

**Environmental Standards
Statement
Ref: Z54116**

Proposed School Development

at

**Redby Street
Manchester
M11 2NP**

for

Create It Studios



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Executive Summary

This document evaluates the technical and economic feasibility of using both passive and low and zero carbon technologies and assesses the practical levels of CO₂ reduction possible for this development to comply with the following Manchester City Council planning requirements:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 – EN8 and DM1
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2021)

The following low and zero carbon technologies are evaluated:

- | | | |
|----------------------|-------------------|-----------------------|
| • Solar Photovoltaic | • Biogas | • Heat Pumps: Air |
| • Solar Hot Water | • Combined Heat & | Source, Ground Source |
| • Biomass | Power (CHP) | and Exhaust Air |
| • Wind | | |

The approach for the Redby Street school development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL2A 2013
- 2) Enhanced air tightness and thermal bridging
- 3) Heating and cooling to be provided by a heat pump system in classroom spaces
- 4) Mechanical ventilation with heat recovery (MVHR) provided to classroom areas
- 5) Hot water storage will be provided by an instantaneous electric system
- 6) LED lighting to have presence detection and daylight dimming control to classroom areas

An assessment of CO₂ emissions is made based on the Simplified Building Energy Model (SBEM) methodology to comply with Approved Document Part L2A (2013) and in line with the requirements of Manchester City Council planning policy. The development will be provided with energy savings through the use of passive improvement measures, such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies.

The principles of a 'Be Lean, Be Clean, Be Green' design philosophy have been applied, which results in a 10.46% improvement over Building Regulations Part L2A 2013, as indicated in Table 1.

Table 1 - Proposed development CO₂ emissions against Building Regulations Part L2A 2013

	Total CO ₂ Emissions (KgCO ₂ /Yr)	
Baseline Emissions of Development (pre-improvement)	44,269	
Proposed Strategy	39,640	
Total Reduction in Carbon (KgCO ₂ /yr)		4,629
Percentage Improvement in Carbon Emissions (over Building Regulations ADL2A 2013)		10.46%

A full design specification that confirms inputs used within the Part L2A 2013 calculations is provided within the appendices of this report.

The development has also been assessed to maximise its sustainability and environmental credentials. This strategy considers many aspects of the design and construction of the development and the following issues have been identified:

- | | |
|-------------------------------------|---|
| 1. Energy Efficiency | 6. Ecological Aspects (Land Use and Ecology) |
| 2. Transport | 7. Health and Wellbeing |
| 3. Pollution | 8. Sustainable Management of the Construction Process |
| 4. Construction Materials and Waste | |
| 5. Water Consumption | |

The BREEAM pre-assessment undertaken indicates that a Very Good rating (62.68%) could be achieved under BREEAM 2018, in line with the requirements stated in the Manchester Core Strategy (2012). A full overview of the credits targeted is included in the appendices of this report.

1. Introduction

This Environmental Standards Statement has been developed in support of the planning application for the proposed Redby Street school development in Manchester.

The proposed development consists of a three-storey school building located between Ashton Old Road and Whitworth Street. The development is required to achieve compliance under Building Regulations Approved Document Part L2A (2013).

This assessment has been undertaken to strategically look at the technical and economic feasibility of energy and sustainability measures to maximise the scheme's sustainable and environmental credentials and in accordance with the following planning policies:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 – EN8 and DM1
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2021)

A range of sustainable design principles are explored for this development to minimise the adverse effects of development on the environment at global and local scales, whilst promoting healthy indoor conditions for the occupants. Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will also be appraised in line with the 'Be Lean, Be Clean, Be Green' philosophy of relevant planning documents and the Energy Hierarchy.

An assessment of CO₂ emissions is made based on the calculation methodology dictated by the Simplified Building Energy Model (SBEM) methodology to comply with Approved Document Part L2A (2013) and in line with the requirements of Manchester City Council planning policy.

1.1. Location

The area of land for the proposed development at Redby Street, Manchester, M11 is highlighted by the red line boundary shown in Figure 1. Manchester city centre is located two miles to the west of the site.



Figure 1 – Satellite view of proposed Redby Street school development

The site is flanked by Ashton Old Road to the north, and Whitworth Street to the south. The proposed site is in a largely industrial and residential area.

1.2. Floor Plans

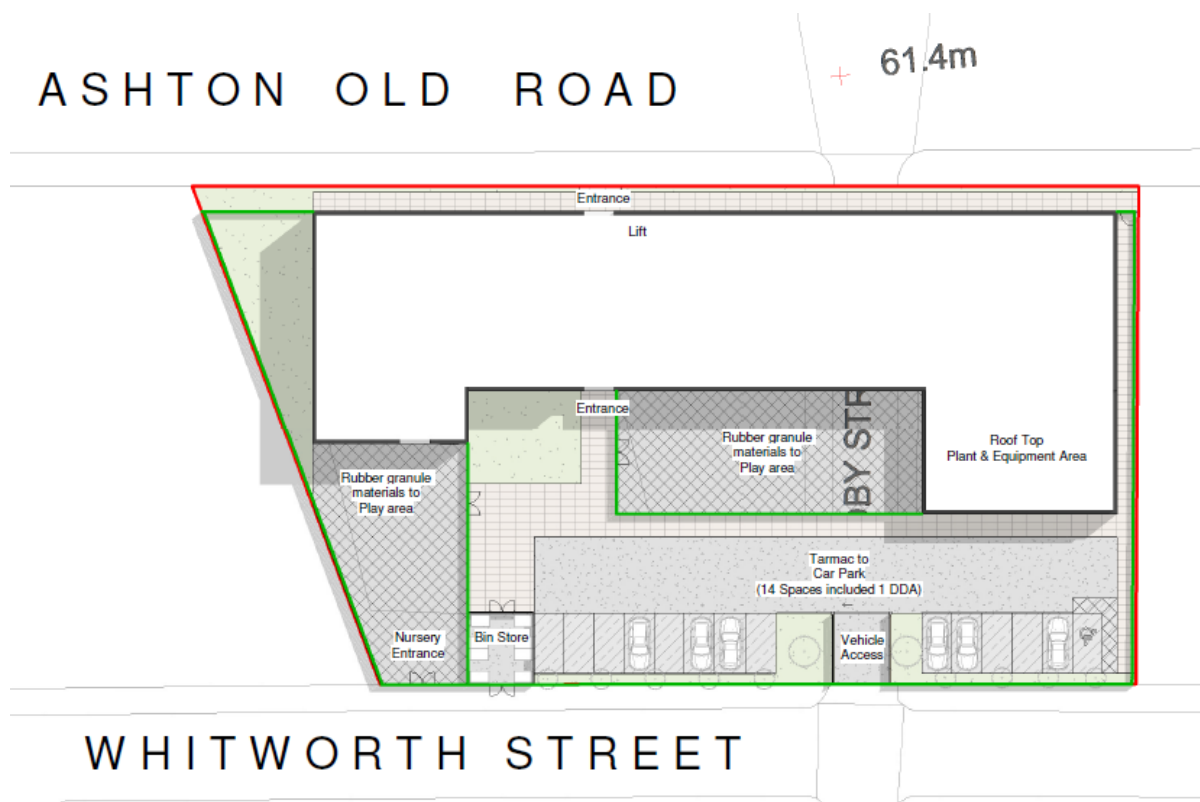


Figure 2 – Proposed floor plan for proposed Redby Street school development

The proposed development consists of a three-storey school building located between Ashton Old Road and Whitworth Street. Internally the building spaces include classrooms, labs, IT rooms, sports hall, dining and kitchen areas, WC blocks, circulation and office space.

2. Policy Drivers for Sustainable Development

This section presents a range of sustainable planning policy that is applicable to the proposed Redby Street school development, at both a national and a local level.

2.1. National Policy

The National Planning Policy Framework, published in July 2021, sets out the government's planning policies for England and they should be applied. Table 2 sets out the relevant sustainability standards for new developments and provides an indication of the design response to be provided.

Table 2 – Key National Planning Policy Requirements and Design Responses

Section	Policy Requirements	Design Response
14. Meeting the challenge of climate change, flooding and coastal change	The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: Shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.	This development will follow the principles set out in Manchester City Council's Core Strategy 2012 – 2027 (2012), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes around the Manchester area and an assessment on the potential for future schemes in relation to this development is provided in Section 4 of this report. This environmental standards statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Manchester Core Strategy 2012 – 2027 (2012) and the Supplementary Planning Document and Planning Guidance (2007) provide a set of guidelines for new development. All relevant energy and sustainability policy within these documents is provided within this section together with a design response.

Table 3 – Key Local Planning Policy Requirements and Design Responses

Manchester Core Strategy 2012 – 2027 (2012)		
Section	Policy Requirements	Design Response
EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development	All development must follow the principle of the Energy Hierarchy, being designed: - to reduce the need for energy through design features that provide passive heating, natural lighting 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 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.	The proposed Redby Street school development will follow the principles of the Energy Hierarchy by adopting a passive fabric-first approach to design before the use of renewable technologies. A full energy strategy is provided in Section 6 of this report, following an appraisal of a range of site-specific measures in line with the 'Be Lean, Be Clean, Be Green' approach. A review of district heating opportunities is provided in Section 4 of this report, in line with current local development. A BREEAM pre-assessment will be undertaken on the proposed development, including a range of

		sustainable and low-impact design recommendations.
Policy EN 5 – 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.	The proposed Redby Street school development does not fall within a Strategic Area for decentralised development, as defined within the Manchester City Council Core Strategy 2012 – 2027. The proximity of the site to current decentralised energy networks is illustrated within Section 4 of this report.

Policy EN 6 - Target Framework for CO2 reductions from low or zero carbon energy supplies	Applications for residential development of 10 or more units and all other development over 1,000m² will be expected as a minimum to meet the target for the defined areas below. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development. The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows: • Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling). • Target 2 Electricity intense areas: Locations where the predominant building type has an all-electric fit-out such as retail units and leisure complexes. • Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical. <table><tr><th>Target</th><th>% Minimum Requirement</th></tr><tr><td>Target 1: Network development area</td><td>CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.</td></tr><tr><td>Target 2: Electricity intense buildings</td><td>+10% increase on Part L 2010</td></tr><tr><td>Target 3: Micro generation area</td><td>+15% increase on Part L 2010</td></tr></table>	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	+10% increase on Part L 2010	Target 3: Micro generation area	+15% increase on Part L 2010	The proposed development consists of a three-storey school building of around 3000m² and is therefore within the threshold of a major development. The site does not sit within an area defined for development of low and zero carbon, decentralised energy. An overview of the site in relation to current decentralised networks in the region is provided in Section 4. No less than a 15% improvement over Part L 2010 will be provided through a fabric first and energy efficiency approach. The use of air source heat pumps (ASHP) provides efficient heating and cooling to classroom/library areas and an LED lighting scheme with presence detection and daylight dimming controls ensures carbon emissions savings against the Part L TER baseline.
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	+10% increase on Part L 2010									
Target 3: Micro generation area	+15% increase on Part L 2010									
Policy EN 7 – Energy Infrastructure opportunities	There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations: That any new generating plant capable of producing heat and cooling as well as electricity should be located in a way	An overview of the site in relation to current decentralised networks in the region is provided in Section 4.								

	that facilitates future connection to a local distributed energy system. • That any energy centre, including generating plant, standby/boiler plant and substations, shall be located and designed to a high quality so as to integrate with and contribute to the townscape. • Biofuels should be obtained from sustainable sources and processes and in a way that minimises transport impacts, following a sequential approach in order to minimise CO2 emissions – firstly prioritising local and regional sources, followed by national, European and international. • Consideration should be given to biofuel delivery by rail and waterways where possible. Where large-scale fuel or feedstock delivery is required by road the energy centre must be located in or adjacent to light industrial, industrial or leisure uses with any impact on local residential amenity minimised. • The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16. • Flood risk, through the Manchester-Salford-Trafford Strategic Flood Risk Assessment. In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where these have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.	Due to the relatively small scale of the development, the development of a new energy centre would not be a feasible design solution.
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	A BREEAM 2018 pre-assessment has been undertaken for the proposed Redby Street school

	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.	development within Section 8, targeting a Very Good rating. Within the BREEAM pre-assessment a range of credits have been targeted, covering items such as flood risk, thermal comfort (overheating), passive design and a variety of ecological aspects in relation to soft landscaping design, habitat management and creation.
Policy DM 1 – Development Management	All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:- • Appropriate siting, layout, scale, form, massing, materials and detail. • Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area. • Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise. • Accessibility: buildings and neighbourhoods fully accessible to disabled people, access to new development by sustainable transport modes. • Community safety and crime prevention. • Design for health.	The proposed Redby Street school development seeks to meet the development management goals through the BREEAM assessments credits targeted within the pre-assessment report, provided within Section 8. The proposed development falls into the category of a commercial development, therefore BREEAM applies rather than Code for Sustainable Homes. As such, a Very Good rating has been targeted within the preassessment report.

