is in Chorlton-cum-Hardy, with **weather** typical of the North-west. Mild conditions are present throughout the year, with relatively high rainfall and cloud cover expected throughout the year. The **microclimate** in the centre of Manchester tends towards higher temperatures than typical in the North-west generally, due to the urban heat island effect.

The residential development is expected to follow Passivhaus design standards.

The following measures are to be incorporated in the design:

- Passive Design
  - Thermal Insulation and Thermal Bridging
  - Natural Ventilation / Mixed mode
  - Natural Daylight
  - Thermal Mass
  - Air tightness
  - Solar Shading
  - Adaption to climate change

These measures promote the reduction of Energy use and carbon emission in the first instance.

Firstly, due to the passive design features, the energy demand has been reduced and therefore the building will be less affected by the decreased availability of energy.

Secondly, the building will have a lower carbon footprint helping to stop the effects of climate change from increasing any further.

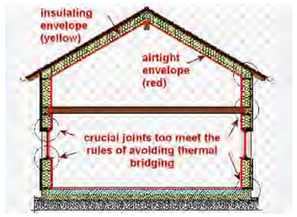
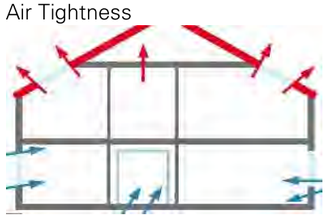
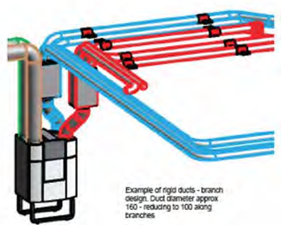
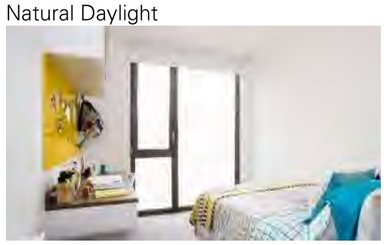
The expected increase in external temperatures could result in future overheating problems. Whilst the building cannot be relocated, by having low g-value glass, there is less solar heat gain entering the rooms.

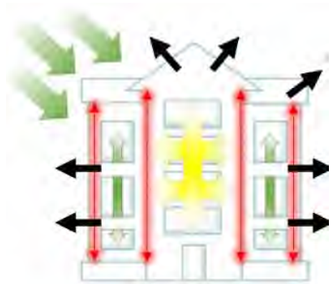
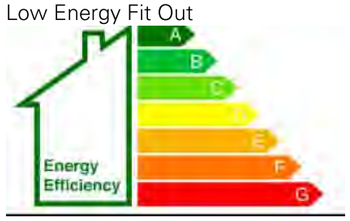
The demand for cooling has also been reduced through by exceeding minimum U-values required under Part L of the Building Regulations.

This combination of passive design measures act to stabilise the temperatures within the building, enabling it to adapt to the likely extremes of both high and low temperatures.

Key:
Y– Yes could be incorporated
P – Possible
N – Not appropriate

7.2.1. Passive Design Measures

MEASURE	DESCRIPTION	SUITABLE FOR CONSIDERATION	COMMENTARY
Thermal Insulation 	Thermal insulation is the reduction of heat transfer (i.e., the transfer of thermal energy between objects of differing temperature) between objects in thermal contact or in range of radiative influence.	**Y**	Insulation is central to low energy construction as it reduces the required heating load by minimising unnecessary heat loss. Future building standards also must be considered, and these are due to come into effect in 2025 with a 40% reduction in Co2 emissions over Part L 2021. The proposed development will adopt the minimum U-values required by Passivhaus standards, and these are detailed in Section 9, to reduce heat loss and therefore overall energy demand.
Air Tightness 	Airtightness is the control of air leakage, i.e. the elimination of unwanted draughts through the external fabric of the building envelope. This may be achieved by the correct and proper installation of a vapour check or vapour barrier.	**Y**	The Proposed Development will target an air tightness that meets the Passivhaus design standards to reduce air infiltration and unwanted draughts through the external fabric of the building envelope and so heating and cooling energy demand will be lowered. The currently air tightness target for the Proposed Development is 0.6ach
Ventilation 	Ventilation with heat recovery is a method of supplying fresh air to a building or room by means of mechanical ventilation.	**Y**	It is important that ventilation systems with heat recovery ensures a plentiful of fresh air enters the building in a controlled manner and that it does not exceed 30m³/hr per person. F7 filters to be installed at the inlet point.
Natural Daylight 	Natural light is light that is generated naturally, the common source of which is the Sun. This is as opposed to artificial light, which is typically produced by electrical appliances such as lamps.	**Y**	To reduce the energy used for artificial lighting, the natural daylight entering occupied spaces will be maximised by optimising window size and orientation. Dimmable lighting with photocells in amenity spaces will sense if the illuminance level of the space has been met and reduce lighting levels as required. North facing windows are particularly effective at providing useful daylight and will be incorporated on the building. The buildings orientation and fenestration strategy will take advantage of passive solar gains and natural daylight to reduce heating energy and the need for artificial lighting.
Solar Shading	Solar shading is a method by which solar radiation in the form of heat and light can be mitigated in a building. While natural heat and light are essential in most buildings and	**N**	Whilst maximising daylight, care must be taken to ensure that direct sunlight does not cause glare in the spaces or cause excessive solar gains in summer which will cause

	modern architecture uses it more and more there are occasions when the levels are too high. This leads to overheating and too much light. Solar shading is a general term for a range of methods used to reduce the amount of solar gain.		spaces to overheat. This is managed by solar shading on affected windows. Some examples of solar shading are canopies, solar control glazing, balconies, internal blinds and curtains which could be adopted on the Proposed Development Solar shading is not proposed on the scheme, however low G-Value glass will help to prevent unwanted solar gain entering the spaces of the Proposed Development
Thermal Mass 	Thermal mass describes a materials capacity to absorb, store and release heat. For example, water and concrete have a high capacity to store heat and are referred to as 'high thermal mass' materials. Insulation foam, by contrast, has very little heat storage capacity and is referred to as having 'low thermal mass'. A common analogy is thermal mass as a kind of thermal battery. Though thermal mass has always been an aspect of buildings, only in recent years has it evolved as a tool to be deployed in the conservation of energy. However thermal mass does not offer a 'one size fits all' concept.	**N**	Thermal mass such as concrete can absorb large amounts of heat energy which prevents spaces from overheating. The thermal mass can be cooled overnight when the space is not occupied to further reduce energy needed for cooling when the space is occupied. The Proposed Development will be of medium lightweight structure.
Low Energy Fit Out 	A low energy fit out is an interior development of a building that is low carbon in its design, operation, and entire lifecycle.	**Y**	All goods and appliances should be highly energy efficient to reduce energy demand.
Sub-metering 	Building submetering is a meter within your building or facility for specific energy measurements.	**Y**	Power, lighting, major plant and separate areas will be individually metered to allow energy consumption to be pinpointed and reviewed if it is excessive. Baselines and targets will also be set to help reduce energy use.
Adaption to climate change 	Average temperatures for central England have risen by approximately 1°C since the 1970s and this has resulted in higher temperatures, changing rain patterns, rising sea levels, in addition to unpredictable extreme weather events such as floods, droughts and freezing winters. Risks of climate change include the increased likelihood of increased external temperatures which could lead to staff illness and therefore lower productivity, damage to equipment due to the high internal building temperatures in addition to increased cooling demand.	**Y**	An uplift in fabric improvements on a development can maximise the retention of heat in winter and reduce heat gains in summer. These improvements will help combat the extremes expected as a result of climate change. G-Values will be carefully selected to maximise natural light and thus reduce reliance on artificial lighting without introducing unwanted thermal gain during the summer months.

7.3. Meeting Demand Efficiently - (Be Clean)

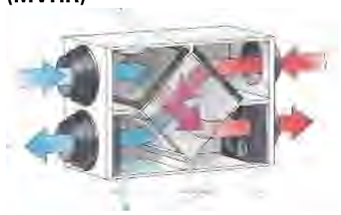
This section looks at technologies that will be used to ensure that energy demand is further reduced and met efficiently:

- Ventilation
- Heat recovery
- Demand Operated Systems
- Variable Speed Drives on fans and pumps
- Power Management
- LED Lighting
- Waste Water Heat Recovery
- BMS

Key:

Y – Yes could be incorporated
P – Possible
N – Not appropriate

7.3.1. Meeting Demand Efficiently

Technology	Description	Suitable For Consideration	Commentary
Mechanical Ventilation Heat Recovery (MVHR) 	MVHR provides fresh filtered air into a building whilst retaining most of the energy that has already been used in heating the building. Heat Recovery Ventilation is the solution to the ventilation needs of energy efficient buildings.	**Y**	Where fresh air is supplied, and stale warm air extracted by mechanical ventilation, heat recovery will be used to recycle a minimum of 85% of the heat from the extracted air to warm the incoming air. The re-use of waste heat in the mechanical ventilation systems provides a significant step towards reducing CO_2 emissions. MVHR units also work to pre-cool warm fresh air during summer months in order to reduce the cooling energy required in air-conditioned spaces. Mechanical Ventilation with Heat Recovery (MVHR) units will be installed within all apartments and communal spaces.
Demand Operated Systems 	The control of the heating, cooling, ventilation, and lighting systems is fundamental to the energy efficiency of buildings. The use of the following measures can reduce energy consumption: Zoned thermostatic control; Time control; Variable flow control; BMS (Building Management System) automated control; Lighting PIR (Passive Infra-Red Sensor) control; Daylight linked lighting control; CO_2 detection; and Energy management control.	**Y**	Where ventilation, heating and cooling is provided to spaces that may not always be in use, occupancy sensors will be used to shut down the systems serving the space and turning them on instantly when they are required. This is fundamental to the energy efficiency of the building. The use of the following measures will be encouraged: Zoned thermostatic control; Time control; Variable flow control; BMS (Building Management System) automated control; Lighting PIR (Passive Infra-Red Sensor) control; Daylight linked lighting control; CO_2 detection; and Energy management control. The use of passive infra-red (PIR) for lighting,heating, ventilation will be adopted where feasible. Typically, this will be in the form of PIR sensors in small spaces and microwave sensors in larger areas.
Variable Speed Drives	Variable speed drives and controls allow an energy system to modulate during periods of low demand. Using variable speed drive pumps therefore uses less energy than traditional pumps, which run at a constant speed.	**Y**	All pumps and fans would be provided with variable speed motors which will speed up and slow down as the demand increases or reduces to conserve energy. These can be used in conjunction with the demand operated systems to reduce the speed of pumps and fan motors to a minimum to conserve energy. Variable speed drives can be adopted on all fan and pump motors where possible to reduce energy consumption.



Power Management 	Power management is a computing device feature that allows users to control the amount of electrical power consumed by an underlying device, with minimal impact on performance. It enables the switching of devices in various power modes, each with different power usage characteristics related to device performance.	**P**	Power factor correction could be used on the electrical supplies of the Proposed Development to improve energy efficiency. Provision including allocation of spare plant space will be made for future introduction of power factor correction into the Proposed Development, this will follow a survey undertaken after 6 months of operation.
LED Lighting 	An LED lamp or LED light bulb is an electric light that produces light using light-emitting diodes. LED lamps are significantly more energy-efficient than equivalent incandescent lamps and can be significantly more efficient than most fluorescent lamps	**Y**	Extensively adopted LED fittings will be used throughout the scheme to limit the energy associated with internal and external lighting. LED lighting will be used throughout the Proposed Development.

7.4. Low Zero Carbon Technologies - (Be Green)

The following Low Zero Carbon (LZC) technologies have been identified and reviewed against their suitability on the Ryebank Chorlton site:

- Solar Water Heating
- Ground Source Heat Pumps
- Water Source Heat Pumps
- District Heating
- Biomass
- Wind Power
- Photovoltaic Electricity Generation
- Combined Heat and Power
- Air Source Heat Pumps
- Battery Storage
- Ambient Loop

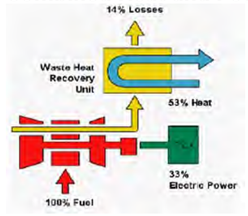
These services are described in more detail below and their suitability discussed.

Key:
Y – Yes could be incorporated
P – Possible
N – Not appropriate

7.4.1. Low Zero Carbon Technologies

Technology	Description	Suitable For Consideration	Commentary
Solar Thermal Water Heating 	Solar thermal water heating systems use heat from the sun to pre-heat domestic hot water. Solar thermal water heating systems are generally composed of solar thermal collectors and a fluid system to move the heat from the collector to a storage tank to store the heat for subsequent use. The system requires solar panels on the roof, ideally south facing, linked to hot water storage cylinders.	**N**	The available roof area, pitch and orientation is critical. The solar energy collection and pipework distribution strategy would centre on collecting and storing thermal energy in cylinders or tanks in plant rooms. Solar thermal alone will not meet the scheme's targets and would require large roof areas to make any meaningful contribution to the energy strategy. The roof space would be better utilised for PV panels and plant equipment as such there would be limited space to utilise this technology therefore not considered for the Proposed Development
Ground Source Heat Pumps 	Ground Source Heat Pumps (GSHP) can be used to extract heat from the ground by circulating a fluid through a system of pipes buried underground to a heat exchanger which transfers the energy to the distribution network. This can provide space heating and/or domestic hot water. Ground source heat pumps have the advantage that they can act as a source of both heating and cooling for the buildings. Ground source heat pumps are either open-loop (abstracting and rejecting water to the aquifer below the site) or closed-loop using boreholes and energy piles.	**N**	Low grade heat is generated with the efficiency of the system dependant on low distribution temperatures. The average Co-efficient of Performance (CoP) will be circa 4-6, meaning that for every unit of electricity used to pump the heat, 4-6 units of heat will be produced. The extensive underground boreholes and pipework will be difficult to install due to availability of land therefore this technology can be discounted for the Proposed Development

Water Source Heat Pumps 	Water Source Heat Pumps (WSHP) work in a similar way to GSHP, with the exception that the pipes are submerged into a river, stream, lake or the sea. The fluid is pumped through the system and absorbs energy from the surrounding water. WSHP can be either an open-loop or closed-loop system.	**N**	No suitable water courses nearby with enough volume therefore water source heat pumps are discounted.
District Heating 	Energy sources include heat from CHP and to a lesser extent, geothermal. Manchester City Council has a district heating scheme with the possibility of connection, however the feasibility and viability of connection to the district heating mains is related to both the proximity of the network and the forecasted annual heat demand.	**N**	Lower carbon emission factors than traditional fuel sources. Potentially able to achieve renewable targets without other technologies. The Manchester district heating mains are not in close proximity to the site, alternative methods of space heating and hot water generation are considered for the Proposed Development and therefore this technology is discounted. Please see Section 8 of this report for further details.
Biomass 	Biomass heating systems burn biomass material in a biomass boiler to heat water in the same way that gas boilers burn gas. Biomass materials include all land and water-based vegetation, e.g. wood chips, wood pellets, wood waste and fast growing coppice trees such as willow. The carbon dioxide emitted from burning biomass is balanced by that absorbed during the fuel's production. Biomass heating therefore approaches a low carbon process. Biomass boilers require fuel storage for the fuel source.	**N**	Could be adopted to offset heating and hot water however high NO_X levels would be a concern in an urban environment. Sourcing of materials and transporting large volumes of fuel to site would also be prohibitive due to the location of the site. The biomass boilers and their associated wood store that would be required to serve the Proposed Developments energy demands would be too large to be considered viable. Maintenance requirements and reliability would also be a cause for concern. Not considered for the Proposed Development.
Wind Power 	Wind power is one of the cleanest and safest methods of generating electricity. Wind turbines use the wind's forces to turn a rotor which in turn generates electricity. Wind power is used in large scale wind farms for national electrical grids as well as in small individual turbines or building integrated turbine.	**N**	As the UK is one of the windiest countries in Europe, wind power is one of the best sources of renewable energy – dependent upon location. There will be relatively low daytime electricity demand for the building and therefore battery storage will need to be incorporated to store the generated electricity for the peak morning and evenings. Wind power is unfeasible due to the fact the Proposed Development is in an urban area and local wind conditions may not be sufficient to provide enough power.
Photovoltaic Electricity Generation 	Photovoltaic (PV) modules are devices or banks of devices that use the photovoltaic effect to generate electricity directly from sunlight. PV can be included on the roof or incorporated into curtain walling systems and louvred external shading devices. Typically, photovoltaics would be installed on a south facing roof.	**Y**	A PV array system with battery storage will be provided to serve the development. Relatively high anticipated daytime electricity demand for the Proposed Development. Therefore, no potential issues with utilisation, i.e. availability will match demand. The PV panels are used to generate electricity reducing CO2 emissions.

Combined Heat and Power (CHP) 	A CHP unit provides heating as well as electrical power. The electricity generated by the CHP plant can be distributed around a development and into the electrical network if needed. The use of this co-generation improves the overall efficiency of the primary energy delivered to the site with a corresponding reduction in the development's CO_2 emissions. The amount of thermal energy provided by the CHP unit will be dependent on the calculated thermal base load for the buildings.	**N**	Relatively low cost of CHP unit if integrated into a gas boiler and domestic water cylinder strategy. High maintenance costs result in marginal returns on small to medium sized installations. Not considered as is not compatible with future de-carbonisation of the grid and reduction of use of fossil fuels.
Air Source Heat Pumps (ASHP) 	Air Source Heat Pumps work in a similar way to GSHPs but extract thermal energy from the surrounding air and transfer it into water. Air source heat pumps can be fitted on the façade or on the roof, but care should be taken when mounting the units to avoid any acoustic problems associated with operating the fans as the outdoor units typically operate with sound levels in the range 55 - 60dB(A). The efficiency of ASHP is measured by Coefficient of Performance (CoP); this is the ratio of units of heat output for each unit of electricity used to drive the system. Average CoP is around 2.5-4 although some systems may have a greater rate of efficiency.	**Y**	The ASHP system offers an attractive solution in terms of the de-carbonisation of the grid and the omission of natural gas to the site. The average CoP of air source heat pumps is around 2.5-4 although some systems may produce a greater rate of efficiency. This means that for every kW of electric power the heat pumps use, 2.5-4 kW of heat energy is generated, this results in reduced carbon emissions and operational energy. Following the appraisal of the Proposed Development and site, Air Source Heat Pumps (ASHP) have been selected as the preferred low carbon technology and will be used to generate heating & hot water.

8. PROPOSALS

8.1. Residential

Energy modelling for the residential development has been carried out to assess the RIBA Stage 2 planning design against Approved Document Part L Volume 1, 2021.

8.1.1. Passive Measures (Be Lean)

Designing the residential apartments with U-values and Air Permeability that are lower than the minimum Building Regulations values from the outset is essential to reducing the energy consumption and therefore CO_2 emissions of the Proposed Development as less energy will be required for the space heating and space cooling requirements.

The team have maximised passive design measures by adopting the following measures:

BUILDING FABRIC ELEMENT	LIMITING U-VALUE (W/M2K)	PASSIVHAUS TARGET U-VALUE (W/M2K)	% BETTERMENT
Walls	0.26	0.11	57%
Floors	0.18	0.15	17%
Roof (flat)	0.16	0.15	7%
Windows	1.6	0.8	43%

AIR PERMEABILITY	TARGET AIR PERMEABILITY
at 50 Pa	0.6ach

For a typical house the Passivhaus standard is approximately 15 times more onerous than UK Building Regulations.

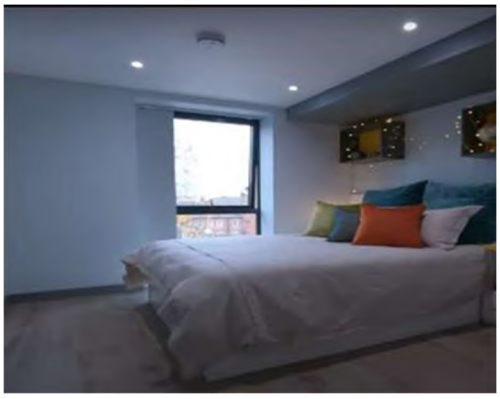
For the proposed residential houses, apartments etc, U-values and Air Permeability that comply with the minimum Passivhaus requirements will be used, essential to the development using less energy to maintain comfortable conditions. Glazing with a G-value of 0.4 has been used to limit the amount of unwanted solar gain to avoid habitable rooms from overheating.

Adopting passive design measures will allow the proposed development to maximise natural sources of cooling and controlled ventilation to allow the heating systems to perform more efficiently.

8.1.2. Energy Efficiency Measures (Be Mean)

The next stage of the design development was to establish energy efficiency measures to meet the demand of the Proposed Development.

High efficiency fans with low specific fan powers (SFP's) will be selected to reduce the energy consumption of the ventilation systems.

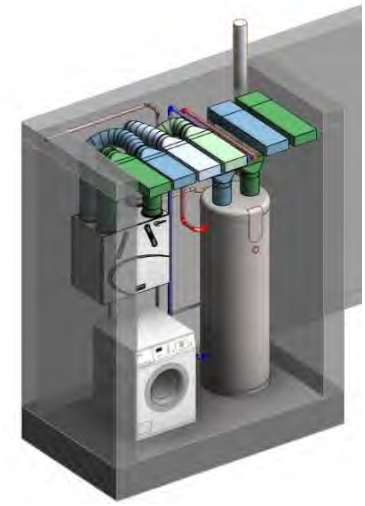


High efficiency LED will be installed throughout the development. Lights within communal areas will be coupled with daylight dimming and absence / presence detection, where appropriate, to reduce the energy consumption and CO_2 emissions associated with lighting. Absence/ presence detection will not be installed within the individual apartments.

Variable speed controls will be installed to mechanical plant equipment throughout the development to reduce the regulated energy demand. The mechanical systems shall also be controlled via a Building Management System.

8.1.2.1. Mechanical Ventilation with Heat Recovery

Mechanical Ventilation with heat recovery (MVHR) is a mechanical system that ensures there is minimal heat loss when ventilating a room.



Typical Apartment MVHR configuration

MVHR units are proposed for all apartments, these units will provide fresh air and heat recovery to the individual bedrooms, bathrooms, living/kitchens and residential amenity spaces.

The units work by extracting the stale air inside the building and feeding it through filters whilst also extracting the heat energy so that it's not exhausted to the outside but transferred back into the building with the filtered incoming air.

The main components of an Mechanical Ventilation Heat Recovery (MVHR) unit is a heat recovery cell where the indoor heat is extracted and supplied into the outside air coming into the building; fans which pull in and blow out the air; and filters for filtering outside air from dust and particles inside the unit, protecting longevity and efficiency.

In addition to this, the MVHR units will come with a summer bypass which rejects the heat instead of recovering it, thus warming up the air even more. This will be used to avoid summertime overheating as during the warmer months of the year, heat recovery will not be required in the habitable spaces.

This reduces any required cooling load which can significantly reduce the CO_2 emissions of the Proposed Development and will also assist in providing comfortable living conditions.

Benefits of mechanical ventilation with heat recovery include, filtered air, minimal heat losses, mitigates overheating, and retains heat that would usually be exhausted to the outside environment.

8.1.3. Renewable and Low Carbon Technologies (Be Green)

The final aspect of the design been to establish what renewable and low carbon technologies can be adopted within the residential apartments.

Following the appraisal of the proposed development and site, Air Source Heat Pumps (ASHPs) will be used to generate heating and cooling (if necessary).

Each house will have a localised Air Source Heat Pump hot water cylinder which will provide the apartments hot water needs.

The average co-efficient of performance (CoP) of Air Source Heat Pumps are typically 2.5-4, although greater efficiency units are available. The CoP means that for every 1kW of electrical power the heat pumps use, 2.5-4kW of heat energy is generated, reducing the carbon emissions and operational energy.



Typical ASHP Cylinder in Utility Cupboard

For the flats, we are proposing to use direct electric heating and hot water storage via a cylinder and heat battery. This is to avoid the requirement for large equipment and long pipework runs which lead to increased internal heat gains. Operationally this is less efficient than ASHP's however it is less complex and easier to maintain.

9. PREDICTED CARBON EMISSIONS AND OPERATIONAL ENERGY SAVINGS

The following SAP results relate to a RIBA Stage 2 design and will be subject to a design development at the next stages. The SAP results are shown in Appendix 1. The BRUKL results are shown in Appendix 2.

9.1. Residential (SAP Results)

In summary, the building emission rate is lower than the target emissions rate and the building primary energy rate is lower than the target primary energy rate. The dwelling fabric efficiency rate is also lower than the target fabric energy efficiency rate.

A sample number of apartment types have been assessed to provide an indication of the emission rate, the energy rate and the fabric energy efficiency.

Apartment 1B 2P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	14.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.6	
Target primary energy rate (DPER), $kgCO_2/m^2$	77.74	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	16.29	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	41.5	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.9	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 3P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.91	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.5	
Target primary energy rate (DPER), $kgCO_2/m^2$	67.61	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	15.2	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.9	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.2	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

Apartment 2B 4P

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	12.11	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	1.19	
Target primary energy rate (DPER), $kgCO_2/m^2$	63.27	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	11.95	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	39.3	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.5	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 5

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.6
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.28

Target primary energy rate (DPER), $kgCO_2/m^2$	49.87	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-19.31	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	30.8	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	26.0	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6A

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	10.77	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.01	
Target primary energy rate (DPER), $kgCO_2/m^2$	56.15	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.52	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.6	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.8	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 6B

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.43	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-6.03	
Target primary energy rate (DPER), $kgCO_2/m^2$	48.95	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-18.69	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	31.1	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	25.4	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

House Type 7

Target dwelling CO_2 emission rate (TER), $kgCO_2/m^2$.	9.86	
Dwelling CO_2 emission rate (DER), $kgCO_2/m^2$	-3.81	
Target primary energy rate (DPER), $kgCO_2/m^2$	51.46	
Dwelling primary energy rate (TPER), $kgCO_2/m^2$.	-9.67	
Target Fabric Energy Efficiency (TFEE) $kgCO_2/m^2$	37.7	
Dwelling Fabric Energy Efficiency (DFEE) $kgCO_2/m^2$	27.1	
Do the buildings emission and primary energy rates exceed the targets?	PASS	PASS

9.2. Co-Housing Amenity (BRUKL Results)

Target CO_2 emission rate (TER), $kgCO_2/m^2$. annum	3.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	2.23	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	42.41	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	24.28	
Do the buildings emission and primary energy rates exceed the targets?	BER = < TER	BPER = < TPER

10. CONCLUSION

This report has set out the methodology in which the design team have approached the design of the proposed Ryebank Chorlton development and how the strategies of Manchester City Council and the Government guidelines have been adopted. As the current proposals all pass Approved Building Regulations Part L 2021, they will more than exceed the MCC Core Strategy of passing Part L 2013 by 15%.