	• Adequacy of internal accommodation and external amenity space. • Refuse storage and collection. • Vehicular access and car parking. • Effects relating to biodiversity, landscape, archaeological or built heritage. • Green Infrastructure including open space, both public and private. • The use of alternatives to peat-based products in landscaping/gardens within development schemes. • Flood risk and drainage. • Existing or proposed hazardous installations. • Subject to scheme viability, developers will be required to demonstrate that new development incorporates sustainable construction techniques as follows (In terms of energy targets this policy should be read alongside policy EN6 and the higher target will apply):- a. For new residential development meet as a minimum the following Code for Sustainable Homes standards. This will apply until a higher national standard is required: Year 2010 – Code Level 3; Year 2013 - Code Level 4; Year 2016 - Code Level 6; and (b) For new commercial developments to demonstrate best practice which will include the application of the BREEAM (Building Research Establishment Environmental Assessment Method) standards. By 2019 provisions similar to the Code for Sustainable Homes will also apply to all new non-domestic buildings.	Within the BREEAM pre-assessment a range of credits have been targeted, covering items such as flood risk, thermal comfort (overheating), passive design and a variety of ecological aspects in relation to soft landscaping design, habitat management and creation.
Supplementary Planning Document and Planning Guidance (2007)		
Section	Policy Requirements	Design Response
4.5 – Energy Efficiency	Part 1 Policy E1.5 encourages high standards of energy efficiency in new development. In the Environmental Standards Statement, developers should show how they have considered the steps necessary to reduce energy demand at the earliest stages of design.	In line with the principles of the Be Lean, Be Clean, Be Green design philosophy, the Redby Steet school development seeks to

	Developers should aim to reduce CO2 emissions by at least 25% more than the requirements of the current Building Regulations, which at present are Building Regulations: Approved Document L (2006) – ‘Conservation of Fuel and Power.’ The following design principles will assist developers in achieving energy efficiency targets: • Minimise reliance on energy-using equipment for heating, cooling, lighting and natural ventilation • Position trees and soft landscaping on and around the development and within buildings to provide natural shading, insulation and air conditioning • Integrate energy efficient micro-generation and community heating schemes, such as combined heat and power (CHP) • Site layout and building design principles should maximise the capture and use of daylight and passive solar energy, whilst avoiding excessive solar gain in summer • Specify energy and water efficient appliances and systems	provide a sufficient design solution that provides compliance with Building Regulations Part L2A. An early-stage overview of these calculations is provided in Section 6.
4.6 – Renewable Energy	To reduce energy demand and the harmful impact of using energy from non-renewables, in line with UDP Part 1 Policy E1.5, developers should aim for at least 20% of final site energy demand to be met by on-site renewable energy technologies. Renewable energy targets can be achieved more readily by undertaking the measures suggested above reducing the total energy demand of the building. It is possible to produce developments that use 50% and even 100% energy from renewable sources. To achieve this, developers should: • Assess opportunities for integrating small- and large-scale renewable energy generation systems to improve the energy security of occupants and the neighbourhood, including siting of energy generation businesses on-site and export of surplus energy • Use a mix of technologies to help generation	A full appraisal of low and zero carbon technologies is provided in Section 5 of this report. Achieving compliance with Building Regulations Part L2A will be demonstrated through a passive fabric-first approach. This ensures that the highest standards of fabric efficiency and energy efficiency are achieved, prior to applying low carbon or renewable technologies to the

	patterns match demand • Investigate energy generation opportunities before designing building envelopes or fixing their location, to optimise utilisation of wind, solar and geothermal resources • Consider final energy demand rather than building energy consumption in the selection and sizing of generation equipment • Explore opportunities to tackle waste and energy issues collectively through use of anaerobic digesters linked to CHPs (Combined Heat and Power devices) • Consider private wire networks as an alternative to grid connection and availability charges on larger developments.	development. The levels of the energy hierarchy are defined below in Section 3.
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3. Methodology

The first step of the full energy strategy assessment has been to undertake a baseline energy assessment. The baseline energy assessment consists of calculating the total CO₂ emissions of the development to meet Building Regulations and then compare the proposed improvement measures against this baseline. Building Regulations Part L2A 2013 (SBEM) applies to the development and provides carbon emissions from regulated energy.

The building can then be benchmarked/thermally modelled using the energy hierarchy:

1. Be Lean <i>A reduction in energy use as a result of passive design and energy efficiency</i>
Thermal performance of envelope (U-values) Glazing design Airtight construction Efficient mechanical ventilation and heat recovery Variable speed fans and pumps Energy Efficient lighting
2. Be Clean <i>A focus on supplying energy to the development through efficient means</i>
Connect to low carbon heat networks Develop site wide heat network from single energy centre On site CHP Provide energy efficient individual heating
3. Be Green <i>The installation of renewable technologies to meet energy demand where possible</i>
Consider the feasibility of renewable energy technologies Assess the integration of renewable technologies based on the above measures

The development must be provided with energy savings through the use of thermal improvements to fabric (a 'fabric first' approach), followed by other clean energy solutions (energy efficiency improvements, district heating, etc...) and finally the use of renewable energy technologies, where

practical. This hierarchy complements the integrated approach to the sustainable energy objectives advocated through Manchester City Council local policy.

The planning policies require a full review of the technical and economic feasibility of the following renewable technologies:

- Biomass heating
- Biomass combined heat and power
- Solar hot water
- Solar photovoltaic
- Ground source heat pumps
- Air source heat pumps / exhaust air heat pumps
- Wind power

To achieve the targets set the development must achieve a balance between fabric, heating and control, ventilation and air leakage improvements, the amount of zero or low carbon technology installed and the capital, life cycle and running costs and maintenance and operation.

Feasible renewable energy technologies have been considered during the assessment to ensure the most suitable renewable energy is chosen for the demands of this scheme. The pros and cons of each technology with respect to this site are considered as part of this statement.

4. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the development in line with the energy hierarchy.

4.1. Decentralised Heating Networks

The energy policy reaffirms the view that energy generated by centralised power stations and transmitted through the national grid is highly inefficient and wasteful.

One of the priorities for reducing CO₂ emissions is to reduce reliance on centralised power stations. This means increasing the use of local, low-carbon energy supplies through de-centralised energy systems.

De-centralised plant generally means any heating and hot water and/or electricity generation provided on a district wide (DHN) or site wide (CHN) basis. DHN and CHN can typically include combined heat and power equipment (CHP). CHP is an engine which, when running, generates electricity and heats water which can then be distributed around a development.

Benefits of district heating networks can include:

- Provision of low carbon / lower cost heat to domestic and commercial customers
- Diversification of the energy mix
- Reductions in region-wide carbon emissions
- Targeting and reduction of fuel poverty
- Potential long term revenue streams for local authorities
- Alignment with regeneration programmes
- Driving the growth of the low carbon services sector

However, there are currently no existing district heating networks within proximity to the site, and the development of a decentralised system would not be feasible or beneficial for a project of this scale. An extract from The Association for Decentralised Energy's District Heating Installation Map is provided in Figure 3. This confirms that the nearest existing network is a residential network in Longsight, around one mile southwest of the proposed site.

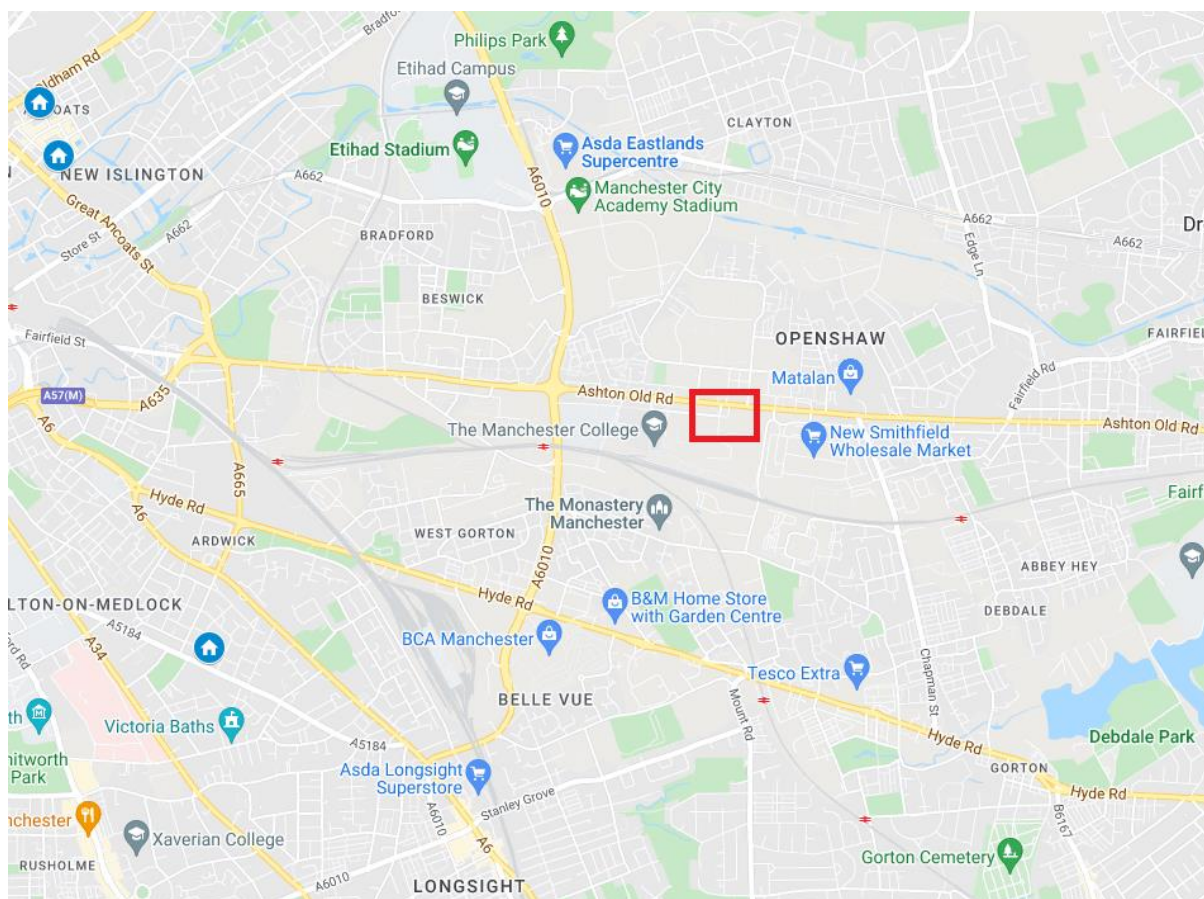


Figure 3 – Location of site in relation to current local heat networks

5. Renewable Energy Technologies

Energy Counsel have reviewed options for the use of on-site renewable energy / Low or Zero Carbon Technology (LZCT) in line with the policy aspirations of the Manchester Core Strategy 2012 – 2027 (2012).

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies –

- Solar Photovoltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

5.1. Photovoltaics (PV)

Photovoltaic panels convert sunlight into electricity to run lights and appliances. Photovoltaic panels use cells to convert light into electricity. A PV cell normally consists of 1 or 2 layers of a semi conducting material such as silicon. When light shines on a cell it generates energy causing electricity to flow, the higher the light intensity is, the more electricity flows.

The amount of energy PV cells generate is referred to as Kilowatt Peak (KWp). PV arrays now come in a variety of shapes and

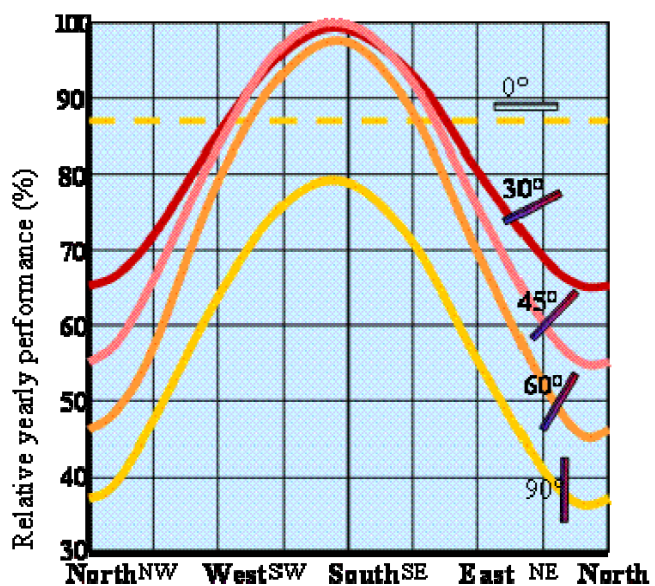


Figure 4 - Performance of photovoltaic panel orientation

colours, ranging from grey 'solar tiles' that look like roof tiles to panels and transparent cells that you can use on conservatories and glass to provide shading as well as generating electricity. The roof must be strong enough to take the weight of the solar panels, especially if the panel is placed on top of existing tiles. For flat roofs the panels can be mounted on A-frames to give the optimum angle.