Our strategy has sought to reduce the carbon emissions for the building using a Lean, Mean & Green approach and these findings have been applied to the Proposed Development.

The Proposed Development has been designed in line with Passivhaus Standards with U-values and air permeability that are lower than the minimum Building Regulations values which is essential in reducing the initial demand for energy and associated CO_2 emissions of the building from the outset using passive measures. This will result in less energy required to maintain comfortable conditions inside the building as well as the building performing better as an insulator. Adopting this approach will also allow the Proposed Development to maximise the use of natural sources of cooling and ventilation which will assist in maintaining comfortable conditions within the internal spaces and will also allow the heating and cooling system to perform more efficiently.

Energy efficiency measures have then been evaluated to assess which measures suit the Proposed Development best. High efficiency LED lighting will be used throughout coupled with demand operated lighting where appropriate in the form of daylight diming, & absence/presence detection, this will reduce energy consumption and CO_2 emissions associated with lighting within the Proposed Development.

MVHR units will be proposed as the strategy for ventilation within the residential apartments.

Mechanical Ventilation with Heat Recovery (MVHR) units will provide fresh air and heat recovery to the individual bedrooms of the development as well as the amenity spaces. Heat Recovery reduces the required cooling & heating load which will in turn reduce CO_2 emissions that the development produces. Alongside this, the proposed ventilation units come with a summer bypass which allows them to bypass the heat exchanger during warmer months, helping maintain thermal comfort.

Various renewable and low zero carbon technologies have been assessed and this report has established the that are best technologies adopted to the Proposed Development are:

- Air Source Heat Pump (ASHP) Hot Water cylinders to the houses of the Proposed Development.
- Roof mounted PV's with battery storage

These systems were chosen to align with the government's policy on the phasing out of fossil fuels and the subsequent decarbonisation of the National Grid. The proposals presented also support the governments and local authorities' policy on phasing out fossil fuels and as the grid decarbonises will offer further carbon reductions.

In conclusion, this report demonstrates that the proposed development accords with the relevant polices (set out previously within this report). Therefore, it is considered that the proposed development is in accordance with national and local policy, and so energy should not be a material consideration that prevents the grant of planning permission.

11. APPENDIX 1- RESIDENTIAL (SAP RESULTS)

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Ariny SAP 10 program, Ariny

Date: Tue,21 May 2024 13:59:00

Assessed By:	Samuel Carr	Building Type:	Flat, End-terrace
OCDEA Registration:	EES0021597	Assessment Date:	2024-11-21

Assessment Type:	As designed	Total Floor Area:	50 m²
Site Reference:	TBAP	Plot Reference:	SF-32P
Address:	1d3P Fyebank Road, Chalfont		

Name:	Ridge
Company:	Ridge
Address:	Wore, England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

Fuel for main heating system:	Electricity	
Target carbon dioxide emission rate	14.77 kgCO2/m²	
Dwelling carbon dioxide emission rate	1.26 kgCO2/m²	Pass
Target primary energy	77.41 kWh/m²/yr	
Dwelling primary energy	16.29 kWh/m²/yr	Pass
Target fabric energy efficiency	41.5 kWh/m²	
Dwelling fabric energy efficiency	26.9 kWh/m²	Pass

Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External wall	0.26	0.15	Walls (1) (0.15)	Pass
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	0.7	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.15	0.1	Roof (1) (0.11)	Pass
Windows, doors, and roof windows	1.6	0.8	N Window (0.8)	Pass
Rooflights	2.2	N/A	N/A	N/A

Name	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	53.3482	0.15
Party wall: Party Wall (1)	21	0 (1)
Exposed roof: Roof (1)	54.8	0.11

Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
N Window, PH Windows	0.952	North	0.7	0.8 (1)
N Window, PH Windows	2.1584	North	0.7	0.8 (1)
N Door, PH Windows	2.19	North	0.7	0.8 (1)
S Door, PH Windows	2.2567	South	0.7	0.8 (1)
S Windows, PH Windows	0.9465	South	0.7	0.8 (1)
S Windows, PH Windows	2.3598	South	0.7	0.8 (1)

Building part 1 • **Main Dwelling**: Thermal bridging calculated from user's thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable competence	0.023 (1)	

Building Regulations England Part L (BREL) Compliance Report

Approved Document L (2021 Edition, England) assessed by Army SAP 10 program: Army

Date: Thu 21 Nov 2024 14:49:03

Assessed By:	Samuel Carr	Building Type:	Flat, Maisonette
OCDEA Registration:	EES/031537	Assessment Date:	2024-11-21

Assessment Type:	As designed	Total Floor Area:	62 m²
Site Reference:	GF 2B3P	Plot Reference:	GF 2B3P
Address:	182F Riverbank Road, Charlton		

Name:	Ridge
Company:	Ridge
Address:	West England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

Fuel for main heating system:	Electricity	
Target carbon dioxide emission rate:	12.97 kgCO2/m²	
Dwelling carbon dioxide emission rate:	15 kgCO2/m²	Fail
Target primary energy and target energy rating		
Target primary energy:	62.67 kWh/m²/yr	
Dwelling primary energy:	153.2 kWh/m²/yr	Fail
Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency:	37.9 kWh/m²/yr	
Dwelling fabric energy efficiency:	37.2 kWh/m²/yr	Pass

Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.25	0.15	Walls (1) (0.15)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floor	0.18	0.11	Ground Floor (0.11)	OK
Roofs	0.15	N/A	N/A	N/A
Windows, doors and roof windows	1.5	0.8	S Door (0.8)	OK
Rooflights	2.2	N/A	N/A	N/A

Name	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	39.5075	0.15
Party wall: Party Wall (1)	42	0 (1)
Ground floor: Ground Floor: Ground Floor	61.5	0.11

Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
S Door: PH Windows	2.2176	South	0.7	0.8 (1)
S Windows: PH Windows	0.4871	South	0.7	0.8 (1)
E Windows: PH Windows	2.41	South	0.7	0.8 (1)
N Windows: PH Windows	2.13	North	0.7	0.8 (1)
N Windows: PH Windows	2.13	North	0.7	0.8 (1)
N Windows: PH Windows	3.9078	North	0.7	0.8 (1)

Building part 1 - **Main Dwelling**. Thermal bridging calculated from linear thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.023 (1)	

Building Regulations England Part L (BREL) Compliance Report

Worksheet Document: L1 2021 Edition England assessed by Ready SAP 10 (beta) - Army

Date: Thu 21 Nov 2024 13:58:51

Property Information:			
Assessed By:	Samuel Carr	Building Type:	Flat, End-terrace
DCDBS Registration:	EES/031507	Assessment Date:	2024-11-21

Dwelling Details:			
Assessment Type:	As designed	Total Floor Area:	77 m²
Site Reference:	FF 2S4P	Plot Reference:	FF 2S4P
Address:	2S4P Rivebank Road, Chorlton		

Client Details:	
Name:	Ridge
Company:	Ridge
Address:	Work, England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a TER and DER for this dwelling, in kgCO2/m² per year	
Fuel for main heating system:	Electricity
Target carbon dioxide emission rate:	12.71 kgCO2/m²
Dwelling carbon dioxide emission rate:	11.83 kgCO2/m²
1b TFEE and DFEE for this dwelling, in kWh/m² per year	
Target primary energy:	63.22 kWh/m²
Dwelling primary energy:	11.30 kWh/m²
2a TFEE and DFEE for this dwelling, in kWh/m² per year	
Target space heating efficiency:	29.2 kWh/m²
Dwelling space energy efficiency:	23.5 kWh/m²

2b Fabric Features				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls:	0.26	0.15	Walls (1) (0.15)	Pass
Party walls:	0.2	0	Party Wall (1) (0)	N/A
Curtain walls:	1.6	0	N/A	N/A
Floors:	0.18	N/A	N/A	N/A
Roofs:	0.16	N/A	N/A	N/A
Windows, doors and roof windows:	1.6	0.6	S Windows (0.6)	Pass
Rooflights:	2.2	N/A	N/A	N/A

2c Party Wall Construction (Type) and Area of Contact (m²)		
Name	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	90.389	0.15
Party wall: Party Wall (1)	21	0 (1)

2d Openings (Doors, Windows, Roof Windows and Roof Lights)				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
S Windows, PH Windows	0.4371	South	0.7	0.8 (1)
S Doors, PH Windows	2.4126	South	0.7	0.8 (1)
W Windows, PH Windows	3.5456	West	0.7	0.8 (1)
W Windows, PH Windows	1.5042	West	0.7	0.8 (1)
N Windows, PH Windows	2.4966	North	0.7	0.8 (1)
N Windows, PH Windows	2.4966	North	0.7	0.8 (1)
N Windows, PH Windows	3.3639	North	0.7	0.8 (1)

2e Thermal Bridging (Junction Details)				
Building part 1 - **Main Dwelling**: Thermal bridging calculated from user's individual repeating thermal bridges at each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.023 (1)	

Building Regulations England Part L (BREL) Compliance Report

Approved Document L | 2021 Dwelling England | assessed by Alray SAP 10 program, Alray

Date: Thu 21 Nov 2024 14:02:

Assessed By:	Samuel Carr	Building Type:	House, Mid-terrace
CCDEA Scheme ID:	EES/07153	Assessment Date:	2024-11-21

Assessment Type:	As designed	Total Floor Area:	92 m²
Site Reference:	House Type 5	Plot Reference:	House Type 5
Address:	House Type 5 Rivebank Road, Cheshire		

Name:	Riego
Company:	Riego
Address:	West England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

Fuel for main heating system:	Electricity	
Target carbon dioxide emission rate:	9.6 kgCO2/m²	
Dwelling carbon dioxide emission rate:	6.29 kgCO2/m²	Pass
Target primary energy:	30.3 kWh/m²/yr	
Dwelling primary energy:	19.38 kWh/m²/yr	Pass
Target fabric energy efficiency:	35.3 kWh/m²	
Dwelling fabric energy efficiency:	26.0 kWh/m²	Pass

Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls:	0.26	0.11	Walls (1) (0.11)	Pass
Party walls:	0.2	0	Party Wall (1) (0	N/A
Curtain walls:	1.6	0	N/A	N/A
Floors:	0.18	0.11	Ground Floor (0.11)	Pass
Roofs:	0.16	0.11	Roof (1) (0.11)	Pass
Windows, doors, rooflights, glazed walls:	1.6	0.85	N Front Door (1)	Pass
Pavilions:	2.2	N/A	N/A	N/A

Name	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	13.8676	0.11 (1)
Exposed wall: Walls (2)	28.4008	0.11 (1)
Party wall: Party Wall (1)	49.83	0 (1)
Party wall: Party Wall (2)	51.51	0 (1)
Ground floor: Ground Floor, Ground Floor	45.84	0.11
Exposed roof: Roof (1)	45.84	0.11

Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
N Front Door: Solid Door	2.1917	North	N/A	1 (1)
N GF Windows: PH Glazing	1.2581	North	0.7	0.8 (1)
N GF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
S Patio Door: PH Glazing	2.0952	South	0.7	0.8 (1)
S (Rear) GF windows: PH Glazing	3.7116	South	0.7	0.8 (1)
S (Rear) FF Windows: PH Glazing	1.3923	South	0.7	0.8 (1)
S (Rear) FF Windows: PH Glazing	1.3923	South	0.7	0.8 (1)

Building Regulations England Part L (BREL) Compliance Report

Approved Document L | 2021 Edition, England (residential) | Area: SAP Worksheet, Area

Date: Thu 21 Nov 2024 11:01:02

Project Information:			
Assessed By:	Samuel Carr	Building Type:	House, End-terrace
DCBEA Registration:	[illegible]0315[illegible]	Assessment Date:	2024-11-21

Dwelling Details:			
Assessment Type:	As designed	Total Floor Area:	95m²
Site Reference:	House Type 6A	Plot Reference:	House Type 6A
Address:	House Type 6A Rivelon Road, Chorlton		

Client Details:	
Name:	Ridge
Company:	Ridge
Address:	Wet, England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate	
Fuel for main heating system:	Electricity
Target carbon dioxide emission rate:	19.[illegible] kgCO2/m²
Dwelling carbon dioxide emission rate:	6.11 kgCO2/m² [illegible]
1b Target primary energy rate and dwelling primary energy	
Target primary energy:	36.15 kWh[illegible]/m²
Dwelling primary energy:	13.52 kWh[illegible]/m² [illegible]
2a Target fabric energy efficiency (TFEE) and dwelling fabric energy efficiency (DFEE)	
Target fabric energy efficiency:	37.9 kWh/m²
Dwelling fabric energy efficiency:	35.8 kWh/m² [illegible]