The optimum panel inclination for solar collection is 35°, oriented due south; however panels that are inclined between 35° and 45° and oriented south of west or east are generally suitable. If solar collectors are oriented away from due south then a larger surface area will be required to generate a set amount of energy. The effect of non-optimal orientation is illustrated by the graph in Figure 4.

The use of photovoltaic panels has not been specified for this development as greater carbon emissions savings can be made through the use of highly efficient heat pumps. As the classrooms have potentially high heat gains with cooling likely required, this is a more suitable technology to utilise to achieve the Part L improvement.



Figure 5 - Photovoltaic array on a pitched roof

5.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat water, most commonly for domestic hot water needs. There are two types of collectors used for solar water heating – flat plate collectors and evacuated tubes collectors. The systems function successfully in all parts of the UK, as they can work in diffuse light conditions. The collector should be mounted on a 10-60 degrees pitch facing south, although other variations can be used, south is the most efficient.

The cost of installing the system is dependent on the distance between the solar collector and the hot water storage and therefore costs vary. The closer the collectors are to the hot water storage, the less pipe work is required. Annual maintenance checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

They are a 'simple' and guaranteed technology which will act as a pre-heat for the Hot Water and Heating usage. Payback between capital cost and energy saving can normally be achieved within 12 – 20 years, subject to usage type.

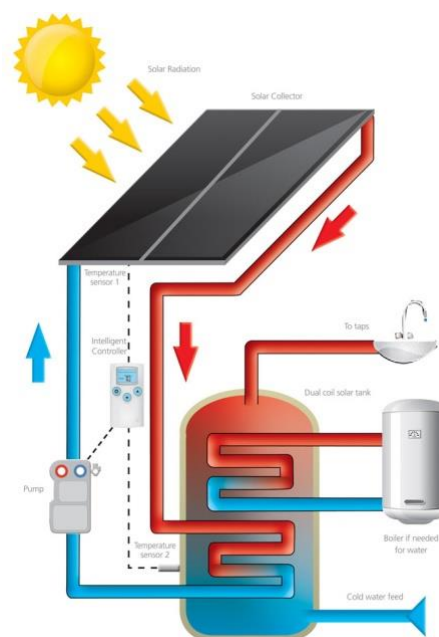


Figure 6 - Principles of a solar thermal system

The use of solar thermal panels work best in conjunction with individual heating systems for dwellings. The orientation of the development is fine for the utilisation of solar water heating to provide domestic hot water however it is not expected to achieve significant carbon savings due to the levels of hot water usage.

5.3. Ground Source Heat Pump (GSHP)

GSHPs have been developed specifically for the housing market and are now considered to be an established reliable technology. The GSHP would be sized to cater for the heating and domestic hot water requirements. Typically, they are more suited to apartments as a centralised system would be installed with multiple bore holes to a depth of up to 125 metres depending on the ground conditions. GSHPs use a heat exchanger to extract heat from the earth.

The efficiency of ground source heat pumps is measured by Co-efficient of Performance (CoP), this is

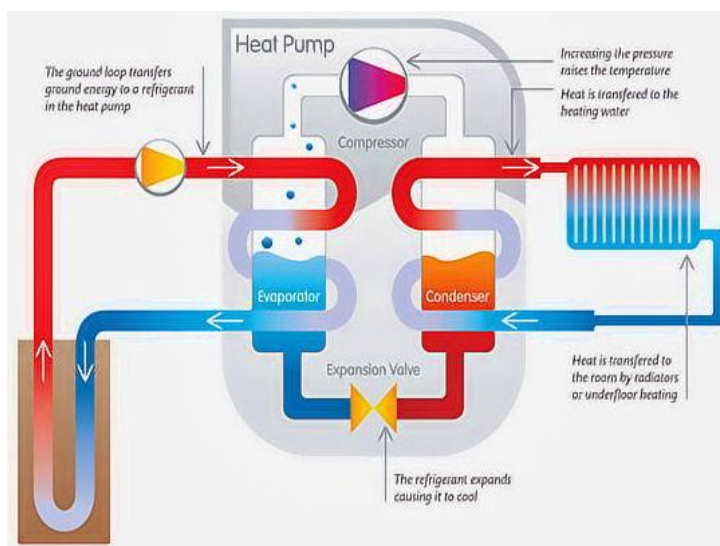


Figure 7 - Principles of a GSHP system

the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency. This means that for every unit of electricity used to pump the heat, 2-4 units of heat are produced, making it an efficient way of heating a building.

If grid electricity is used for the compressor and pump, then there is

the opportunity to consider a range of energy suppliers to benefit from the lowest running costs, for example by choosing an economy 10 or economy 7 tariff.

Due to the availability of land around the development, GSHPs are not considered an appropriate design solution.

5.4. Air Source Heat Pump/Exhaust Air Heat Pump

Air source heat pumps (ASHP) and exhaust air heat pumps (EAHP) work in a similar way to GSHP. Air source heat pumps can be fitted on the external façade or in the roof space. An air source heat pump uses small amounts of electricity to take in large quantities of air and extract heat. 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 2-4 although some systems may produce a greater rate of efficiency.

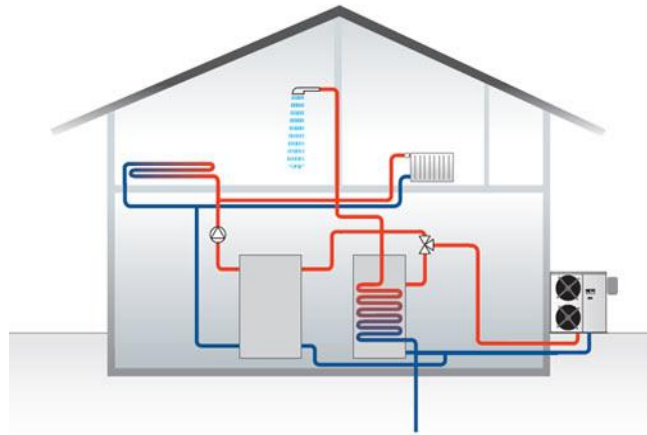


Figure 8 - Principles of an ASHP system

Exhaust air heat pumps such as the NIBE F370 work in a similar manner to ASHP units but have only indoor units (no outdoor compressors) and in addition they also recover heat from their integral exhaust air ventilation system. These units work well on apartment blocks and dwellings where mains gas is unavailable or unsuitable for a development. They are expensive in terms of capital cost of the equipment, installation and the enhanced structural requirements.

ASHPs are utilised for this development, as heating and cooling will likely be required from classroom areas where there are high or rapidly fluctuating internal/solar gains and openable windows are restricted due to the proximity of Ashton Old Road. It is proposed that a VRF-type system is adopted for all classroom and library areas for these reasons. The proposed system has a high efficiency rating and can be used in conjunction with a mechanical ventilation system with heat recovery to ensure that carbon emissions savings are maximised.

5.5. Micro Wind Power

Wind power is one of the cleanest and safest methods of generating electricity. However, wind power is unfeasible due to the fact the development is in an urban area and local wind conditions would not be sufficient to provide enough power. Most small wind turbines generate Direct Current (DC) electricity. Systems that are not connected to the national grid require battery storage and an inverter to convert DC electricity into Alternating Current (AC) which is mains electricity.

There are two types of wind turbine available:

- Roof mounted – Installed on the roof of the development
- Mast mounted – Which are free standing

Important issues to consider when using wind turbines are:

- Wind speed increases with height so it's best to have the turbine high on a mast or tower.
- Generally speaking the ideal site is a smooth top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, dwellings or other buildings.
- Small scale wind power is particularly suitable for remote off grid locations where conventional methods of supply are expensive or impractical.
- Where the local annual average wind speed is 6 m/s or more.
- Where there are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the wind speed or increase turbulence



Figure 9 - Mounted wind turbine

As this development is in an urban area there will be obstacles which reduce wind speed. The average wind speed in this area is 4.7 m/s at a height of 10 metres, which is less than the 6 m/s required. Therefore, micro wind is not a viable technology for this development.

5.6. Biomass

Biomass is a generic name for any fuel produced from organic sources and falls into mainly two categories:

- Woody biomass- forest products, untreated wood products, energy crops and wood pellets
- Non-wood biomass – liquid biofuels (such as biodiesel, bioethanol) or animal waste industrial municipal products and high energy crops such as rape seed, sugar cane and maize.

For domestic properties the fuel used is normally wood pellets, wood chips or wood logs. For larger applications, biomass boilers replace conventional fossil fuel boilers and come with an automated feed by screw drives from hoppers.

Biomass systems require more cleaning than gas or oil boilers and they must be capable of being taken out of service for cooling and cleaning whilst maintaining the building heating supply particularly in communal heating systems. Centralised gas boilers are therefore still required to support the biomass boiler, which would be the lead boiler. The size of the dedicated plant rooms is substantial. Fuel availability, delivery and storage are also important issues to consider.

Air quality issues are also an important factor when looking to install biomass. The cost of the fuel depends on the type, delivery distances and whether it is obtained as simple waste product or from another organisation. The cost of wood pellets is currently a little more expensive than mains gas, and woodchip is approx. 30% cheaper, however prices are fluctuating rapidly in the bio-

fuel market at the present time creating uncertainty over their take up.



Figure 10 - Biomass boiler and hopper

Biomass CHP is still relatively new to the UK market and is more suitable to large developments where energy demand does not require significant modulation. There are technical issues with small scale Biomass CHP and until these can be resolved and proven the take up of these systems in the UK and Europe has been slow.

Overall carbon savings of 40%+ are achievable with biomass technology. Biomass is more suited to a communal heating system; there is insufficient space to accommodate the equipment and fuel storage to facilitate a biomass boiler. Furthermore, there are noise and air quality issues associated with this type of technology. For this reason, biomass is discounted.

6. Energy Assessment of Proposed Scheme

The proposed Redby Street school development has adopted the principles of the 'Be Lean, Be Clean, Be Green' approach. The thermal performance of the modelled elements in the proposed development is indicated in Table 4.

Table 4 - Fabric efficiency in the Redby Street Part L2A model

	U-value (W/m ² K)	G Value	Light Transmittance
Roof	0.12	n/a	n/a
Ground Floor	0.10	n/a	n/a
External Wall	0.19	n/a	n/a
External Glazing	1.40	0.50	0.71
Door	1.40	n/a	n/a

The most practical and economically feasible solution for the development is a good quality thermally insulated fabric, airtight envelope, passive improvements and the use of highly efficient building services to condition spaces.

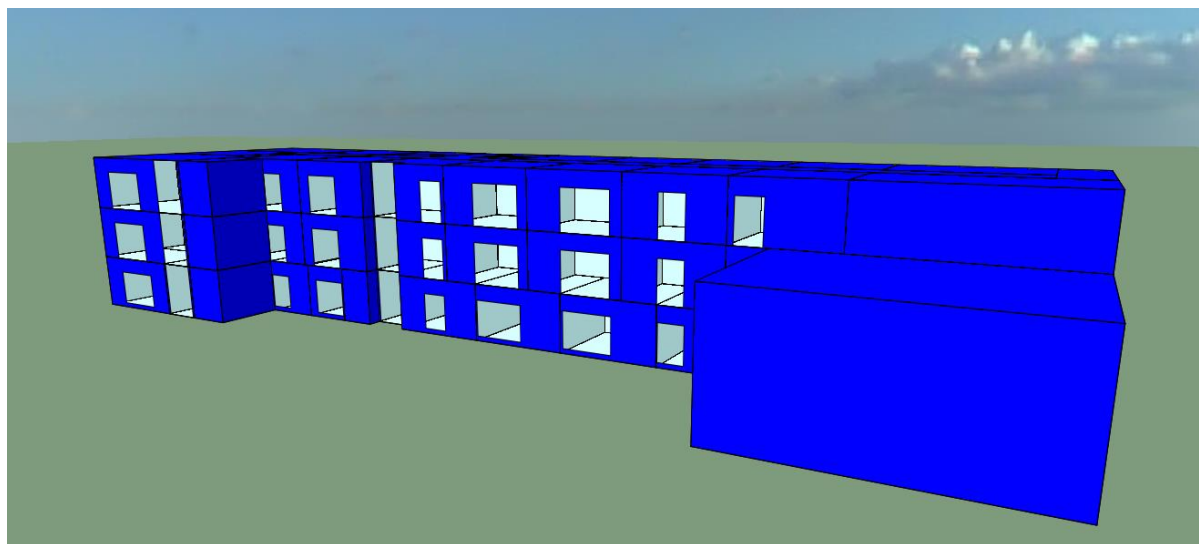


Figure 11 – Redby Street School Part L2A model within IES-VE 2021

A preliminary model design has been developed within IES-VE 2021 to understand the likely performance of the development against Approved Document Part L2A 2013. A full overview of inputs within the model is provided within the appendices of this report.

The results in Table 5 indicate that a 10.46% improvement can be achieved through the adoption of passive design techniques and energy efficiency systems. This provides a 4,629kg reduction in annual carbon emissions above Part L2A 2013 compliance.

This has been achieved through the use of heat pumps (VRF) in the classroom and library areas and an efficient lighting strategy with presence detection and daylight dimming. Mechanical ventilation with heat recovery (MVHR) has also been provided to classroom and library areas due to potential pollution issues from the proximity to Ashton Old Road and the high and variable nature of heat gains within these spaces.

Table 5 - Results of preliminary model Part L2A 2013 calculations

Emissions	Actual	Notional	Carbon Emissions Improvement
Total emissions (kg/m ²)	BER: 13.7	TER: 15.3	10.46%
Annual emissions (kg)	39,640	44,269	

7. Sustainable Design & Construction

The design currently includes a number of components that gives the scheme a solid grounding in relation to sustainability and the BREEAM targets. The list below is not exhaustive and the full BREEAM pre-assessment, listed in the Appendix, covers all the issues.

Management

- The contractor will utilise the Considerate Constructors Scheme and aim for a best practise standard, which is a score of 35+ with a minimum score of 7 in each category, at the final CCS visit.
- The contractor will manage and monitor environmental issues during construction process. This will include the monthly monitoring and management of energy and water consumption of site activities, separation, streaming and recycling of waste, the reduction of air, dust and ground pollution.

Health and Wellbeing

- External lighting to the proposed development will be highly efficient and will comply with all current guidelines and regulations.
- Safety issues will incorporate recommendations from a CPDA or ALO input no later than RIBA stage 2, wherever practicable.

Energy

- The development will be designed and constructed to achieve low energy and carbon dioxide emissions, improving upon current Building Regulations Part L 2013 using the Be Lean, Be Clean, Be Green energy hierarchy.
- Sub-metering of all major energy consuming systems will be provided to differentiate between energy loads for heating and hot water, lighting and small power consumption.
- Dedicated energy efficient lighting will be installed internally and externally. Movement and daylight-controlled lighting will be introduced, where practicable. The efficacy and colour rendering index ratings will be considered.

Transport

- A travel plan will be developed at the preliminary stages of the project, with a range of transport improvement measures to be included within the development. These measures aim to promote the use of sustainable modes of transport.

Water

- Dual-flush toilets will be provided with low-flow water consuming fittings, to ensure water use within the development is minimised.
- Where areas use more than 10% of the buildings predicted total water usage, sub-metered pulsed output meters will be considered.

Materials

- The scheme will seek to use environmentally certified products with Green Guide A/ A+ Rated materials, wherever practicable.
- All building and construction materials used on the schemes will aim to be sought from environmentally managed accreditation schemes, (such as EMAS/ ISO 14001 accreditation). All timber will be sourced from a certified chain of custody. Overall at least 80% of all material sourced on this project will be responsibly sourced, and where practical.
- The building will incorporate suitable durability and protection measures or designed features/solutions to prevent damage to vulnerable parts of the internal and external building and landscaping elements
- Insulation will have low environmental impact in use and during manufacture. This is measured via the insulation index rating.

Waste

- A SWMP will be used on this site. Our aim is to divert as much waste from landfill as possible by reducing construction waste below 11.1 tonnes/100m² GIFA and re-use or recycling waste, with diversion from landfill of non-hazardous construction waste >80%.

Ecology and Land-use

- The contractor will enlist the help of a suitably qualified ecologist to recommend appropriate ecological features that will positively enhance the ecology of the site.
- Protection and mitigation measures will be introduced, where practicable, to reduce the impact of the development on the existing site and to enhance the development.

- Ecological improvement will be undertaken to enhance the ecological value of the site once the development is built, wherever practicable.

Pollution

- A flood risk assessment will be undertaken, with the results of which guiding a drainage design that ensures surface water run-off, flooding in the case of drainage failure and watercourse pollution are minimised.
- Reduction of night time light pollution using ILE compliant light fittings will be installed, where practicable.

8. BREEAM 2018 Pre-Assessment

The Building Research Establishment's Environmental Assessment Methodology (BREEAM) is an environmental assessment method for rating and certifying the performance of non-domestic buildings. The BREEAM assessment is conducted in two phases: design (interim) and post-construction (final) to ensure that sustainability is embedded into the design and construction of new non-domestic developments with a view to encouraging continuous improvement.

BREEAM issues are provided across the following categories:

- Management
- Health and Wellbeing
- Energy
- Transport
- Water
- Materials
- Waste
- Land Use and Ecology
- Pollution

For each category, there are a number of 'credits' available. Where a development achieves or exceeds various benchmarks of performance, an appropriate number of credits are awarded.

The relative importance of the credits awarded under each issue is taken into account in the final score, which is interpreted in the form of an overall rating of:

- Unclassified - <30%
- Pass - $\geq 30\%$
- Good - $\geq 45\%$
- Very Good - $\geq 55\%$
- Excellent - $\geq 70\%$
- Outstanding - $\geq 85\%$

In addition, a number of minimum standards are set for each specific BREEAM ratings level. This ensures that a holistic approach to sustainability is provided when targeting the prescribed BREEAM rating.

The proposed design currently includes a number of components that gives the scheme a good grounding in sustainable development. A preliminary BREEAM pre-assessment was undertaken on the proposed Redby Street school development to assess the viability of achieving a Very Good rating.

The BREEAM pre-assessment undertaken indicates that a Very Good rating (62.68%) could be achieved under BREEAM 2018, in line with the requirements stated in the Manchester City Council Core Strategy (2012). A full overview of the credits targeted has been included in the appendices of this report.

The development seeks to provide sustainability through an energy strategy that focuses on reducing energy demand and prioritising energy efficiency. The requirements set out in the Manchester City Council Core Strategy (2012) will also be met by integrating sustainability into the heart of the development through a range of measures, as detailed in Section 7 of this report.

9. Conclusions

The approach for the proposed Redby Street development is to embed sustainability into the heart of the development through the 'Be Lean, Be Clean, Be Green' design hierarchy. The proposed design is predicted to reduce the total carbon emissions by 4,629Kg/CO₂/yr from the baseline emissions of 44,269kg/CO₂/yr. This equates to a 10.46% carbon reduction from the calculated baseline regulated emissions. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL2A 2013
- 2) Enhanced air tightness and thermal bridging
- 3) Heating and cooling to be provided by a heat pump system in classroom spaces
- 4) Mechanical ventilation with heat recovery (MVHR) provided to classroom areas
- 5) Hot water storage will be provided by an instantaneous electric system
- 6) LED lighting to have presence detection and daylight dimming control to classroom areas

9.1. Low/ Zero Carbon Technologies Review

- Photovoltaic panels have not been specified for this development as the carbon emissions savings can be achieved by utilising energy efficient heating and cooling systems.
- Solar Thermal Hot Water is not considered a viable option as an accurate estimate of hot water demand is not known; however it is not expected to be a major energy contributor.
- Biomass has been discounted as it poses problems in terms of air quality, delivery of fuel, storage and transportation for deliveries, etc. It would require a centralised larger plant space for storing fuel, which is not suitable.
- Micro-wind turbines are not preferred on this development due to potential problems with wind turbulence and mounting of the units. The wind speeds in the area are not conducive to wind power electricity generation and there would be issues with turbulence, wind shading and noise.
- GSHPs are not viable for site because of spatial and financial costs. There is no room to accommodate a GSHP vertical bore and associated communal plant room, ground conditions are unknown and systems are costly.
- ASHP units have been specified for this development as the large heating and cooling demands from classroom areas will require a high efficiency system, from which the carbon emissions savings can be made.

An overall 10.46% improvement in CO₂ emissions above the Building Regulations Part L2A 2013 baseline is proposed to support our application and to meet policy requirements.

Table 6 - Summary of Carbon Emissions

	Total CO₂ Emissions (KgCO₂/Yr)	
Baseline Emissions of Development (pre-improvement)	44,269	
Proposed Strategy	39,640	
Total Reduction in Carbon (KgCO₂/yr)		4,629
Percentage Improvement in Carbon Emissions (above Bldg Regs ADL2A 2013)		10.46%

Several sustainable initiatives will be implemented by the project team and commitments have been identified to further improve the environmental and sustainability profile of the proposed development in the future stages of the design and construction processes. This will offer building occupiers, and the surrounding area added benefits in terms of quality of living standards, lower energy and water bills and enhanced/improved surroundings and facilities.

- A preliminary assessment has been undertaken to review how the orientation, layout, design and materials used in the construction of the development will impact on the sustainability. A range of improvements have been listed in Section 7.
- Water efficiency will be promoted throughout the development through the incorporation of water efficient fittings and water metering. Reduction in water usage indirectly impacts on energy usage embodied carbon reductions through water treatment.
- Procurement and construction processes will be carried out to minimise the environmental impacts of materials, with sustainable locally sourced and/or recycled materials being selected wherever practicable. This also impacts on embodied carbon and energy usage.
- A BREEAM pre-assessment has been undertaken confirming a 'Very Good' rating of 62.68%, in line with the compliance requirements of Manchester City Council's Core Strategy (2012).
- The development provides compliance with the sustainability measures in Manchester City Council local policy through a holistic range of sustainability and energy efficiency measures to ensure impact is minimised.

10. Appendices

10.1. Energy Model Inputs for Part L2A 2013 Compliance

Item	Brief description	Notes	Confirm
	The following information is required for the design submission (as per requirements of approved doc L2A).	Please note submission is now in two stages. A) Design B) As installed	
1. Building Details			
1.1	Building Regulations Part L2A 2013 applies.		
1.2	Full Building address is:		
1.3	Building Owner is:		
1.4	Electric Power Factor Correction = <0.90		
2. Floor Construction Details			
2.1	Ground floor is insulated to achieve the U-value stated opposite.	U-Value = 0.10 W/m ² K	
3. Wall Construction Details			
3.1	External walls are insulated achieving the U-value stated opposite.	U-Value = 0.19 W/m ² K	
4. Roof Construction Details			
4.1	Roof is insulated achieving the U-value indicated opposite.	U-Value = 0.12 W/m ² K	
5. Openings			
5.1	External solid personnel doors are installed to achieve the U-value opposite.	U-Value = 1.4 W/m ² K	
5.2	All double-glazed windows are to achieve the U-Value indicated opposite.	U-value = 1.4 W/m ² K G-Value = 0.50	
6. Ventilation			
6.1	This Design Stage SBEM calculation assumes an air permeability of 5m ³ /hr.m ² at 50pa will be achieved.		
6.2	Local extract ventilation is provided to WC and kitchen areas.	Extract Only SFP = 0.4W//s	
6.3	Mechanical ventilation with heat recovery (MVHR) is provided to classrooms (including lab and IT), hall, nursery and library areas.	SFP = 0.9W//s	
6.4	All other areas of the building are naturally ventilated.		
7. Space Heating and Cooling			
7.1	Heating and cooling to classrooms (including lab and IT), hall, nursery and library areas to be provided by a high-efficiency air source heat pump system.	SCOP = 4.0 SEER = 6.0	
7.2	Heating to all other areas is provided by electric panel heaters.	Efficiency = 1	
7.3	The heating system is provided with central time control, local time and temperature control and weather compensation.		
7.4	Heating and cooling systems are metered but not provided with automatic monitoring and targeting with alarms for out-of-range values warn of out of range values.		
8. Water Heating			
8.1	Water heating is provided by electric point of use instantaneous water heater units only.		
9. Lighting and lighting controls			
9.1	All light fittings will be LED type and have a minimum luminous efficacy of 100 lamp lumens/circuit Watt.		