2b Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External wall:	0.26	0.11	Walls (1) (0.11)	[illegible]
Party wall:	0.2	0	Party Wall (1) (0)	N/A
Curtain walls:	1.6	0	N/A	N/A
Floor:	0.18	0.11	Ground Floor (0.11)	[illegible]
Roofs:	0.16	0.11	Roof (1) (0.11)	[illegible]
Windows, doors and roof windows:	1.6	0.82	(1) Front) GF Door (1)	[illegible]
Rooflights:	2.2	N/A	N/A	N/A

2b Fabric U-values (opaque elements)		
Name:	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	47.1908	0.11 (1)
Exposed wall: Walls (2)	25.9847	0.11 (1)
Party wall: Party Wall (1)	24.96	0 (1)
Party wall: Party Wall (2)	25.76	0 (1)
Ground floor: Ground Floor: Ground Floor	47.68	0.11
Exposed roof: Roof (1)	47.68	0.11

2c Openings (windows, doors, roof windows and rooflights)				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
N (Front) GF Door: Solid Door	2.1917	North	N/A	[illegible] (1)
N GF Windows: PH Glazing	1.2565	North	0.7	0.8 (1)
N GF Windows: PH Glazing	2.0688	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
E (Side) GF Windows: PH Glazing	1.9685	East	0.7	0.8 (1)
E (Side) GF Windows: PH Glazing	1.9685	East	0.7	0.8 (1)
S (Rear) Patio Door: PH Glazing	3.0932	South	0.7	0.8 (1)
S GF Windows: PH Glazing	3.689	South	0.7	0.8 (1)
S FF Windows: PH Glazing	1.3053	South	0.7	0.8 (1)
S FF Windows: PH Glazing	1.3923	South	0.7	0.8 (1)

[illegible] | [illegible]

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Ariesy SAP 10 program, Ariesy

Date: Thu 21 Nov 2024 11:01:35

Project Information:			
Assessed By:	Samuel Carr	Building Type:	House: Mid-terrace
OCDEA Registration:	ESS-031507	Assessment Date:	2024-11-21

Dwelling Details:			
Assessment Type:	As designed	Total Floor Area:	90 m²
Site Reference:	House Type 6B	Plot Reference:	House Type 6B
Address:	House Type 6B, Ryecairn Road, Cramond		

Client Details:	
Name:	Ridge
Company:	Ridge
Address:	Wark, England, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

Fuel for main heating system:	Electricity
Target carbon dioxide emission rate:	9.43 kgCO2/m²
Dwelling carbon dioxide emission rate:	6.88 kgCO2/m²
Target primary energy:	49.95 kWh/m²/yr
Dwelling primary energy:	18.69 kWh/m²/yr
Target fabric energy efficiency:	31.9 kWh/m²
Dwelling fabric energy efficiency:	25.3 kWh/m²

Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External wall:	0.26	0.11	Wall (1) (0.11)	OK
Party wall:	0.2	0	Party Wall (1) (0)	N/A
Curtain wall:	1.5	0	N/A	N/A
Floor:	0.18	0.11	Ground Floor (0.11)	OK
Roofs:	0.16	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows:	1.6	0.6	N (Front)GF Door (0.6)	OK
Rooflights:	2.2	n/a	N/A	N/A

Name:	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	67.9485	0.11 (1)
Exposed wall: Walls (2)	21.4388	0.11 (1)
Party wall: Party Wall (1)	48.38	0 (1)
Party wall: Party Wall (2)	51.51	0 (1)
Ground floor: Ground Floor, Ground Floor	42.59	0.11
Exposed roof: Roof (1)	47.68	0.11

Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
N (Front)GF Door, PH Glazing	2.191	North	0.7	0.6 (1)
N GF Windows, PH Glazing	1.2158	North	0.7	0.6 (1)
N GF Windows, PH Glazing	2.0856	North	0.7	0.6 (1)
N FF Windows, PH Glazing	1.3923	North	0.7	0.6 (1)
N FF Windows, PH Glazing	1.3923	North	0.7	0.6 (1)
S (Rear) GF Patio Door, PH Glazing	2.191	South	0.7	0.6 (1)
S GF Windows, PH Glazing	0.8673	South	0.7	0.6 (1)
S FF Windows, PH Glazing	1.3923	South	0.7	0.6 (1)
S FF Windows, PH Glazing	1.3923	South	0.7	0.6 (1)

Building Regulations England Part L (BREL) Compliance Report

Approved Document L (2021 Edition, England) assessed by Ariny SAP 10 program: Ariny

Date: Thu 21 Nov 2024 14:02:03

Project information:			
Assessed By:	Samuel Carr	Building Type:	House, End-terrace
DCDEA Registration:	EBS031697	Assessment Date:	2024-11-21

Dwelling Details:			
Assessment Type:	As designed	Total Floor Area:	134 m²
Site Reference:	House Type 7	Plot Reference:	House Type 7
Address:	House Type 7 Tivesark Road, Chesson		

Client Details:	
Name:	Redo
Company:	Redo
Address:	Work, Ennsand, England

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emissions and dwelling emission rate	
Fuel for main heating system:	Electricity
Target carbon dioxide emission rate:	9.86 kgCO2/m²
Dwelling carbon dioxide emission rate:	9.81 kgCO2/m²
2a Target primary energy and dwelling primary energy	
Target primary energy:	51.45 kWh/m²/yr
Dwelling primary energy:	48.67 kWh/m²/yr
2b Target fabric energy efficiency and dwelling fabric energy efficiency	
Target fabric energy efficiency:	37.7 kWh/m²/yr
Dwelling fabric energy efficiency:	27.1 kWh/m²/yr

3 Fabric U-values				
Element	Maximum permitted average U-value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.11	Walls (1) (0.11)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.11	Ground Floor (0.11)	OK
Roofs	0.16	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	1.6	0.83	N (Front) GF Door (1)	OK
Rooflights	2.7	N/A	N/A	N/A

3 Envelope elements (roof, floor, walls) and openings (doors, windows, rooflights)		
Name	Net area [m²]	U-Value [W/m²K]
Exposed wall: Walls (1)	48.3708	0.11 (1)
Exposed wall: Walls (2)	25.4219	0.11 (1)
Exposed wall: Walls (3)	51.3048	0.11 (1)
Party wall: Party Wall (1)	34.89	0 (1)
Party wall: Party Wall (2)	29.76	0 (1)
Ground floor: Ground Floor: Ground Floor	50.24	0.11
Exposed roof: Roof (1)	13.8	0.11
Exposed roof: Roof (2)	36.33	0.11

3 Openings (doors, windows, roof windows and rooflights)				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m²K]
N (Front) GF Door: Solid Door	2.223	North	N/A	1 (1)
N GF Windows: PH Glazing	1.2644	North	0.7	0.8 (1)
N GF Windows: PH Glazing	2.0625	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.3923	North	0.7	0.8 (1)
N FF Windows: PH Glazing	1.392	North	0.7	0.8 (1)
N 3F Windows: PH Glazing	1.0552	North	0.7	0.8 (1)
W (Side) GF Door: Solid Door	2.2134	West	N/A	1 (1)
W GF Windows: PH Glazing	1.9474	West	0.7	0.8 (1)
W GF Windows: PH Glazing	1.9474	West	0.7	0.8 (1)

12. APPENDIX 2- CO-HOUSING AMENITY (BRUKL RESULTS)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Co-Housing Apartment Block - Amenity Areas — As designed

Date: Thu Nov 21 14:06:17 2024

Administrative information

Building Details

Address: Address | City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.35

BRUKL compliance module version: v6.1.r7

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 76.56

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), kgCO$_2$/m²annum	3.97	
Building CO_2 emission rate (BER), kgCO$_2$/m²annum	2.29	
Target primary energy rate (TPER), kWh$_{PE}$/m²annum	42.91	
Building primary energy rate (BPER), kWh$_{PE}$/m²annum	24.89	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U_{value}	U_{max}	U_{min}	First surface with maximum value
Walls	0.26	0.35	0.15	SP000006:Surf[1]
Floors	0.18	0.25	0.13	SP000006:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	2.0	0.8	SP000007:Surf[2]
Rooflights***	2.2	-	-	No rooflights in building
Personnel doors	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	-

Page 1 of 8

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	178.8	178.8
External area [m²]	329.1	329.1
Weather	MAN	MAN
Infiltration [m³/hm²@ 50Pa]	1	3
Average conductance [W/K]	76.7	115.65
Average U-value [W/m²K]	0.23	0.35
Alpha value* [%]	25.3	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
6	Hotels
46	Residential Spaces
47	Non-residential Institutions: Community/Day Centre

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	2.69	7.92
Cooling	2.93	1.01
Auxiliary	4.37	7.11
Lighting	4.95	4.6
Hot water	3.39	7.81
Equipment*	24.07	24.07
TOTAL**	**18.32**	**28.44**

* Energy used by equipment does not affect regulated CO2 emissions for notional building
** Total to be net of any electrical energy displaced by CHP generators, if applicable

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	1.83	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*1.83*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	87.8	96.08
Primary energy [kWh_{PE}/m^2]	24.28	42.41
Total emissions [kg/m²]	2.23	3.97



RIDGE

www.ridge.co.uk

APPENDIX C: PASSIVHAUS VERIFICATION REPORT

Passivhaus Verification

LETI Operational and Embodied Carbon

Concept Stage

Summary Report



Report prepared by: Jeremy Poulter RIBA
Passivhaus Designer
PHPP Expert

Checked: Sara Darwin ARB
Passivhaus Designer

Date Dec 2024

Ref: 22-109-2.4-O&EC Summary

Revision /

Ryebank Fields — Chorlton

phi Low Carbon

Introduction

This report outlines the methodology we have used to assess the proposals for Ryebank Fields against Passivhaus criteria as well as calculate the Concept Stage Operational and Embodied Carbon emissions. These are then benchmarked against LETI targets.

We have modelled 6 block types which represent the typical proposed building types across the site including.

- Age friendly apartments– southern block. (20 dwellings)
- Age friendly apartments—northern block (22 dwellings)
- Southern Terrace Terrace. HT1A&B (10 dwellings)
- A semi-detached villa HT (2 dwellings)
- A northern terrace HT4 (7 dwellings)
- Co-housing apartments (12 dwellings)

A summary sheet of each block type is provided in Appendix B.

Methodology

Using Design PH, a plugin to Sketchup we have created a 3D model of each block type and the surroundings. This model establishes the building orientation, area of thermal envelope, window openings and shading from surrounding buildings, landscape and trees, both in winter and summer.

This data is then exported into the Passivhaus Planning Package (PHPP) for the detailed calculation of the energy performance.

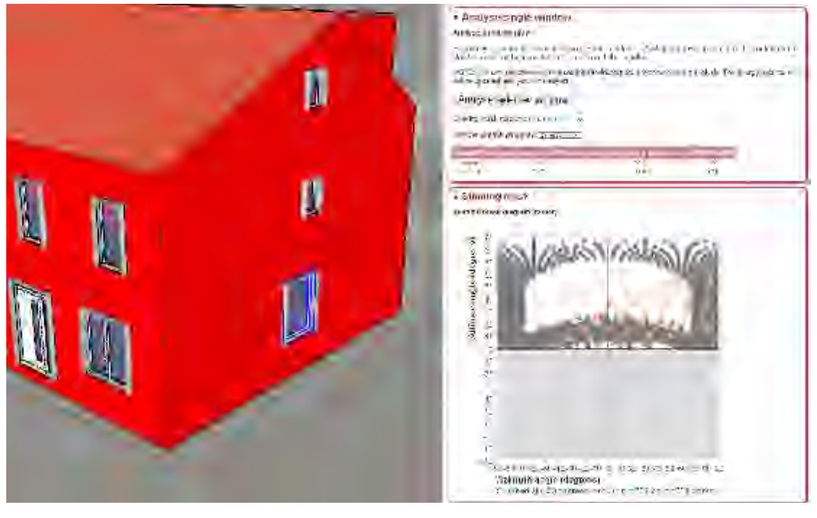
Winter



Summer



Shading of windows



PHPP Analysis

Within the PHPP we add data for each block, including the U values of the external fabric, performance of windows, MVHR system, heating, hot water and ancillary electrics as well as the area and performance of the Photovoltaics.

All of the 6 block types are meeting the Passivhaus performance requirements at this stage which are.

- An annual space heating demand <=15KWh/m² annum

Or

- A peak heating load <= 10W/m²

And

- Overheating < 10% annum
- A Primary Energy Renewable (PER) <=60KWh/m² annum.

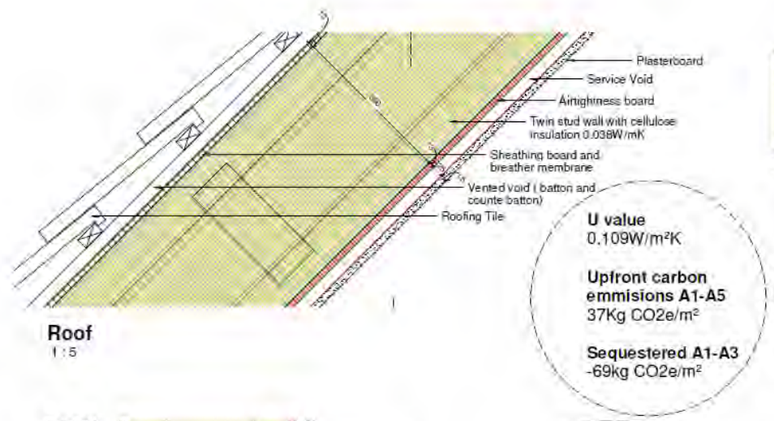
The Passivhaus criteria for Space Heating Demand is in line with the guidance in Places for Everyone for flats and an improvement on the target for houses.