9.2	Display lighting will have a minimum luminous efficacy of 100 lamp lumens/circuit Watt.		
9.3	Lighting to all areas includes presence detection with manual switch override.		
9.4	Lighting to classrooms (including lab and IT), hall, nursery and library includes daylight dimming controls.		
9.5	Light fitting energy use is metered but the system does not warn of out of range values.		
10. Renewables			
10.1	No renewables are provided within the development.		
11. Other			
11.1	All fans are in accordance with the minimum requirements of 'Non-Domestic Building Services Compliance Guide, 2013' in terms of Specific Fan Power.		
11.2	A Building Log Book will be provided following the guidance in CIBSE TM31, Building Log Book Toolkit.		
11.3	Building Regulations Part L2A 2016 apply. Please confirm that all fixed building services are in accordance with the minimum standards set out in paragraphs 2.45-2.48 of Building Regulations Part L2A 2013.		

10.2. BREEAM Pre-Assessment

Achieved	0.00%	UNCLASSIFIED
Targeted	62.68%	VERY GOOD
Potential	63.75%	VERY GOOD



BREEAM New Construction 2018 - Independent School - Redby St

KEY TO COLOUR CODING			
	Evidence required		
	Further evidence required		
	Evidence has been validated		
	Credits not sought		



Credit Summary				Minimum Requirement				RIBA Stage reqs.	Credits available	Credits targeted	Credits achieved	Potential	Evidence needed	Comments	Responsibility	Risk level		
				Pass	Good	Very Good	Excellent									High	Medium	Low
Management	Man 01	Project brief and design	Project delivery planning					2	1	1			Meeting minutes confirming a meeting has taken place prior to completion of Concept Design with the client, the building occupier (where known), the design team and the principal contractor/suitably experienced person with substantial construction or contracting experience in projects similar to the proposed works. Complete Man 01 Roles and Responsibilities matrix. Enter project specific details as the original text is a prompt.					
			Stakeholder consultation (interested parties)					1, 4	1	1			A list of the stakeholders consulted. A consultation plan setting out the process and scope of the consultation. Agenda/minutes from consultation meetings. Documentation demonstrating consultation feedback and subsequent actions.					
			BREEAM AP - Pre-Requisite						PR	PR								
			BREEAM AP (Concept Design)					2	1	1			Copy of design AP appointment letter.					
			BREEAM AP (Developed Design)					2	1	1			Copies of formal documentation that requires members of the design team to achieve the required BREEAM rating.					
	Man 02	Lifecycle cost and service life planning	Elemental life cycle cost (LCC)					2	2	2			Copy of PD 156865: 2008 compliant LCC conducted at RIBA Stage 2 that: - Provides an indication of future replacement costs over a period of analysis as required by the client (e.g. 20, 30, 50 or 60 years); - Includes service life, maintenance and operation cost estimates. Report referencing drawings/specifications showing how the LCC has influenced building and systems design.					
			Component level LCC options appraisal					4	1	1			Copy of PD 156865: 2008 compliant LCC conducted at RIBA Stage 4 that includes: - Envelope, e.g. cladding, windows, or roofing - Services, e.g. heat source, cooling source, or controls - Finishes, e.g. walls, floors or ceilings - External spaces, e.g. alternative hard landscaping, boundary protection. Report referencing drawings/specifications showing how the LCC has influenced building and systems design.					
			Capital cost reporting						1	1			Email confirming the capital cost for the building in pounds per square metre of gross internal floor area (£/m²).					
			Legally harvested and traded timber - Pre-Requisite						M	M			Email confirming 100% of timber and timber-based products used during the construction process of the project will be 'legally harvested and traded timber' as outlined in the Central Point of Timber (CPET) 5th Edition of the UK Government Timber Procurement Policy (TPP) (www.gov.uk/government/uploads). At the time of writing, the policy requires all timber and wood-based products to be covered by at least one of the following: 1. Third party, independent forest certification schemes–Category A (e.g. FSC or PEFC) 2. Evidence on a case-by-case basis in line with the Framework for Evaluating Category B evidence–Category B. The website (www.gov.uk/guidance/) will be checked for changes prior to purchase to ensure compliance.					
	Man 03	Responsible construction practices	Environmental management system of contractor						1	1			Environmental Management System certificate (ISO14001, BS8555 etc) of any contractor managing the site or contractual evidence that this is required if not yet appointed. Email confirming the contractor is required to have pollution prevention policies in line with PPG6, Pollution Prevention Guidelines or contractual evidence that this is required if not yet appointed - https://www.sepa.org.uk/media/60125/ppg-6-working-at-construction-and-demolition-sites.pdf					
			BREEAM AP (Site)					5	1	1			Copy of construction AP appointment letter. Copies of formal documentation that requires members of the design team to achieve the required BREEAM rating.					
			Responsible construction management				1		2	2			Please complete table with details of how each item will be implemented and provide supporting documentation.					
			Monitoring of construction site impacts						2	2			Evidence that the contractor is required to assign responsibility to an individual for monitoring, recording and reporting energy use, water consumption and transportation data resulting from all on-site construction processes (and dedicated off-site manufacturing) throughout the build programme. To ensure the robust collection of information, this individual must have the appropriate authority and responsibility to request and access the data required. The data required is as follows: Energy •Set targets for the site energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation. •Monitor and record data for the energy consumption described above. •Report the total carbon dioxide emissions (total kgCO ₂ /project value) from the construction process. Water •Set targets for the potable water consumption (m³) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation. •Monitor and record data for the potable water consumption described above. •Use the collated data to report the total net water consumption (m³), i.e. consumption minus any recycled water use from the construction process. Transportation of construction materials and waste •Set targets for transportation movements and impacts resulting from delivery of the majority of construction materials to site and construction waste from site. As a minimum cover: o transportation of materials from the point of supply to the building site, including any transport, intermediate storage and point of supply. Monitor as a minimum: □Materials used in major building elements □Ground works and landscaping materials. o transportation of construction waste from the construction gate to waste disposal processing or recovery centre gate. This monitoring must cover the construction waste groups outlined in the project's resource management plan. •Monitor and record data for the transportation movements as described above. •Using the collated data, report separately for materials and waste, the total transport-related carbon dioxide emissions (kgCO ₂ -eq), plus total distance travelled (km).					
	Man 04	Commissioning and handover	Testing schedule and responsibilities				1 1	1	2	1	1		Document stating the contractor is required to prepare a schedule of commissioning and testing. The schedule will identify and include a suitable timescale for commissioning and re-commissioning of all complex and non-complex building services and control systems and for testing and inspecting building fabric. The schedule will identify the appropriate standards for all commissioning activities to be conducted, where applicable, in accordance with: •Current Building Regulations •BSRIA guidelines •CIBSE guidelines •Other appropriate standards: oBuilding fabric: □BS EN 13187: 1999 Thermal performance of buildings. Qualitative detection of thermal irregularities in building envelopes - Infrared method. □BS EN ISO 9972: 2015 Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurisation method. Any process or manufacture-related equipment specified as part of the project will not be included where they form an integral part of the building HVAC services, such as some heat recovery systems. A building management system (BMS) is specified, therefore the contractor is required to: •Carry out commissioning of air and water systems when all control devices are installed, wired and functional •Include physical measurements of room temperatures, off-coil temperatures and other key parameters, as appropriate, in commissioning results •Ensure the BMS or controls installation should be running in auto with satisfactory internal conditions prior to handover •Ensure all BMS schematics and graphics are fully installed and functional to user interface prior to handover •Fully train the occupier or facilities team in the operation of the system. The contractor is required to appoint an appropriate project team member to monitor and programme pre-commissioning, commissioning and testing. Where necessary this will include re-commissioning activities on behalf of the client. The principal contractor will account for the commissioning and testing programme, responsibilities and criteria within their budget and the main programme of works. They will allow the required time to complete all commissioning and testing activities prior to handover.					
			Design and preparation					2	1	1			Document stating during the design stage, the client or the principal contractor will appoint an appropriate project team member, provided they are not involved in the general installation works for the building services systems, with responsibility for: a. Undertaking design reviews and giving advice on suitability for ease of commissioning. b. Providing commissioning management input to construction programming and during installation stages. c. Management of commissioning, performance testing and handover or post-handover stages. For buildings with complex building services and systems, this role will be carried out by a specialist commissioning manager					
			Testing and inspecting building fabric					5	1	1			Email confirming the contractor will undertake post-construction testing and inspection to quality-assure the integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths (this is through airtightness testing and a thermographic survey). A suitably qualified professional undertakes the survey and testing in accordance with the appropriate standard as follows: 1. Airtightness testing: by professionals with membership of Air Tightness Testing and Measurement Association (ATTMA) or Independent Air Tightness Testing Scheme (IATS) attained at organisational level. 2. Thermographic survey: by professionals holding a valid Category 2, e.g. PCN (Personnel Certification in Non-Destructive Testing) or QCF (Ofqual's Qualification and Credit Framework) or RQF (Regulated Qualifications Framework) Level 4, e.g. ABDE (Awarding Body for the Built Environment), certificate in thermography (as defined by the UKTA (UK Thermography Authority) website). Where a Category 2 or Level 4 thermographer is not available, the survey may be undertaken by a Category 1 thermographer and then the images interpreted by a Category 2 or Level 4 thermographer. Any defects identified will be rectified during post-construction testing and inspection prior to building handover and close out. Any remedial work will meet the required performance characteristics for the building or element as defined at the design stage.					

Building Rating Scale

Pass ($\geq 30\%$)	★☆☆☆☆
Good ($\geq 45\%$)	★★☆☆☆
Very Good ($\geq 55\%$)	★★★☆☆
Excellent ($\geq 70\%$)	★★★★☆



ADVISORY PROFESSIONAL DESIGN & SITE
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KEY TO COLOUR CODING

	Evidence required
	Further evidence required
	Evidence has been validated
	Credits not sought



24/05/2022 2 of 6

Achieved	0.00%	UNCLASSIFIED
Targeted	62.68%	VERY GOOD
Potential	63.75%	VERY GOOD

Building Rating Scale
Pass (≥30%) ★☆☆☆☆
Good (≥45%) ★★☆☆☆
Very Good (≥55%) ★★★☆☆
Excellent (≥70%) ★★★★☆
Outstanding (≥85%) ★★★★★



BREEAM New Construction 2018 - Independent School - Redby St

Evidence required
Further evidence required
Evidence has been validated
Credits not sought