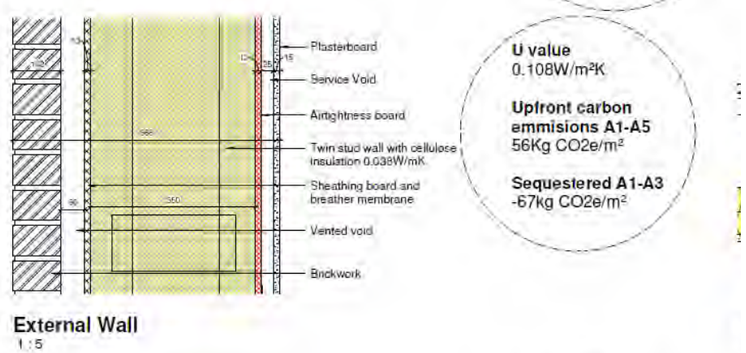
	Space Heat Demand	Hot Water Energy Demand	Renewable Energy Generation
2025 - onwards	Houses (20kWh/m2) Flats (15kWh/m2)	20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 40% ground floorspace
Proposed scheme Houses Flats	15kWh/m2/a 15kWh/m2/a	Reduce demand by - Low flow showers - Waster water recycling	Roof PVs are maximised Roof PVs provide approx 70% of EUI

Places for Everyone—Metrics for Domestic Buildings

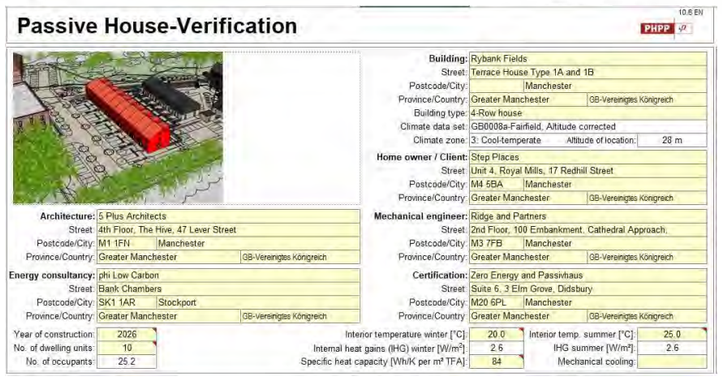


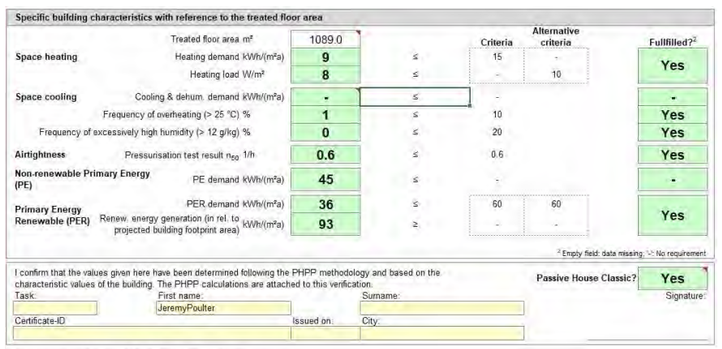
Fabric build ups





Verification





Ryebank Fields — Chorlton

phi Low Carbon

Summer strategy

Summer overheating is a key consideration within the PHPP which considers the risk of overheaing to the whole block. It is our view that the frequency of overheating should be brought down to at least 2% within the PHPP calculations to allow for extraordinary situations.

The PHPP includes a stress test to these extraordinary situations which includes reduced window ventilation, removal of any temporary shading, increased occupancy or increased external temperatures.

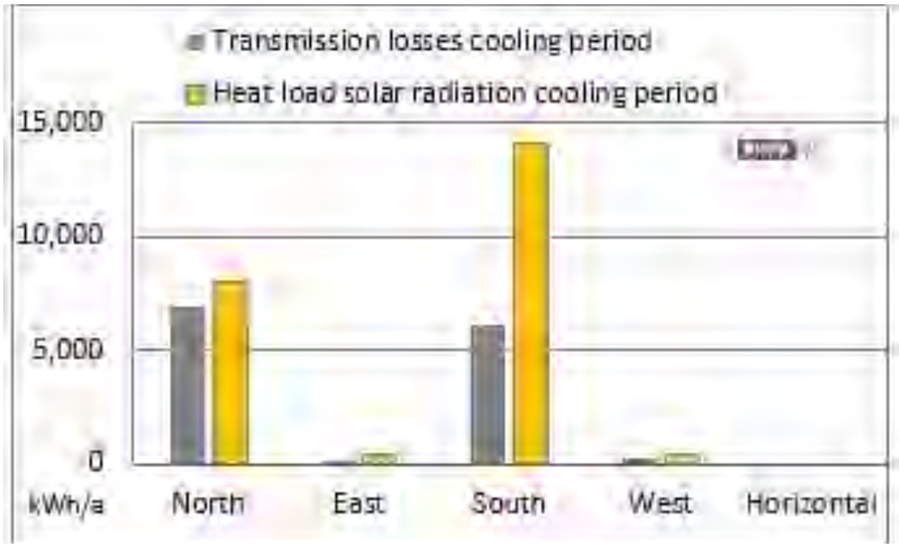
Our baseline summer strategy assumes that for reasons of security, windows cannot be opened during daytime hours and that as with TM59 guidance, internal blinds cannot be relied upon to be drawn during the daytime.

It is however assumed that overnight a small amount of natural ventilation can be provided through windows on tilt only. For the apartment blocks, opening the ground floor windows at night might not be possible, due to security, therefore a strategy for secure opening vents should be incorporated.

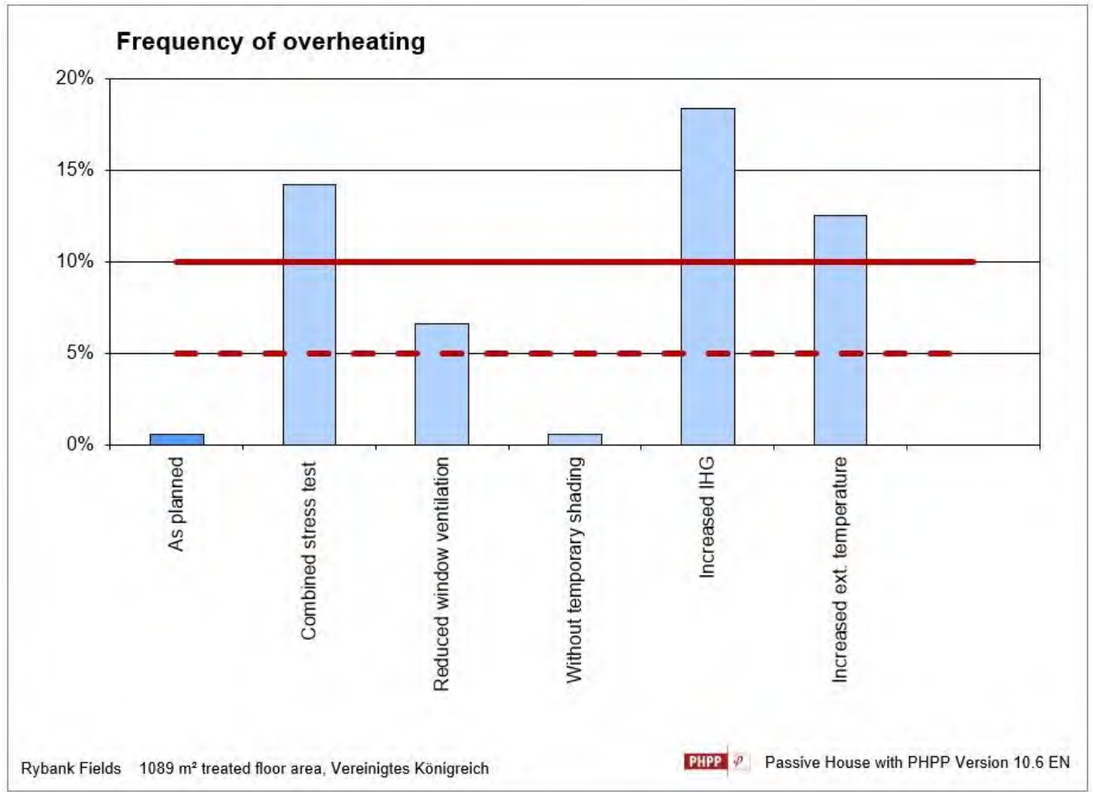
The MHVR system operates at its normal rate during the day but is boosted overnight to increase the air change rate and benefit from the cooler nighttime temperatures.

As the PHPP calculations are an analysis of the whole block, individual rooms or houses may be susceptible to overheating due to their orientation and shading and these will need more specific dynamic modelling.

Summer solar gains and heat losses through windows.



Summer stress test



Benchmarking— LETI Operational Energy

The PHPP also generates information on the overall energy use or Energy Use Intensity (EUI) of the block, based on occupancy. This includes

- Household electricity
- Domestic hot water generation
- Space Heating
- Cooling and dehumidification

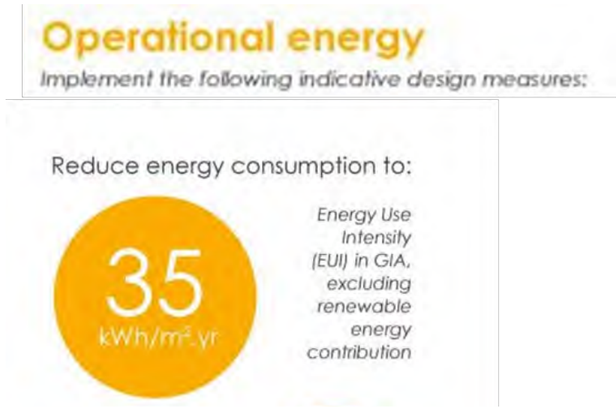
This total figure can then be benchmarked against the LETI Operational Energy EUI target of 35KWh/m² annum.

At this concept stage we have added a 15% contingency to the total figures in accordance with RICS Whole Life Carbon assessment procedures.

For the houses, where an Air Source Heat Pump is proposed for both the heating and hot water we are coming in under the target.

For flats where, for simplicity and maintenance, we are using a direct electric heating and hot water, the figures are coming out above the target.

However, sitewide, these two strategies are balancing each other out. A sitewide summary is provided in Appendix A , whilst a summary sheet for each of the block types is provided in Appendix B





Ryebank Fields — Chorlton

phi Low Carbon

Benchmarking— LETI Renewables

The PHPP also includes a Photovoltaic systems sheet which calculates the estimated annual yield based upon the orientation and performance of the panels and any shading.

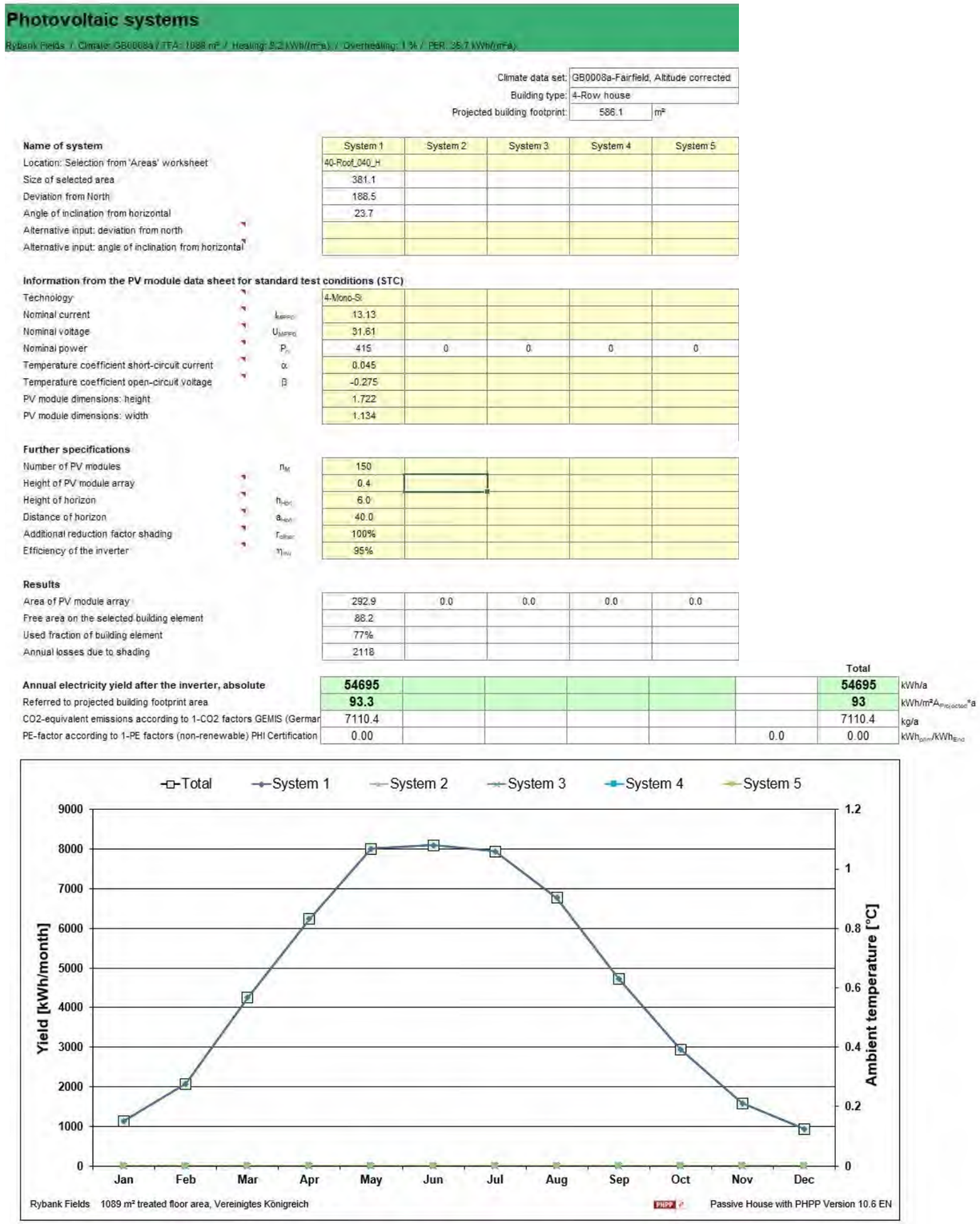
LETI guidance advices that 100% of the energy demand for houses should be matched by the PV yield. For flats the guidance recommends that 70% of the roof area is covered with PV.

On this project there are certain house types where there is not the space for PV panels on the roof, such as the Villas, where the annual yield is relatively low. However other types, such as the terraces with their south facing roofs achieve a higher yield than 100% balancing this out.

Demand Response.

The dwellings will include smart metering and battery storage to make full use of variable rate tariffs and draw electricity when it is at its cheapest and lowest carbon.

In the flats, the use of either a direct electric cylinder or heat battery will allow occupants to heat and store their hot water when electricity is at its cheapest.



Photovoltaic systems

Rybank Fields / Climate: GB0008a / TFA: 1088 m² / Heating: 5.2 kWh/(m²a) / Overheating: 1 % / PER: 35.7 kWh/(m²a)

Climate data set: GB0008a-Fairfield, Altitude corrected
Building type: 4-Row house
Projected building footprint: 586.1 m²

		System 1	System 2	System 3	System 4	System 5
Name of system						
Location: Selection from 'Areas' worksheet		40-Roof_040_H				
Size of selected area		381.1				
Deviation from North		188.5				
Angle of inclination from horizontal		23.7				
Alternative input: deviation from north						
Alternative input: angle of inclination from horizontal						
Information from the PV module data sheet for standard test conditions (STC)						
Technology		4-Mono-Si				
Nominal current	$I_{MPP,0}$	13.13				
Nominal voltage	$U_{MPP,0}$	31.61				
Nominal power	P_{n}	415	0	0	0	0
Temperature coefficient short-circuit current	α	0.045				
Temperature coefficient open-circuit voltage	β	-0.275				
PV module dimensions: height		1.722				
PV module dimensions: width		1.134				
Further specifications						
Number of PV modules	n_{M}	150				
Height of PV module array		0.4				
Height of horizon	h_{Hor}	6.0				
Distance of horizon	d_{Hor}	40.0				
Additional reduction factor shading	$r_{diffuse}$	100%				
Efficiency of the inverter	η_{inv}	95%				
Results						
Area of PV module array		292.9	0.0	0.0	0.0	0.0
Free area on the selected building element		88.2				
Used fraction of building element		77%				
Annual losses due to shading		2118				

							Total	
Annual electricity yield after the inverter, absolute	**54695**						**54695**	kWh/a
Referred to projected building footprint area	**93.3**						**93**	kWh/m²$A_{Proj(ground)}$*a
CO2-equivalent emissions according to 1-CO2 factors GEMIS (Germar	7110.4						7110.4	kg/a
PE-factor according to 1-PE factors (non-renewable) PHI Certification	0.00					0.0	0.00	kWh_{prim}/kWh_{End}

Ryebank Fields — Chorlton

phi Low Carbon

Benchmarking— LETI Embodied Carbon

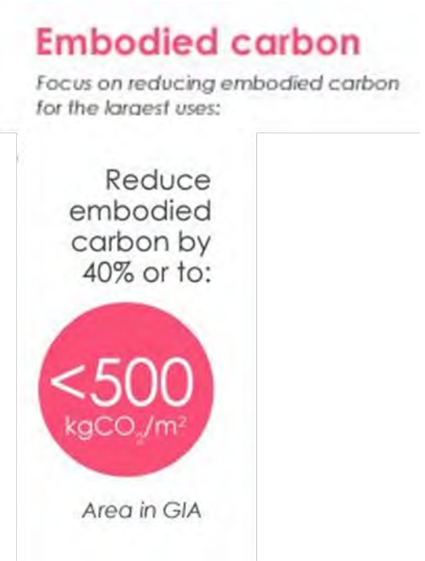
The embodied carbon of the development is the sum of the carbon emitted in the manufacture of the construction materials, their transport to site, their erection and ultimately their demolition. The recognised method of calculating Embodied Carbon is using the RICS Whole Life Carbon Assessment version 2 which became effective in July 2024.

The LETI Climate Emergency Design Guide sets targets using this methodology for both the upfront embodied carbon (A1-3) and Cradle to Grave embodied carbon (A1-5, B1-5, C1- C4) and uses an A**-G rating scale. As a benchmark a B rating is considered good practice whilst A** represents best practice. An F/G rating represents the current average design.

We have used PHRibbon, a plug in to PHPP to carry out Concept Stage Embodied Carbon assessments on the key building types following the RICS methodology. This concept stage assumes a 15% contingency and the results are generally showing that the proposals are falling within a B rating.

This primarily is achieved through the use of a timber framed superstructure for all of the buildings using bio based cellulose insulation. The other key driver is the compact form factor of all the buildings, which means that more floor area is provided for less external fabric.

A sitewide summary is provided in Appendix A , whilst a summary sheet for each of the block types is provided in Appendix B





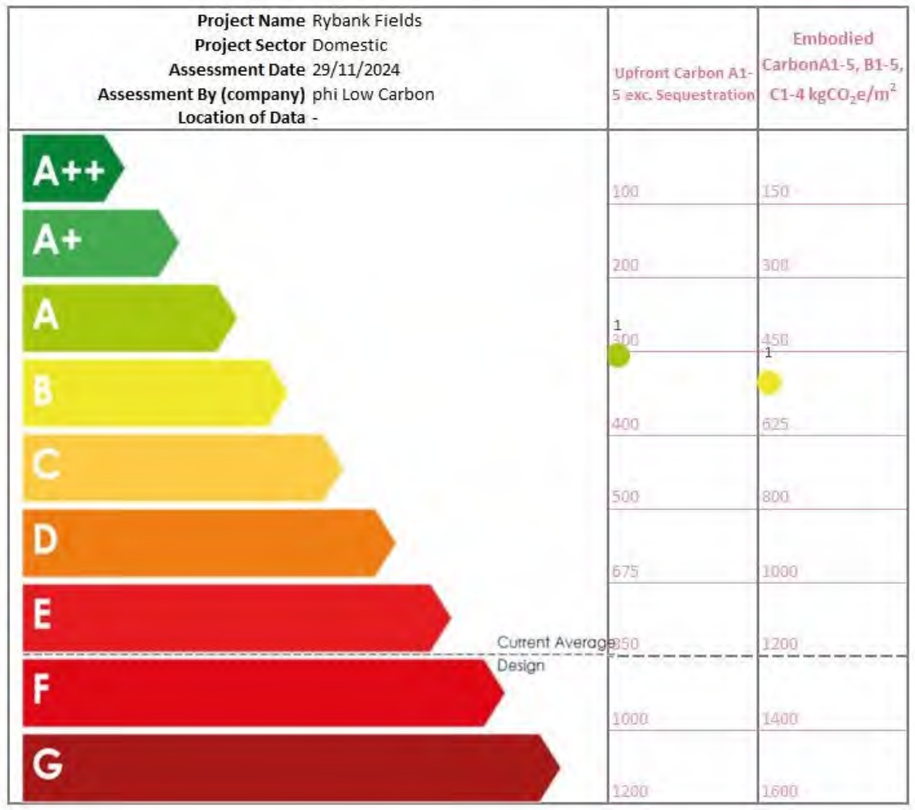
Assumptions

This is a Cradle to Grave calcuation (stages A-C) for RIBA/RIAI and LETI targets. Data is also laid out in the RICS layout, though RICS requires a lot more, for example site based emissions, estimation of plug loads (if not already in PHPP), and Module D. It follows the RICS professional statement edition 2 version3, Aug 2024 for concept design stage though is not an official RICS calculation. It is based on the external dimensions in PHPP which overestimates quantities slightly.

A0 Non material - not calculated but could be added, not needed for RIBA or LETI
A1-A3 Sequestration is only included if 100% FSC/PEFC, or it uses a proportion pro-rata
A1-A3 Manufac emissions from raw material extraction, transport and processing, these can be per m3, m2, m or kg
A4 Transport to site includes the 43% empty running factor for the return journey, except for in-situ concrete where the empty running factor is 100% (always empty)
A5.1 Preconstruction demolition is a fixed amount per m2 GIA
A5.2 Construction is calculated for totals only
A5.3 Construction waste is a fixed percentage for each material type, most are specified by RICv2

B1.1 Use, data taken from EPD if given, but factored to the RSP 60yrs, this includes carbonation by concrete during the RSP (not the life of the concrete which is much longer, 150yrs)
B1.2 Refrigerants, data taken from EPD if given, factored up to the whole RSP
B2-3 Repair, data taken from EPD if given, factored up to the whole RSP
B4 Replacement, repeats module A and C for the number of replacements
B5 Refurb, optional figures to be manually adjusted, life of product becomes the refurb interval and B4 emissions become B5.
B6.1-6.3 Operational Energy Use only the emissions in PHPP are included, the rest, e.g. plug loads could be added but are not automatically included in PHPP, so would require extra assumptions.
B7.1-7.3 Water cells are provided for you to enter the use in the Embod tab, though carbon figures are not required for RIBA or LETI.
B8.1-8.2 User Activities not reported here yet

C1 Demolition calculation based on GIA and user selection of business as usual (BAU), Good Practice or Best Practice
C2 Transport, includes empty running factor for return journey. Reuse is included only if the reuse is expected to be offsite
C3 Waste Processing, uses the RICSv2 reuse/recycling rates and user selection of business as usual (BAU), Good Practice or Best Practice. Includes incineration only if an R1 facility
C4 Waste Disposal, uses the RICSv2 landfill rates and user selection of business as usual (BAU), Good Practice or Best Practice. Includes incineration local sites not R1 facilities
D1 Potential Benefits / D2 Exported Benefits - not calculated but could be added, not needed for RIBA or LETI



Ryebank Fields — Chorlton

phi Low Carbon

Exclusions— LETI Embodied Carbon

Some key points about the scope of the calculations. Based on LETI guidance the calculations exclude.

Renewables.

This is because PV panels have a high embodied carbon which would skew the results, whilst not capturing the benefits they provide from the displacement of carbon that would be required to generate energy from the grid. This is a key difference between LETI and RIBA 2030 Climate Challenge figures.

Non fixed FFE

To avoid any difficulty comparing buildings that are fitted out with those that aren't, most often developer dwellings, this element is excluded.

External Works

Both within and outside the site boundary. This is primarily to allow buildings to be compared against each other, without any confusion over the extent of the surroundings that should, or should not be included.

At this stage we have not included calculations for these elements but that is not to say that these elements cannot be calculated and reported separately.