Credit Summary				Credit Breakdown				Minimum Requirement				Evidence needed				Comments		Responsibility		Risk level		
								Pass	Good	Very Good	Excellent									Outstanding	RIBA Stage reqs.	Credits available
	Hea 06	Security	Security of site and building											Suitably Qualified Security Specialist's report undertaken prior to RIBA Stage 2. This must include: - identification of attributes contributing towards the approach for security - controls and recommendations Design memo confirming how the recommendations have been implemented and copies of any correspondence detailing compromises discussed with the SQSS. SQSS CV to confirm they are suitably qualified.								
	Hea 07	Safe and healthy surround	Safe access																			
														Drawing showing an outside space providing building users with an external amenity area.								
Category Credit Total									18	14	0	0										
Category Percentage Weighting									14.00%	10.89%	0.00%	0.00%										
Energy	Ene 01	Reduction of energy use and carbon emissions	Energy performance				4		6		9	4			BRUKL and .inp file.							
			Prediction of operational energy consumption						2, 4, 6	4	0			Meeting minutes of preliminary design workshop carried out prior to completion of Concept Design focusing on operational energy performance. Report detailing additional modelling carried out during the design and post-construction stage to generate predicted operational energy consumption figures. This must include predicted energy consumption targets by end use, design assumptions and input data with justifications. Methodology for compliance is detailed in GN32 provided. Copy of risk assessment detailing any significant design, technical, and process risks that should be monitored and managed throughout the construction and commissioning process.								
	Ene 02	Energy monitoring	Sub-metering of end-use categories				1	1		1	1			Mechanical and electrical schematics showing sub-metering for: Space heating Domestic hot water heating Humidification Cooling Ventilation, i.e. fans (major) Pumps Lighting Small power Renewable or low carbon systems (separately) Controls Other major energy consuming systems or plant Details of labelling if project is less than 1,000m2 or BMS details if greater than 1,000m2.								
	Ene 03	External Lighting	External lighting system, controls and efficacies							1	1			External lighting drawings showing design and controls. Manufacturer's details for external lighting. Calculation confirming luminous efficacy for the design.								
	Ene 04	Low carbon design	Passive design analysis						2	1	0											
			Free cooling							1	0											
			Low and zero carbon technologies						2	1	1			LZC feasibility report, calculations/outputs engineer or approved modelling software confirming carbon savings as a result of the installed LZC technology. The report should cover: 1. Energy generated from LZC energy source per year 2. Carbon dioxide savings from LZC energy source per year 3. Life cycle cost of the potential specification, accounting for payback 4. Local planning criteria, including land use and noise 5. Feasibility of exporting heat or electricity from the system 6. Any available grants 7. All technologies appropriate to the site and energy demand of the development 8. Reasons for excluding other technologies 9. If appropriate: a. The building is connected to an existing local community CHP system or b. the building is connected to an existing source of waste heat or power OR c. a building or site CHP system is specified with the potential to export excess heat or power via a local community energy scheme or d. a source of waste heat or power is specified with the potential to export excess heat or power via a local community energy scheme 10. Energy storage. CV of person creating report to confirm they have the expertise and are not connected to a supplier. Specification and technical details of the LZC technology specified (manufacturer's data, etc.). Please note: MCS or CHPQA certificates will be required at post construction to confirm installer has the skill and ability to install the technology.								
	Ene 06	Energy efficient transportation systems	Energy consumption							1	1			Copy of lift transport analysis to show optimum size and number of lifts. Where provision is a single lift in a low rise building for disabled access or a goods lift, this can be a written statement with a justification for selection.								
			Energy efficient features								1	1			Specification confirming the chosen lift and escalator strategy includes the following energy saving features: - A standby condition for off-peak periods - The lift car lighting and display lighting provides an average luminous efficacy across all fittings in the car of > 70 luminaire lumens per circuit Watt - Use of a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor - Regenerative drives where they will save energy.							
	Category Credit Total									20	9	0	0									
Category Percentage Weighting									16.00%	7.20%	0.00%	0.00%										
Transport	Tra 01	Transport assessment and travel plan	Travel plan											Travel plan generated with the end user's input based on a site specific travel assessment including: - Existing travel patterns and opinions of existing building or site users towards cycling and walking, identifying constraints and opportunities, if relevant - Travel patterns and transport impact of future building users - Current local environment for walkers and cyclists (accounting for visitors who may be accompanied by young children) - Reporting of the number and type of existing accessible amenities within 500m of the site (food outlet, cash machine, outdoor space, leisure facility, post box, community facility, pharmacy, GP, school/nursery) - Disabled access (accounting for varying levels of disability and visual impairment) - Calculation of the existing public transport Accessibility Index (AI) using Tra 01 AI Calculator provided. This needs maps showing distance to public transport and associated timetables - Current facilities for cyclists - Proposals to increase or improve sustainable modes of transport and movement of people and goods during the building's operation and use The following measures must be considered for the building: - Negotiation with local bus, train or tram companies an increase in the local service provision for the development - Provision of a public transport information system in a publicly accessible area - Provision of electric recharging stations - Provision of parking priority spaces for car sharers - Consultation with the local authority on the state of the local cycling network and on improvements - Provision of dedicated and convenient cycle storage - Provision of cyclists' facilities - Lighting, landscaping and shelter to create pleasant pedestrian and public transport waiting areas - Restrictions or charging for car parking - Pedestrian and cyclist friendly (for all types of user regardless of the level of mobility or visual impairment) with the provision of cycle lanes, safe crossing points, direct routes, appropriate tactile surfaces, good lighting and signposting to other amenities, public transport nodes and adjoining off-site pedestrian and cycle routes - Provision of suitable taxi drop-off or waiting areas - Ensure rural buildings have appropriate access to transport to serve the local community adequately (where procured to do so, e.g. community centre). Email confirming the travel plan will be implemented post construction and be supported by the building's management in operation.								

Achieved	0.00%	UNCLASSIFIED
Targeted	62.68%	VERY GOOD
Potential	63.75%	VERY GOOD



BREEAM New Construction 2018 - Independent School - Redby St

KEY TO COLOUR CODING
Evidence required
Further evidence required
Evidence has been validated
Credits not sought



Credit Summary				Credit Breakdown				Minimum Requirement				Evidence needed				Comments		Responsibility		Risk level		
								Pass	Good	Very Good	Excellent									Outstanding	RIBA Stage reqs.	Credits available
Credit value:														Details of the following implemented: 1. The existing AI calculated in Tra 01 achieves ≥ 4 for prison or MOD sites, rural location sensitive buildings, and other building group 3, ≥ 8 for all other building types 2. Demonstrate an increase over the existing AI through negotiation with local bus, train or tram companies to increase the frequency of the local service provision for the development; OR 3. Demonstrate an increase over the existing AI. This could be through provision of a diverted bus route, a new or enhanced bus stop, or other similar solutions. OR 4. Provide a dedicated service, such as a bus route or service for buildings with a fixed shift pattern to the local population centre, transport interchange or door to door. 5. Provide a public transport information system in a publicly accessible area, to allow building users access to up-to-date information on the available public transport and transport infrastructure. This may include signposting to public transport, cycling, walking infrastructure or local amenities. 6. Provide electric recharging stations of a minimum of 3kw for at least 10% of the total car parking capacity for the development. 7. Set up a car sharing group or facility to facilitate and encourage building users to car share. 8. Raise awareness of the sharing scheme with marketing and communication materials. 9. Provide priority spaces for car sharers for at least 5% of the total car parking capacity for the development. 10. Locate priority parking spaces nearest the development entrance used by the sharing scheme participants. 11. During preparation of the brief, the design team consults with the local authority (LA) on the state of the local cycling network and public accessible pedestrian routes, to focus on whichever the LA deems most relevant to the project, and how to improve it. 12. Agree and implement one proposition chosen with the local authority. The proposition supported by the development is additional to existing local plans and has a significant impact on the local cycling network or on pedestrian routes open to the public. 13. Install compliant cycle storage spaces to meet the minimum levels: •Offices, industrial – 1 per 10 staff •Large retail – 1 per 10 staff AND 1 per 20 public car parking spaces •Small retail – 4 in total for staff •Preschool – 1 per 10 staff •Primary school – 5 per class in year group •Secondary school, 6th form, FE and HE – 1 per 10 staff and pupils •All healthcare – 1 per 10 staff AND 1 per 2 consulting rooms OR 1 per 10 beds •Prison establishment – 1 per 10 staff •Law court – 1 per 10 staff and visitors •Student residences, key worker accommodation – 1 per 10 staff AND 1 per 2 residents •Sheltered housing, care homes, supported living facility – 1 per 10 staff AND 1 per 10 visitors or beds •Type A (mainly staff/employees with occasional visitors) – 1 per 10 staff •Type B (core staff with a larger number of frequent visitors) – 1 per 10 staff AND 1 per 10 visitors or beds •Type C (as B but need to be located rurally) – 1 per 20 staff AND 1 per 20 visitors or beds •Transport hubs – 1 per 10 public users •MOD non-residential – 1 per 10 living out personnel •MOD residential – 1 per 2 residents 14. Option 7 has been achieved. 15. Provide at least two compliant cyclists' facilities for the building users, (including pupils where appropriate to the building type): •Showers – secure, covered, fixed in a permanent structure, no obstructions, visible from building, lit in accordance with Hea 01 with timeclocks and daylight sensors •Changing facilities – appropriately sized, privacy for each gender, bench and hooks •Lockers – equals number of parking spaces, in or adjacent to changing rooms, appropriately sized •Drying spaces – specifically designed with adequate finishes, heating and ventilation, ability to hang wet clothes with sufficient air movement 16. At least three existing accessible amenities are present within 500m: food outlet, cash machine, outdoor space, leisure facility, post box, community facility, pharmacy, GP, nursery/school. 17. Ensure a minimum of one new accessible amenity, in accordance with the table above, for the relevant Building Group, is provided. OR 18. Focus more than one new accessible amenity, in accordance with the table above for the relevant Building Group, is provided.								
0.83%				Tra 02	Sustainable transport measures	Transport options implementation							10	10								
Category Credit Total												12	12	0	0							
Category Percentage Weighting												10.00%	10.00%	0.00%	0.00%							
Water	Wat 01	Water consumption	Efficiency of water consuming components		1	1	1	2		5	2		Sanitary ware specification confirming the flush rate of WCs, flow rates of taps (hand wash basin taps + kitchen taps), showers, urinals, fill volume of any baths. Details of any water consuming equipment such as dishwashers, washing machines, waste disposal units etc. Data entered into Wat 01 calculator provided.									
	Wat 02	Water monitoring	Water meter on mains supply		M	M	M	M		M	M		Drawing showing location of water meter. Manufacturer's details confirming the meter is pulsed.									
			Water monitoring						1	1		Details of BMS monitoring. Sub-metering of sanitary ware where there is another usage.										
		Wat 03	Leak detection	Leak detection system							1	1		Specification confirming a compliant water leak detection for within building and between building and site boundary. Drawing showing location of the water meters. Manufacturers literature confirming features of the system. This must show: - Permanent automated system that alerts or inbuilt automated diagnostic procedure - System activated when the flow of water passing through meter is at a flow rate above a pre-set maximum for a pre-set period of time - Able to identify different flow rates - Programmable to suit the owner/occupiers' water consumption criteria - Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers								
	Flow control devices									1	1		Specification and drawings confirming solenoid valves to the cold water flow each toilet area and method of control. Evidence this will not shut off cold water to showers whilst hot water is running.									
Category Credit Total												8	5	0	0							
Category Percentage Weighting												7.00%	4.38%	0.00%	0.00%							
Materials	Mat 01	Environmental impacts from construction products - Building life cycle assessment (LCA)	Superstructure						2, 4	6	0											
			Substructure and hard landscaping options appraisal during Concept Design						2, 4	1	0											
	Mat 02	Environmental impacts from construction products - Environmental Product Declarations	Specification of products with a recognised environmental product declaration (EPD)							1	0		1									
Credit value:	Mat 03	Responsible sourcing of construction products	Legally harvested and traded timber	M	M	M	M	M		M	M		Details as per Man 03.									
			Enabling sustainable procurement						1	1	1	Copy of sustainable procurement plan to be used by the design team produced before Concept Design.										
			Measuring responsible sourcing						3	1		Breakdown of each major building element by constituent materials. Specification confirming levels of responsible sourcing certification to be provided for each relevant material. Details entered into Mat 03 spreadsheet.										
	1.07%	Mat 05	Designing for durability and resilience	Protecting vulnerable parts of the building from damage and degradation									1	1	Design drawings illustrating vulnerable areas/parts of the building (internal and external) covering: - Negative impacts of high user numbers in relevant areas of the building (e.g. corridors, lifts, stairs, doors etc.). - Damage from any vehicle or trolley movements within 1m of the internal building fabric in storage, delivery, corridor and kitchen areas. - External building fabric damage by a vehicle. Protection where parking or manoeuvring areas are within 1 metre of the building façade and where delivery areas or routes are within 2 metres of the façade, i.e. specifying bollards or protection rails. - Potential malicious damage to building materials and finishes, in public and common areas where appropriate. Design drawings and/or relevant section/clauses of the building specification confirming the durability measures specified. Drawings identifying exposed elements and design measures taken to limit degradation via either: - Evidence of quality, durability standard or design guide for product in line with standards (http://www.breem.com/NC2018/#09_material/mat05_a.htm%3FTocPath%3D9.0%2520Materials%7C_____5 Table 9.14) - Detailed elemental assessment looking at resilience when exposed. Evidence confirming convenient access to the roof and façade for cost-effective cleaning, replacement and repair in the building's design and that the roof and façade has been designed to prevent water damage, ingress and detrimental ponding.							
Mat 06					Material efficiency	Material optimisation						1, 2, 3, 4, 5	1	1	Material efficiency report produced at Preparation and Brief. Minutes of materials efficiency workshop held at Concept Design. Evidence of how feedback has fed into design. Report identifying changes from previous stages and drawings showing implementation of materials efficiency measures at Developed and Technical Design. Construction stage update to report including minutes, training and waste reduction measures. See Mat 06 table provided.							