Calculation Scope Summary

Date of assessment: 29/11/2024 — Year of project completion: 2026
Carried out by: phi Low Carbon
Project type: New build
Assessment objective: Brief assessment purpose statement
Project location: Rybank Fields
Property type: Domestic
Building description: 2 and a half storey terrace of 10 houses

Size: TFA 1089 m^2 GI 1222 m^2 for scenario 1

Reference Study Period: 60 years
Assessment scope: Cradle to Grave as in RICSv2
Assessment stage: Concept stage (Design stage would require uncertainty factors not yet implemented)
Data sources: PHribbon: PHPP for external dimensions of thermal elements
Specific EPD certificates, (possibly also some ICE Database 2019

Building elements coverage — RIBA and LETI say 95% of the cost should be included

# Building parts	Building elements	Tonnes CO2	% incl	Clarification if needed
0 Facilitating works	0.1 Temporary/Enabling works/Preliminaries	0	100%	
1 Substructure	1.1 Substructure	90	100%	
2 Superstructure	2.1 Frame	41	100%	
	2.2 Upper floors incl. balconies	41	100%	
	2.3 Roof	41	100%	
	2.4 Stairs and ramps	41	100%	
	2.5 External Walls	140	100%	
	2.6 Windows and External Doors	140	100%	
	2.7 Internal Walls and Partitions	30	100%	
	2.8 Internal Doors	30	100%	
3 Finishes	3.1 Wall finishes	13	100%	
	3.2 Floor finishes	13	100%	
	3.3 Ceiling finishes	13	100%	
4 Fittings, furnishings and	Fixed (Building-related)	2	100%	
	Non Fixed (Non Building-related), excluded by LETI	0	100%	
5 Building Services/MEP	5.1 Public Health	20	100%	
	5.2 Heating, Ventilation and Cooling (HVAC) & Refrigerant	121	100%	
	5.3 Electrical installations	33	100%	
	5.4 On site renewable energy generation	348	100%	
	5.5 Systems including life safety, fuel installations, lift and convey	0	100%	
6 Prefab Buildings/Units	6.1 Prefabricated Buildings and Building Units	0	100%	
7 Existing Building	7.1 Minor Demolition and Alteration Works	0	100%	
8 External works	Within site boundary	0		
	Outisde the site boundary	0		

RIBA/RIAI CHALLENGE includes
LETI includes

Appendix A

Ryebank Fields Sitewide Operational and Embodied Carbon Calculation

Block	no of dwellings	GIA (m^2)	Operational EUI (KWh/m^2annum)	Operational Total EUI (KWh annum)	Embodied A1-A5 kgCO2e/m^2	Embodied A1-A5 Total tonnesCO2e	Embodied A1-A5 B1-B5 C kgCO2e/m^2	Embodied A1-A5 B1-B5 C Total tonnes CO2e	Sequestered kgCO2e/m^2	Sequestered Total tonnes CO2e	Module D kgCO2e/m^2	Module D Total tonnes CO2e	Renewables Generated KWh/annum	Renewables %EUI
Z2 Block 1 South - Age Friendly	20	1297	54	70038	370	480	533	691	-302	-392	0	0	38993	56%
Z2 Block 1 North - Age Friendly	22	1420	51	72420	310	440	447	635	-220	-312	0	0	37816	52%
Z2 Block 4 HT1A&B Terrace	10	1222	31	37882	298	364	518	633	-157	-192	-5	-6	54695	144%
Z1 Block 6 HT 2A&B Villas 1	2	340	28	9520	316	107	502	171	-150	-51	0	0	5179	54%
Z1 Block 6 HT 2A&B Villas 2	2	340	28	9520	316	107	502	171	-150	-51	0	0	5179	54%
Z1 Block 6 HT 2A&B Villas 3	2	340	28	9520	316	107	502	171	-150	-51	0	0	5179	54%
Z1 Block 6 HT 2A&B Villas 4	2	340	28	9520	316	107	502	171	-150	-51	0	0	5179	54%
Z1 Block 6 HT 2A&B Villas 5	2	340	28	9520	316	107	502	171	-150	-51	0	0	5179	54%
Z1 Block 7 HT4 A&B Terrace 1	7	887	35	31045	309	274	421	373	-174	-154	-2	-2	33386	108%
Z1 Block 7 HT4 A&B Terrace 2	7	887	35	31045	309	274	421	373	-174	-154	-2	-2	33386	108%
Z1 Block 8 HT4 A&B Terrace 1	7	887	35	31045	309	274	421	373	-174	-154	-2	-2	33386	108%
Z1 Block 9 HT4 A&B Terrace 2	7	887	35	31045	309	274	421	373	-174	-154	-2	-2	33386	108%
Z1 Block 8 HT4 A&B Terrace 1	4	507	35	17745	309	157	421	213	-174	-88	-2	-1	19077	108%
Z2 Co housing apartments	12	1059	54	57186	422	447	559	592	-279	-295	0	0	48718	85%
Z2 Co housing Terrace	6	420	31	13020	298	125	518	218	-157	-66	-5	-2		0%
Autism Friedly (Not yet modelled)	8													
Total	**120**	**11173**		**440071**		**3646**		**5329**		**-2218**		**-16.32**	**358738**	

Sitewide average per m^2	Operational EUI	Embodied A1-A5	Embodied A1-A5 B1-B5 C1-C4	Sequestered	Module D	Renewables Generated
	39 KWh/m^2annum	326 kgCO2e/m^2	477 kgCO2e/m^2	-199 kgCO2e/m^2	-1.5 kgCO2e/m^2	%EUI 82%
	minus 15% / plus 15%	minus 15% / plus 15%	minus 15% / plus 15%	minus 15% / plus 15%	minus 15% / plus 15%	minus 15% / plus 15%
Range	34 / 45	284 / 375	415 / 549	-173 / -228	-1 / -2	71% / 94%

NOTE: Text in Purple are the blocks that have been modelled. All other blocks are estimates based upon similar block types.

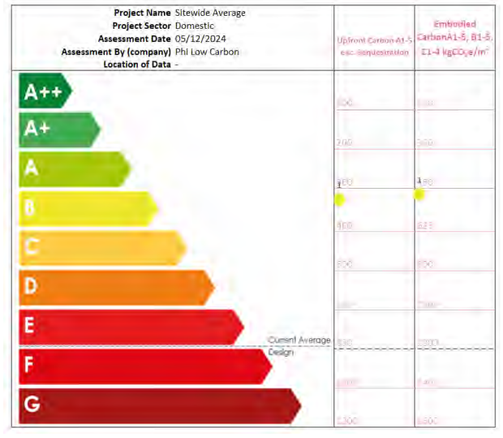
Operational Energy

These figures include a 15% contingency as this is a Concept Stage assessment. Whilst the houses are below the target, the flats are above it. However, these 2 average out across the scheme.

Whilst the sitewide average is above the 35KWh/m² EUI LETI target is within range and given that the proposals are to be certified as Passivhaus, we would expect the actual operational energy performance to be close to the designed target with no performance gap. With the contingency this is likely an overestimate of performance. .

Embodied Carbon

The proposals average below the 500KgCO2e/m² LETI Target and this includes the 15% contingency required at Concept Stage. Overall, this makes the proposals a solid B rating on LETI Embodied Carbon Graph.



Ryebank Fields — Chorlton

phi Low Carbon

Appendix B

Block Operational and Embodied Carbon Summary Sheets

Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Age Friendly Apartments
No of Dwellings	22 apartments
Orientation of Principal (street)Elevation	196 (South~)
Treated Floor Area m² (TFA)	1133m2
Form Factor	1.83
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	8
Heat Load <=10W/m²	7
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	7% (without window vent)
PER <=75 KWh/m²y	71
Space Heating method	Electric
Hot Water method	Electric cykinder or heat battery

Further overheating analysis is required to check the apartments on the upper floors on the south and west elevations for Part O compliance on a room by room basis.

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

No window opening during daytime hours for security reasons whilst people are likely to be away from home.

Overnight ventilation via tilted windows to the upper floor apartments only. 0.1ach window ventilation assumed. NOTE, Ground floor flats to be considered with SBD

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 190mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork	0.15
Roof **Terrace**	12.5mm plasterboard; posi joists, WBP decking on firrings, vcl, 190mm PIR insulation, roofing membrane As above	0.11
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Passivhaus certified otherwise efficiency is penalised	

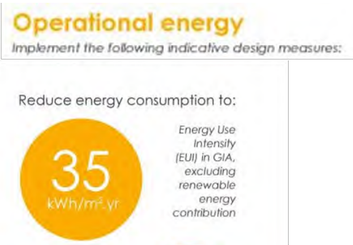
Performance against LETI	
GIA m²	1420

Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	51	43.3—58.7

Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	310	263.5 - 356.5
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	447	380 - 514
Sequestered Carbon kgCO2/m²	-220	187-253
Module D kgCO2/m²	0	

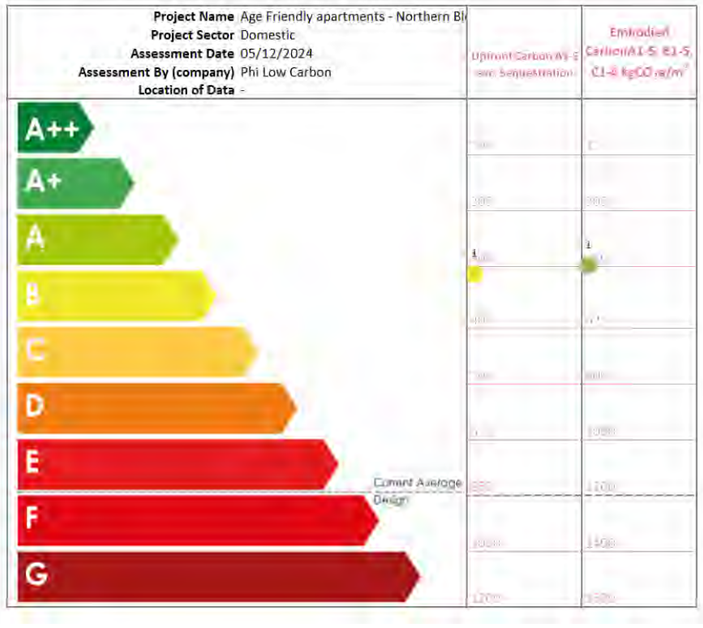
Renewable Energy Generation		**Range –15%/+15%**
KWh/annumn	37816	32143.6—43488
%of EUI	52%	





LETI Embodied Carbon Rating

LETI Results graphic. Coloured dots labelled 1-12 are the results for scenarios 1-12.



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Age Friendly South
No of Dwellings	20 apartments
Orientation of Principal (street)Elevation	9 (North elevation)
Treated Floor Area m² (TFA)	1051.7m2
Form Factor	1.8
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	10
Heat Load <=10W/m²	8
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	7% (without window vent)
PER <=75 KWh/m²y	69
Space Heating method	Electric
Hot Water method	Electric cylinder or heat battery

Further overheating analysis is required to check the apartments on the second floor on the south and west elevations for Part O compliance on a room by room basis.

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

No window opening during daytime hours for security reasons whilst people are likely to be away from home.

Overnight ventilation via tilted windows to the first floor bedrooms only. Closed bedroom doors mean no significant through ventilation. 0.1ach achieved for the whole house. NOTE, These dwellings are away from a main road where noise

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 190mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork	0.15
Roof	12.5mm plasterboard; posi joists, WBP decking on firrings, vcl, 190mm PIR insulation, roofing membrane	0.11
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Passivhaus certified otherwise efficiency is penalised	

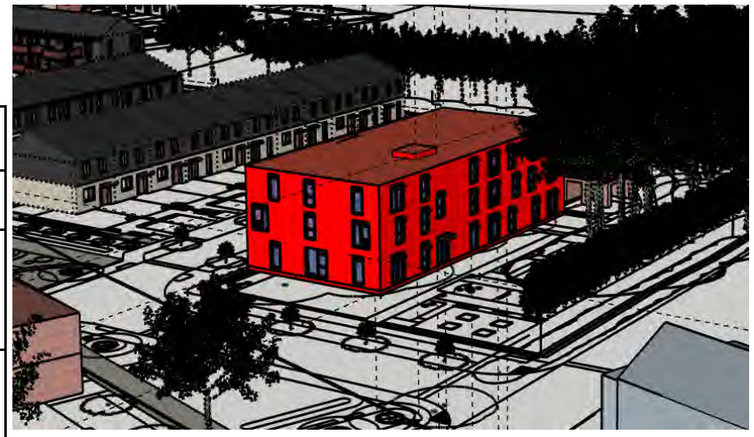
Performance against LETI	
GIA m²	1297

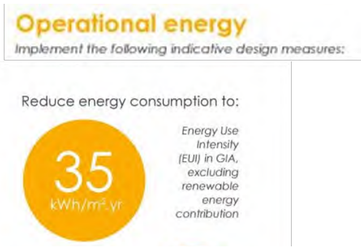
Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	54	43.35—58.65

Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	370	314.5-425.5
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	533	453-613
Sequestered Carbon kgCO2/m²	-302	256.7- 347.3
Module D kgCO2/m²	0	

Renewable Energy Generation		**Range –15%/+15%**
KWh/annumn	38993	33144—44842
%of EUI	56%	

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.





LETI Embodied Carbon Rating



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Co Housing Apartments
No of Dwellings	12
Orientation of Principal (street)Elevation	North and East
Treated Floor Area m² (TFA)	914
Form Factor	2.34
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	16
Heat Load <=10W/m²	10
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	0
PER <=67 KWh/m²y	67
Space Heating method	Electric Panel Heaters
Hot Water method	Electric cylinders

Further overheating analysis is required to check the apartments on the east facing elevations for Part O compliance , particularly the ground floor where opening windows overnight may not be an option.

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

No window opening during daytime hours for security reasons whilst people are likely to be away from home.

Overnight ventilation via tilted windows to the first floor bedrooms only. Closed bedroom doors mean no significant through ventilation. 0.1ach achieved for the whole house. NOTE, These dwellings are away from a main road where noise could be an issue.

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 200mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork or board cladding	0.11
Roof	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, vented void , ply with metal roofing	0.11
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Pas-sivhaus certified otherwise efficiency is penalised	

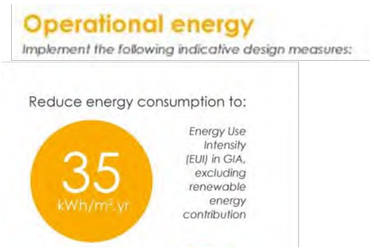
Performance against LETI	
GIA m²	1059

Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	52	45 / 60

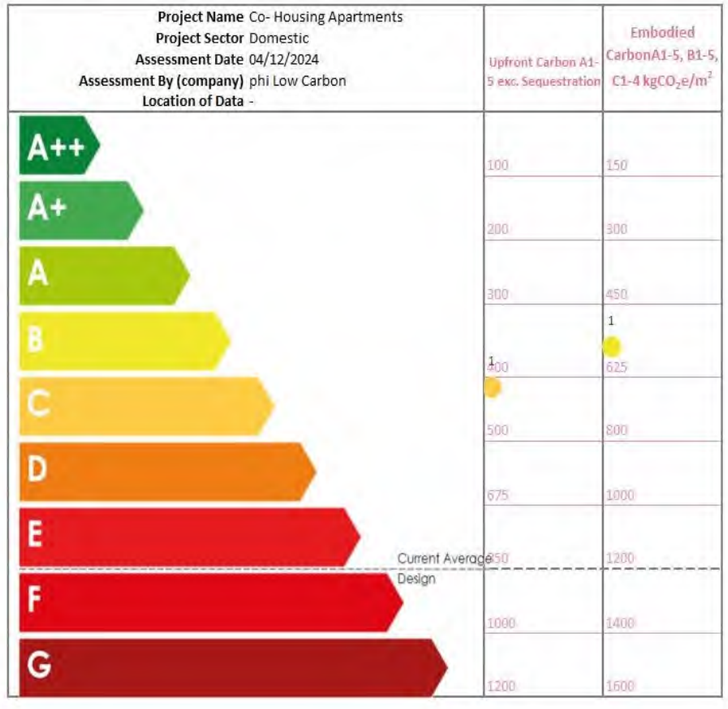
Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	422	367 / 485
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	559	486 / 643
Sequestered Carbon kgCO2/m²	-279	-243 /- 320
Module D kgCO2/m²	0	0

Renewable Energy Generation		**Range –15%+15%**
KWh/annumn	48718	42363 / 56026
%of EUI	88%	77% / 101%





LETI Embodied Carbon Rating



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Terrace Block 7 HT4B
No of Dwellings	7
Orientation of Principal (street)Elevation	West
Treated Floor Area m² (TFA)	796.6
Form Factor	2.23
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	10
Heat Load <=10W/m²	8
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	15% (no window vent)
PER <=60 KWh/m²y	41
Space Heating method	Air Source Heat Pump
Hot Water method	Air Source Heat Pump and Cylinder

Further overheating analysis is required to check the apartments on the second floor on the south and west elevations for Part O compliance on a room by room basis.

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

No window opening during daytime hours for security reasons whilst people are likely to be away from home.

Overnight ventilation via tilted windows to the first floor bedrooms only. Closed bedroom doors mean no significant through ventilation. 0.1ach achieved for the whole house. NOTE, These dwellings are away from a main road where noise

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 200mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork	0.11
Roof	12.5mm plasterboard; posi joists, WBP decking on firrings, vcl, 190mm PIR insulation, roofing membrane	0.11
Terrace	12.5mm plasterboard, Psi joists, OSB deck, VCL, insulation and membrane	0.1
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Passivhaus certified otherwise efficiency is penalised	

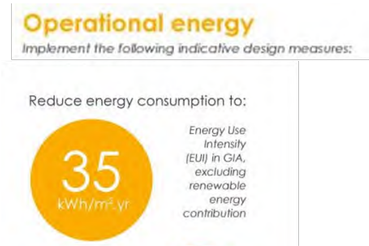
Performance against LETI	
GIA m²	887.3

Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	35	30/ 40

Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	309	263/355
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	421	358 / 484
Sequestered Carbon kgCO2/m²	-174	-148 /- 200
Module D kgCO2/m²	-2	- 1.7 / -2.3

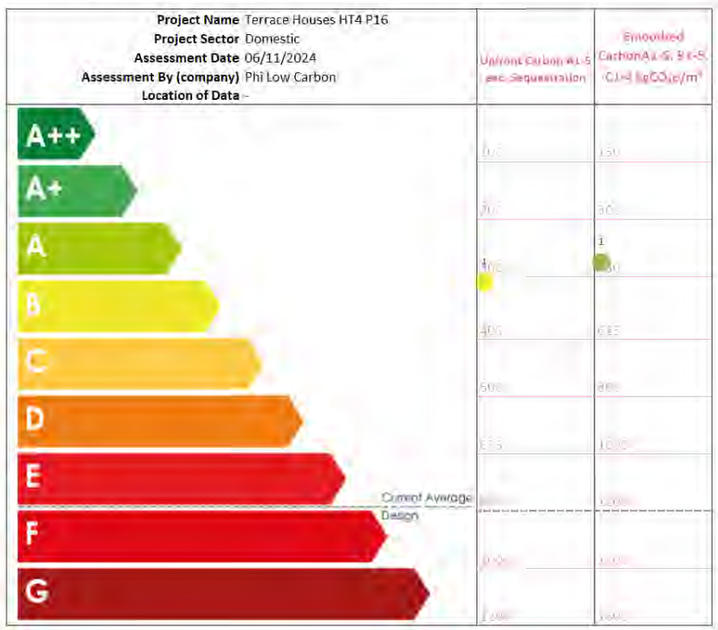
Renewable Energy Generation		**Range –15%/+15%**
KWh/annumn	31056	26397 / 35714
%of EUI	108%	91.8/124%





LETI Embodied Carbon Rating

LETI Results graphic. Coloured dots labelled 1-12 are the results for scenarios 1-12.



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Terrace HT1A and B
No of Dwellings	10
Orientation of Principal (street)Elevation	South
Treated Floor Area m² (TFA)	1089
Form Factor	2.03
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	9
Heat Load <=10W/m²	8
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	1
PER <=60 KWh/m²y	37
Space Heating method	Air Source Heat Pump
Hot Water method	Air Source Heat Pump and Cylinder

Further overheating analysis is required to check for Part O compliance

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

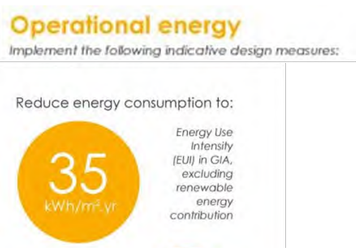
No window opening during daytime hours for security reasons whilst people are likely to be away from home.

Overnight ventilation via tilted windows to the first floor bedrooms only. Closed bedroom doors mean no significant through ventilation. 0.1ach achieved for the whole house. NOTE, These dwellings are away from a main road where noise could be an issue.

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 200mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork or board cladding	0.11
Roof	**Pitched** 12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, pan-elvent, breather membrane, vented void, ply and metal roofing **Dormer** 12.55mm plasterboard; joists, WBP decking on firrings, vcl, 190mm PIR insulation, roofing membrane	0.11
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Pas-sivhaus certified otherwise efficiency is penalised	





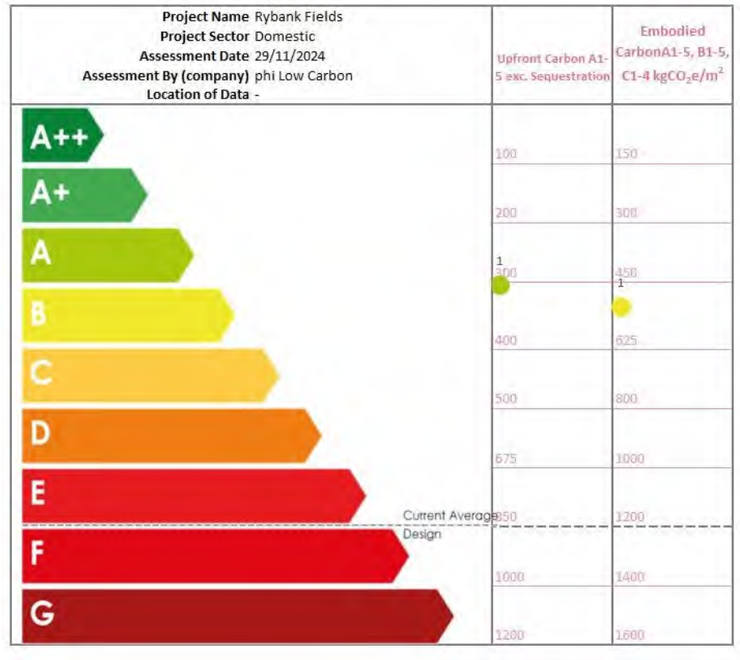
Performance against LETI	
GIA m²	1222

Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	32	28 / 37

Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	298	259/343
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	518	450 / 596
Sequestered Carbon kgCO2/m²	-157	-137 /- 181
Module D kgCO2/m²	-5	- 4 / -6

Renewable Energy Generation		**Range –15%/+15%**
KWh/annumn	54695	47561 / 62899
%of EUI	140%	122% / 161%

LETI Embodied Carbon Rating



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon

Block	Semi detached villas
No of Dwellings	2
Orientation of Principal (street)Elevation	East
Treated Floor Area m² (TFA)	311
Form Factor	2.3
Performance against Passivhaus Criteria	
Annual Heating Demand <= 15KWh/m²y	14
Heat Load <=10W/m²	10
Airtightness <=0.649 @50pa	0.649
Frequency of overheating <10%	4
PER <=60 KWh/m²y	32
Space Heating method	Air Source Heat Pump
Hot Water method	Air Source Heat Pump and Cylinder

Further overheating analysis is required to check for Part O compliance particularly the east facing windows which are currently showing a high level of summer solar gain.

The model assumes the following Summer Ventilation strategy.

MVHR to have automatic summer bypass controlled by temperature difference with boost.

No window opening during daytime hours for security reasons whilst people are likely to be away from home. Temporary shading is provided to the rooflight

Overnight ventilation via tilted windows to the upper floors and opening rooflight. . 0.1ach achieved for the whole house. NOTE, These dwellings are away from a main road where noise could be an issue.

NOTE: Results in the tables and graphic include a 15% contingency as required by RICSv2 for early design phase. The Range shows the potential for reductions or additions as the proposals are developed.

Specification of Thermal Elements		**U Value W/m²K**
Ground Floor	75mm screed; 200mm PIR Insulation; Beam and Block	0.11
External Walls	12.5mm plasterboard, service void, OSB Propassiv board, Timber studs and insulation, panelvent, breather membrane, cavity and wall ties, brickwork Or vented void, ply with standing seam metal cladding (Dormer roof also)	0.11
Roof	12.5mm plasterboard; posi joists, WBP decking on firrings, vcl, 190mm PIR insulation, roofing membrane	0.11
Window Frames	Ideal Combi frames	1.76 (jamb)
Glazing	Triple glazing (g value 0.53) (1.04 ave U value installed)	0.57
MVHR	Zehnder Group Nederland B.V. - ComfoAir200 Heat recovery Efficiency 92% NOTE: Must be Passivhaus certified otherwise efficiency is penalised	

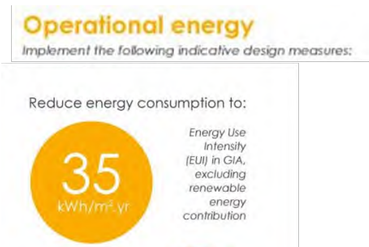
Performance against LETI	
GIA m²	340

Operational Energy		**Range –15%/+15%**
EUIkWh/m2/annum	28	24 / 32

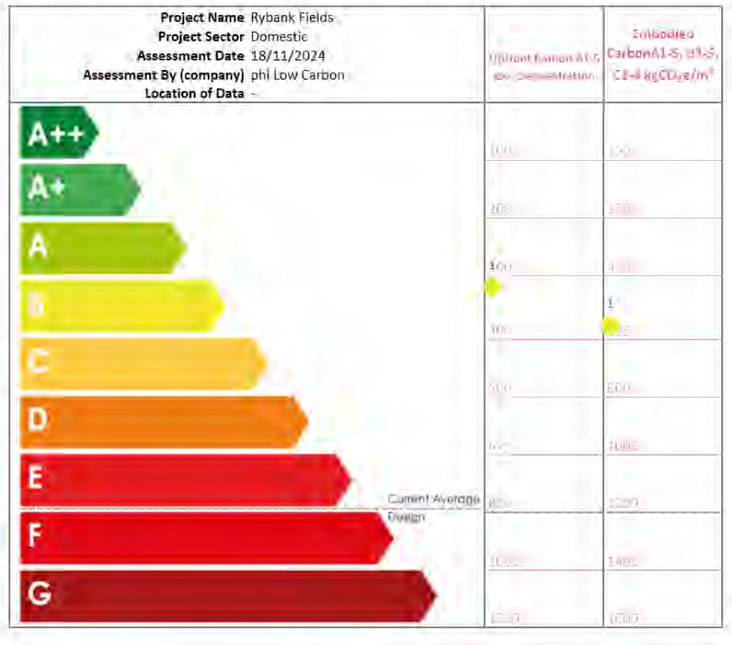
Embodied Carbon		**Range –15%/+15%**
Upfront Carbon A1-A5 kgCO2e/m²	316	275 /363
Embodied Carbon A1-A5, B-B5,C1-4 kgCO2e/m²	502	436/ 577
Sequestered Carbon kgCO2/m²	-150	-130 /- 173
Module D kgCO2/m²	0	-0

Renewable Energy Generation		**Range –15%/+15%**
KWh/annumn	5179	4503 / 5956
%of EUI	55%	48% / 63%





LETI Embodied Carbon Rating



Summary Sheet

Passivhaus Verification

LETI Operational and Embodied Carbon Report

Ryebank Fields — Chorlton

phi Low Carbon



RIDGE

www.ridge.co.uk