Achieved	0.00%	UNCLASSIFIED
Targeted	62.68%	VERY GOOD
Potential	63.75%	VERY GOOD



BREEAM New Construction 2018 - Independent School - Redby St

KEY TO COLOUR CODING	
	Evidence required
	Further evidence required
	Evidence has been validated
	Credits not sought



Credit Summary				Credit Breakdown		Minimum Requirement				Outstanding	RIBA Stage reqs.	Credits available	Credits targeted	Credits achieved	Potential	Evidence needed	Comments	Responsibility	Risk level		
						Pass	Good	Very Good	Excellent										High	Medium	Low
Category Credit Total											14	4	0	1							
Category Percentage Weighting											15.00%	4.29%	0.00%	1.07%							
Waste	Wst 01	Construction waste management	Pre-demolition audit					1	2	1	1		Copy of pre-demolition audit carried out by a competent person at RIBA Stage 2. Must include consideration of materials for reuse and set targets for waste management, guide the design, engage contractors in maximising high grade reuse and recycling opportunities, compare actual waste with targets and look at waste management routes.								
			Construction resource efficiency							3	1		SWMP including name of person responsible, procedures and commitments for minimising non-hazardous and hazardous waste, procedures for monitoring measuring and reporting site waste and procedures for sorting, reusing and recycling construction waste into defined waste groups. Monthly reporting and analysis must take place. Procedure to update the plan. SWMP to include resource efficiency benchmarks appropriate to the number of targeted credits and reference pre-demolition audit. 1 credit - ≤ 13.3 m³/100m² 2 credits - ≤ 7.5 m³/100m² 3 credits - ≤ 3.4 m³/100m² Exemplary credit - ≤ 1.6 m³/100m²								
			Diversion of resources from landfill							1	1		Confirmation that waste diverted from landfill as follows: Non demolition = 70% by volume or 80% by tonnage Demolition = 80% by volume or 90% by tonnage Confirmation that waste materials will be sorted into separate key waste groups as per (according to the waste streams generated by the scope of the works) either on-site or through a licensed contractor for recovery.								
	Wst 02	Use of recycled and sustainably sourced aggregates	Pre-demolition audit						PR	0		Copy of pre-demolition audit carried out by a competent person at RIBA Stage 2. Must include consideration of materials for reuse and set targets for waste management, guide the design, engage contractors in maximising high grade reuse and recycling opportunities, compare actual waste with targets and look at waste management routes.									
			Project sustainable aggregate points						1	0		Identify aggregate uses and types, quantity, regional location, distance travelled by transport type and enter into the Wst 02 calculator.									
	Wst 03	Operational waste	Operational waste				1	1	0		Drawing showing the location of the dedicated recyclable waste storage area. Confirmation of the area (m2) dedicated to recyclable waste. Confirmation of Net floor area of the building. Details of the labelling for the area in accordance with the criteria. Where applicable, evidence demonstrating that compliant facilities are provided for packaging or compostable waste.										
	Wst 05	Adaptation to climate change	Structural and fabric resilience					2, 4	1	1		Copy of climate change adaptation strategy appraisal for structural and fabric resilience. Must be carried out at Concept Design and be updated during Technical Design to show recommendations implemented.									
	Wst 06	Design for disassembly and adaptability	Recommendations						1	1		Copy of study undertaken by the end of Concept Design. Please expand on this as much as possible and make specific to the project.									
			Implementation						2, 4	1	1	Copy of study updated at Technical Design including details on how recommendations have been implemented. Any omissions must be justified in the updated report. Copy of building adaptability and disassembly guide to be handed to the tenants/occupier.									
	Category Credit Total											10	6	0	0						
Category Percentage Weighting											6.00%	3.60%	0.00%	0.00%							
Land Use & Ecology	LE 01	Site Selection	Previously occupied land						1	0											
			Contaminated land						1	0											
		Identifying and understanding the risks and opportunities for the project	Statutory obligations						1	PR			Evidence confirming the client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.								
			Survey and evaluation						1, 2	1	1		Completed Guidance Note 40 checklist.Evidence of appointment of Suitably Qualified Ecologist no later than RIBA Stage 1/2 so they can be involved in site configuration and can influence planning. Copy of report based on site survey undertaken before end of preparation and brief. This must include all details from the BREEAM guidance (http://www.breem.com/NC2018/#11_landuse/le02a.htm%3FTocPath%63D11.0%2520Land%2520Use%2520and%2520Ecology%7C_____2) Evidence that the findings have been shared with the project team to inform site preparation, design and construction works.								
			Determining the ecological outcomes for the site						2	1	1		Meeting minutes showing project team and stakeholders identified and considered ecological outcome for the site. This must include identification, appraisal and selection of specific solutions and measures early in the process to influence planning decisions. The following hierarchy must be used: - avoidance - protection - reduction or limitation of negative impacts - on site compensation and, - enhancement, considering the capacity and feasibility within the site, or where viable, off-site. Evidence that optimal ecological outcome is selected.								
	LE 03	Managing negative impacts on ecology	Identification and understanding the risks and opportunities for the site						1, 2	PR	PR		Email confirming compliance will be monitored against all relevant UK and EU or international legislation relating to the ecology of the site.		LE02 must be achieved						
			Planning, liaison, implementation and data						2	1	1		Copy of roles and responsibilities matrix/report detailing: - Responsibilities, relationships and management required for implementation, including clear ownership of each task - Allocation of roles and responsibilities and identification of when these apply - Allocation of resources (including financial, time, technical and skills) - Procedures to promote effective implementation, monitoring and feedback for continual improvement - Alignment with and, where relevant, integration into related activities and processes - Effective handover and collaborative activities where responsibility is transferred and shared, including transition to long term management and maintenance arrangements. Evidence showing ecological site inspection outcome and data has been shared with the design team to allow consideration in site preparation, design and construction works. Evidence showing site preparation and construction works have been planned for at an early stage to optimise benefits and outputs. Evidence of measures and solutions implemented and selected, or required to be, during site preparation and construction.								
			Managing negative impacts of the project						2	2	1		Evidence showing identification of negative impacts on biodiversity as a result of the project. Details of how each has been managed in line with the following hierarchy: Route 1 1. Avoidance of negative impacts on habitats and features of ecological value on the site. 2. If it is not possible for avoidance of negative impacts, protect habitats and features of ecological value from damage in accordance with best practice guidelines during development works. 3. If it is not possible for avoidance of all negative impacts or to protect habitats and features of ecological value, reduce, limit or control negative impacts as far as possible. Route 2 As above plus, where it is not possible for avoidance, protection, limitation or control of the negative impacts on features of ecological value on site, compensation has taken place to ensure the existing ecological value is maintained during and after the project.								
	Credit value: 1.00%	LE 04	Change and enhancement of ecological value	Identifying and understanding the risks and opportunities for the project						PR	PR		Email confirming compliance will be monitored against all relevant UK and EU or international legislation relating to the ecology of the site.		Criteria 3&4 of LE03 must be achieved						
				Enhancement of ecology						1	1		Evidence showing the project team and stakeholder liaison considered ecological data provided by the ecologist. Evidence of implementation of solutions and measures recommended by the ecologist and recognised 'local' experts. Details of locally relevant ecological solutions that enhance the site and how they will be implemented. Proof that data collated has been provided to the local environmental records centres nearest to the site.								
Change and enhancement of ecology									3	1		Ecologist's calculations within report in line with Guidance Note 36 determining the change in ecological value for: - Linear Biodiversity Units: Foliage related habitats - Linear Biodiversity Units: Watercourses habitats - Area Based Biodiversity Units: Area based habitat									
LE 05		Long-term ecology management and maintenance	Roles and responsibilities, implementation, statutory obligations						PR	PR		Email confirming compliance will be monitored against all relevant UK and EU or international legislation relating to the ecology of the site. LE04 achieved.		Criteria 3&4 of LE03 must be achieved and 1 credit under LE04							
			Planning, liaison, data, monitoring and review management and maintenance						1	1		Meeting minutes confirming project team and stakeholders monitor and review effectiveness of measures implemented and develop and review management and maintenance solutions. This should include: - Monitoring and reporting of on the ecological outcomes for site implemented at the design and construction stage - Monitoring and reporting of outcomes and successes from the project - Arrangements for the ongoing management of landscape and habitat connected to the project - Maintaining the ecological value of the site and its relationship or connection to its zone of influence - Maintaining the site in line with any sustainability linked activities, e.g. ecosystems benefits (LE 02). - Remedial or other management actions are carried out which relate to those identified in LE 02, LE 03 and LE 04. Email confirming that a section on Ecology and Biodiversity will be included in the building owner information supplied detailing local ecological features, value and biodiversity on or near the site.									
			Landscape and ecology management plan development						1	1		Copy of BS 42020 compliant landscape and habitat management plan covering minimum 5 years post completion. This must include: - Actions and responsibilities, prior to handover, to give to relevant individuals - Ecological value and condition of the site over the development life - Identification of opportunities for ongoing alignment with activities external to the development project - Identification and guidance to trigger appropriate remedial actions to address previously unforeseen impacts - Clearly defined and allocated roles and responsibilities Email confirming the plan will be updated as appropriate to support maintenance of the ecological value of the site.									

Achieved	0.00%	UNCLASSIFIED
Targeted	62.68%	VERY GOOD
Potential	63.75%	VERY GOOD

Building Rating Scale
Pass (≥30%) ★☆☆☆☆
Good (≥45%) ★★☆☆☆
Very Good (≥55%) ★★★☆☆
Excellent (≥70%) ★★★★☆
Outstanding (≥85%) ★★★★★



BREEAM New Construction 2018 - Independent School - Redby St

KEY TO COLOUR CODING	
	Evidence required
	Further evidence required
	Evidence has been validated
	Credits not sought



Credit Summary				Credit Breakdown				Minimum Requirement				RIBA Stage reqs.	Credits available	Credits targeted	Credits achieved	Potential	Evidence needed	Comments	Responsibility	Risk level				
								Pass	Good	Very Good	Excellent									Outstanding	High	Medium	Low	
Category Credit Total													13	8	0	0								
Category Percentage Weighting													13.00%	8.00%	0.00%	0.00%								
Pollution																								
Credit value: 0.67%	Pol 01	Impact of refrigerants	Pre-requisite																					
			Impact of refrigerant																					
			Leak detection																					
	Pol 02	Local air quality	Emissions														Provide post code for location to be checked for Air Quality Management Area at uk-air.defra.gov.uk/data/gis-mapping. High pollution locations have lower emissions rates needed to comply with this credit. Manufacturer's datasheets for all heating and hot water providing sources.							
	Pol 03	Flood and surface water management	Suitably qualified consultant														CV for person completing the report to show they are appropriately qualified: qualifications and experience relevant to designing SuDS and flood prevention measures and completing peak rate of run-off calculations. Where complex flooding calculations and prevention measures are required, this must be a specialist hydrological engineer.							
			Flood resilience															Copy of FRA confirming low risk from all sources below: 1.Fluvial (rivers) 2.Tidal 3.Surface water: sheet run-off from adjacent land (urban or rural) 4.Groundwater: most common in low-lying areas underlain by permeable rock (aquifers) 5.Sewers: combined, foul or surface water sewers 6.Reservoirs, canals and other artificial sources.						
			Surface water run off - pre-requisite															Written description of how the surface water runoff solutions are bespoke to site requirements and natural or man-made environment of the site and surrounding area. Justifications for the following priority list provided where water is allowed to leave the site: – Priority Level 1 Water is collected for use in the development (e.g. rainwater harvesting) – Priority Level 2 Water is infiltrated into the ground – Priority Level 3 Water is discharged to surface water body – Priority Level 4 Water is discharged to the drainage system – Priority Level 5 Water is discharged to a combined sewer						
			Surface water run off - rate															Design calculation showing a 30% improvement in peak rate of run-off for 1 year and 100 year return events. SuDS maintenance agreement or contractual document confirming this will be in place for handover. Written description of how climate change has been considered in line with the most appropriate guidance from the following: – www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacementseries/guidance-for-pollution-prevention-gpps-full-list/ – www.gov.uk/guidance/pollution-prevention-for-businesses – www.gov.uk/guidance/storing-oil-at-a-home-or-business						
			Surface water run off - volume															Written confirmation that flooding of property will not occur in the event of local drainage system failure (caused either by extreme rainfall or a lack of maintenance). Option A Written description confirming that drainage design measures are specified so that the post-development run-off volume, over the development lifetime, is no greater than it would have been prior to the assessed site's development. This must be for the 100-year 6-hour event, including an allowance for climate change in line with the most appropriate guidance as above. Drawings and written description detailing how any additional predicted volume of run-off for this event is prevented from leaving the site by using infiltration or other SuDS techniques. Option B Written justification as to why Option A cannot be achieved. Drawings and written description confirming the post-development peak rate of run-off is reduced to the limiting discharge. The limiting discharge is defined as the highest flow rate from the following options: - The pre-development one-year peak flow rate - The mean annual flow rate (Qbar) - 2L/s/ha. SuDS maintenance agreement or contractual document confirming this will be in place for handover. Written description of how climate change has been considered in line with the most appropriate guidance as above.						
			Minimising watercourse pollution														The consultants report detailing the design specifications, calculations and drawings to confirm the first 5mm rainfall is not discharged. Design drawings and/or relevant section/clauses of the building specification or contract indicating - High and low risk areas of the site. - Specification of SUDS, source control systems, oil/petrol separators and shut-off valves as appropriate. Where chemical or liquid gas storage areas are present, details confirming they have a means of containment fitted to the site drainage system (i.e. shutoff valves) Written description and drawings confirming: - Water pollution prevention systems are designed in accordance with the SUDS manual and any other applicable guidance. - Outlining indicative examples of compliance with the SUDS manual to show the solution is bespoke to site Confirmation a copy of the drainage plan will be produced and handed over to the building occupier. Confirmation design of all external storage and delivery areas is in compliance with current best practice planning guidance with examples.							
		Pol 04	Reduction of Night Time Light Pollution	External lighting design, strategy and controls														External lighting drawings showing scope and method of control. Specification/letter confirming external lighting strategy is designed in accordance with Table 2 (and its accompanying notes) of the ILP Guidance notes for the reduction of obtrusive light, 2011, with indicative examples.						
	Pol 05	Reduction of Noise Pollution	External noise assessment and plant noise														Drawings showing any noise sensitive properties within 500m radius and location of proposed new development. Acoustician CV confirming they are suitably qualified. This must include 3 years' experience in the last 5 years, recognised acoustic qualification and membership of an appropriate professional body.							
Category Credit Total													12	5	0	0								
Category Percentage Weighting													8.00%	3.33%	0.00%	0.00%								
Exemplary																								
Credit value: 1.00%	Man 01	Project brief and design	BREEAM AP - Simple Buildings only																					
	Man 03	Responsible Construction Practices	Achieve all responsible construction management items																					
	Hea 01	Visual Comfort	Exemplary levels met																					
	Hea 02	Indoor Air Quality	Exemplary levels met																					
	Hea 06	Security	Independent assessment																					
	Ene 01	Reduction of Energy Use and Carbon Emissions	Zero net CO2 emissions																					
			Post occupancy modelling																					
	Wat 01	Water Consumption	65% improvement																					
	Mat 01	Environmental impacts from construction products	Core building services and LCA/LCC alignment																					
	Mat 03	Responsible Sourcing of Materials	> 50% RSM points																					
	Wst 01	Construction Waste Management	Exemplary levels met																					
	Wst 01	Construction Waste Management - Simple Buildings only	Exemplary levels met																					
	Wst 02	Use of recycled and sustainably sourced aggregates	> 6 project sustainable aggregate points																					
	Wst 05	Adaptation to Climate Change	Achieve further credit requirements as per guidance																					
	LE02	Identifying and understanding the risks and opportunities for the site	Achieve further credit requirements as per guidance and wider site benefit consideration																					
	Pol 03	Flood and surface water management - Simple Buildings only	Exemplary levels met																					
Category Credit Total													21	0	0	0								
Category Percentage Total													10.00%	0.00%	0.00%	0.00%								
TOTAL								TOTAL				100.00%	62.68%	0.00%	1.07%									

10.3. Preliminary Design Part L2A 2013 BRUKL Report

Project name

Z54116 Redby Street School

As designed

Date: Thu May 26 11:24:28 2022

Administrative information

Building Details

Address: Redby Street, MANCHESTER,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Anthony Turner

Telephone number:

Address: Energy Counsel, Viridor House, 3 Bolholt Terrace,
BURY, BL8 1PPCriterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.3
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	13.7
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.19	0.19	GF000003:Surf[1]
Floor	0.25	0.1	0.1	GF000003:Surf[0]
Roof	0.25	0.12	0.12	GF000013:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	GF000002:Surf[1]
Personnel doors	2.2	1.4	1.4	GF000013:Surf[2]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. *** Display windows and similar glazing are excluded from the U-value check. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Elec Panel Heaters + Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- Elec Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- VRF H&C w/MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	6	0	0	0.8
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- DHW - Elec Immersion

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
GF Staff Tea Point		-	-	-	-	-	0.4	-	-	-	-	N/A
GF DDA WC		-	-	-	-	-	0.4	-	-	-	-	N/A
GF WC		-	-	-	-	-	0.4	-	-	-	-	N/A
GF Staff WC		-	-	-	-	-	0.4	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
GF Sports Hall	-	-	-	0.9	-	-	-	-	-	-	N/A	
GF Dining Hall	-	-	-	0.9	-	-	-	-	-	-	N/A	
GF Kitchen	-	-	-	-	-	0.4	-	-	-	-	N/A	
GF WCs	-	-	-	-	-	0.4	-	-	-	-	N/A	
GF Classroom 3	-	-	-	0.9	-	-	-	-	-	-	N/A	
GF Classroom 2	-	-	-	0.9	-	-	-	-	-	-	N/A	
GF Classroom 1	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Lab 1	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 1	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Lab 2	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F IT Lab	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F WC	-	-	-	-	-	0.4	-	-	-	-	N/A	
1F Classroom 6	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 5	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 4	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 3	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Lab 1	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 1	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Lab 2	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F IT Lab	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F WC	-	-	-	-	-	0.4	-	-	-	-	N/A	
1F Classroom 6	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 5	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 4	-	-	-	0.9	-	-	-	-	-	-	N/A	
1F Classroom 3	-	-	-	0.9	-	-	-	-	-	-	N/A	

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
GF Staff Tea Point		-	100	-	145
GF Office		100	-	-	212
GF Circulation		-	100	-	28
GF Nursery		100	-	-	546
GF Boiler Room		100	-	-	63
GF DDA WC		-	100	-	43
GF WC		-	100	-	75
GF Staff WC		-	100	-	53
GF Stairwell		-	100	-	34
GF Circulation		-	100	-	30
GF Circulation		-	100	-	50
GF Head Office		100	-	-	116
GF Admin		100	-	-	106
GF Reception		-	100	90	44

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
GF Circulation		-	100	-	43
GF Staff Room		100	-	-	139
GF Library		100	-	-	203
GF Sports Hall		-	100	-	778
GF Dining Hall		-	100	-	284
GF Stairwell		-	100	-	33
GF Kitchen		-	100	-	281
GF WCs		-	100	-	173
GF Classroom 3		100	-	-	170
GF Classroom 2		100	-	-	172
GF Classroom 1		100	-	-	168
GF Medical		100	-	-	11
GF Circulation		-	100	-	120
GF Classroom 4		100	-	-	166
GF Classroom 5		100	-	-	167
GF Classroom 6		100	-	-	169
GF Classroom 7		100	-	-	169
1F Lab 1		100	-	-	701
1F Classroom 1		100	-	-	169
1F Stairwell		-	100	-	38
1F Reception/Office		100	-	-	124
1F Circulation		-	100	-	47
1F Staff Room		100	-	-	223
1F Store		100	-	-	15
1F Classroom 2		100	-	-	170
1F Lab 2		100	-	-	589
1F IT Lab		100	-	-	337
1F Cleaners		100	-	-	11
1F Head Teacher		100	-	-	245
1F Circulation		-	100	-	90
1F WC		-	100	-	165
1F Classroom 6		100	-	-	169
1F Classroom 5		100	-	-	170
1F Classroom 4		100	-	-	172
1F Classroom 3		100	-	-	168
1F Stairwell		-	100	-	45
1F Circulation		-	100	-	160
1F Classroom 7		100	-	-	166
1F Classroom 8		100	-	-	169
1F Classroom 9		100	-	-	168
1F Classroom 10		100	-	-	166
1F Library		100	-	-	414
1F Lab 1		100	-	-	701

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
1F Classroom 1		100	-	-	169
1F Stairwell		-	100	-	38
1F Reception/Office		100	-	-	124
1F Circulation		-	100	-	47
1F Staff Room		100	-	-	223
1F Store		100	-	-	15
1F Classroom 2		100	-	-	170
1F Lab 2		100	-	-	589
1F IT Lab		100	-	-	337
1F Cleaners		100	-	-	11
1F Head Office		100	-	-	245
1F Circulation		-	100	-	90
1F WC		-	100	-	165
1F Classroom 6		100	-	-	169
1F Classroom 5		100	-	-	170
1F Classroom 4		100	-	-	172
1F Classroom 3		100	-	-	168
1F Stairwell		-	100	-	45
1F Circulation		-	100	-	160
1F Classroom 7		100	-	-	166
1F Classroom 8		100	-	-	169
1F Classroom 9		100	-	-	168
1F Classroom 10		100	-	-	166
1F Library		100	-	-	414

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF Office	NO (-51.1%)	NO
GF Nursery	NO (-48.1%)	NO
GF Head Office	NO (-52.4%)	NO
GF Admin	YES (+12.8%)	NO
GF Reception	N/A	N/A
GF Staff Room	N/A	N/A
GF Library	N/A	N/A
GF Sports Hall	N/A	N/A
GF Dining Hall	N/A	N/A
GF Classroom 3	NO (-41.9%)	NO
GF Classroom 2	NO (-42.6%)	NO
GF Classroom 1	NO (-41.1%)	NO
GF Classroom 4	NO (-61.8%)	NO
GF Classroom 5	NO (-13.1%)	NO
GF Classroom 6	NO (-16.4%)	NO
GF Classroom 7	NO (-31%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1F Lab 1	NO (-79.8%)	NO
1F Classroom 1	NO (-34.9%)	NO
1F Reception/Office	N/A	N/A
1F Staff Room	NO (-37%)	NO
1F Classroom 2	NO (-42.1%)	NO
1F Lab 2	NO (-0.9%)	NO
1F IT Lab	NO (-21.4%)	NO
1F Head Teacher	YES (+7.1%)	NO
1F Classroom 6	NO (-33.7%)	NO
1F Classroom 5	NO (-34.4%)	NO
1F Classroom 4	NO (-35.2%)	NO
1F Classroom 3	NO (-33.6%)	NO
1F Classroom 7	NO (-0.4%)	NO
1F Classroom 8	NO (-3.5%)	NO
1F Classroom 9	NO (-52.1%)	NO
1F Classroom 10	YES (+5.3%)	NO
1F Library	YES (+13.1%)	NO
1F Lab 1	NO (-79.8%)	NO
1F Classroom 1	NO (-35.2%)	NO
1F Reception/Office	N/A	N/A
1F Staff Room	NO (-33%)	NO
1F Classroom 2	NO (-36.9%)	NO
1F Lab 2	NO (-0.9%)	NO
1F IT Lab	NO (-21.4%)	NO
1F Head Office	YES (+10.6%)	NO
1F Classroom 6	NO (-33.7%)	NO
1F Classroom 5	NO (-34.4%)	NO
1F Classroom 4	NO (-35.2%)	NO
1F Classroom 3	NO (-33.6%)	NO
1F Classroom 7	YES (+0.4%)	NO
1F Classroom 8	NO (-2.1%)	NO
1F Classroom 9	NO (-50%)	NO
1F Classroom 10	NO (-49.5%)	NO
1F Library	NO (-62.7%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	2893.4	2893.4
External area [m ²]	4104	4104
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	4
Average conductance [W/K]	1130.41	1829.95
Average U-value [W/m ² K]	0.28	0.45
Alpha value* [%]	10.08	10

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

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services
A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
B1 Offices and Workshop businesses
B2 to B7 General Industrial and Special Industrial Groups
B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
C2 Residential Institutions: Universities and colleges
C2A Secure Residential Institutions
Residential spaces
D1 Non-residential Institutions: Community/Day Centre
D1 Non-residential Institutions: Libraries, Museums, and Galleries
100 D1 Non-residential Institutions: Education
D1 Non-residential Institutions: Primary Health Care Building
D1 Non-residential Institutions: Crown and County Courts
D2 General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger terminals
Others: Emergency services
Others: Miscellaneous 24hr activities
Others: Car Parks 24 hrs
Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	6.25	11.23
Cooling	1.47	1.67
Auxiliary	1.93	1.17
Lighting	8.38	12.92
Hot water	8.38	9.2
Equipment*	22.56	22.56
TOTAL **	26.41	36.19

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	62.71	83.05
Primary energy* [kWh/m ²]	81.07	77.54
Total emissions [kg/m ²]	13.7	15.3

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	37.7	0	13.1	0	0	0.8	0	1	0
	Notional	64	0	20.6	0	0	0.86	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	11.6	0	4	0	1.2	0.8	0	1	0
	Notional	40.1	0	12.9	0	1.1	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	44.9	36	3.3	2.3	2.9	3.73	4.26	4	6
	Notional	61.2	36.3	6.6	2.7	1.7	2.56	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.19	GF000003:Surf[1]
Floor	0.2	0.1	GF000003:Surf[0]
Roof	0.15	0.12	GF000013:Surf[1]
Windows, roof windows, and rooflights	1.5	1.4	GF000002:Surf[1]
Personnel doors	1.5	1.4	GF000013:Surf[2]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5

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