



Storage World, Manchester Ambrose Street

Renewable and Sustainability Planning Report

October 2022

Waterman Building Services Limited

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Client Name: Storage World

Document Reference: BSD14588

Project Number: BSD14588

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004)

Issue	Date	Prepared by	Checked by	Approved by
0	28/10/22	Andy Warren Mechanical Engineer	Tim Davies Director	Tim Davies Director
1	31/10/22	Andy Warren Mechanical Engineer	Tim Davies Director	Tim Davies Director

Comments

Our Markets



Property & Buildings



Transport & Infrastructure



Energy & Utilities



Environment

Disclaimer

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1. Introduction

This report outlines the renewable and sustainable energy design proposals for a new Storage World facility on Ambrose Street, Manchester. The report sets out the approach that has been taken with the design to meet the Local Planning Application requirements, minimising the energy use of the building through passive and active measures and incorporating renewable technologies to further reduce the carbon emissions from the building. The report also addressed the design steps taken to allow the building to adapt to climate change in future years.

1.1 Manchester City Council Core Planning Policies

The building has been assessed against the following Manchester City Council Core Planning Policies, and the following report outlines how each has been met, summarised below and in the following document text.

Policy ENE04

Policy EN 4 'Reducing CO2 Emissions by Enabling Low and Zero Carbon Development' states that the Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO2 emissions, and rising fossil fuel prices, through a number of actions. These include that 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.

Design Response:

The following report demonstrates how the scheme has been designed following the Energy Hierarchy approach, building from a fabric first, passive design philosophy onto active low energy systems and finally with the application of low and zero carbon renewable technologies.

Policy ENE06

Policy EN 6 'Target Framework for CO2 reductions from low or zero carbon energy supplies' states that applications for development over 1,000 sq m will be expected - as a minimum - to meet the target shown in Tables 12.1 or 12.2, unless this can be shown not to be viable. This should be demonstrated through an Energy Statement submitted with the application, and such statements will be expected to

set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development.

The applicable table 12.2 (non-domestic buildings) is listed below

Non-domestic CO₂ emissions reduction targets	
Table 12.2	
Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible, a 15% increase on Part L 2010
Target 2: Electricity intense buildings (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO ₂ /m ²))	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Design Response:

The following report demonstrates how the Building design, utilising the Energy Hierarchy approach, has reduced the overall energy use of the building and achieves a betterment of the Approved Document Part L2A. Whilst the Policy ENE06 references a 10% betterment of Part L2A 2010 (for an electric intensive building as the proposed building is), the assessment has been made against the more onerous Part L2A 2013 assessment criteria, and the included BRUKL document (Annex B) shows that a betterment is being achieved, which will equate to a higher level of betterment on a 2010 Part L assessment. Therefore, the building has been demonstrated as bettering the ENE06 requirement.

Policy EN8

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

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

Design Response:

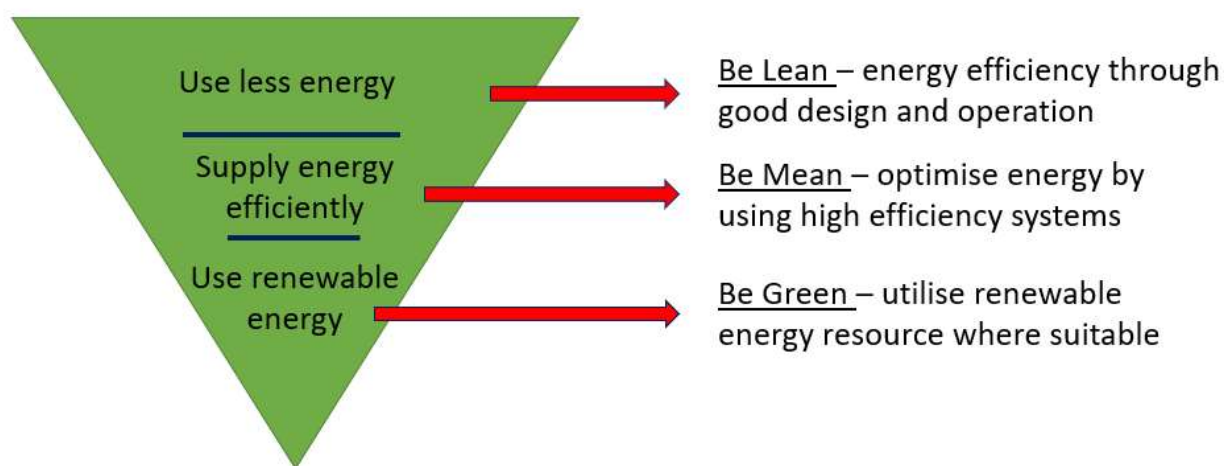
The following report demonstrates how the building has been developed to address the required elements of Policy EN8, outlining the passive design measures such as solar shading, natural ventilation measures, free cooling and daylight, fabric material choices and green walls. The report also addresses how the building can be modified simply in the future to maintain a comfortable environment, by adapting to changes in the external climate.

2. The Approach to Sustainability (ENE04)

This section outlines the project's approach to sustainable design and presents the design proposals for achieving an energy efficient building.

2.1 The Energy Hierarchy

The Energy Strategy for the proposed development has been progressed on the well-founded approach that is often referred to as the “lean, mean, green” approach. The lean, mean, green strategy applies throughout the development and the specific solutions have been analysed and are summarised in the sections below.



2.2 Energy Conservation Measures to be Taken

The energy conservation measures (“Lean” Solutions) proposed for the building, include the following

- Improving thermal insulation. Wall, roof, floor & glazing provide ‘U’ values, significantly better than Building Regulation standards. (see annex B for U values used)
- Improving airtightness. Air tightness standards are significantly better than Building Regulations and will provide large energy savings to heating and cooling.
 - Proposed Air Permeability 5m³/hm²@50Pa
- Optimising daylighting. Providing generous glazing to the function spaces to enhance daylighting
- Low water demand appliances. Careful specification of the sanitaryware is required to minimise water demand and hot water heating energy.
- Improving services thermal insulation.
- Control of solar gains using high efficiency glazing

- Proposed Glazing G-Value – (see annex B for glazing value)
- Passive natural ventilation systems, coupled with night cooling and thermal mass

2.3 Energy Measures to be Taken

The energy efficiency measures (“Mean” Solutions) for the building will include

- Lighting. Use of high efficacy LED lighting in all areas.
- Lighting Control. Use of automatic lighting control provided where possible and in line with room use to ensure lights are on only when demand dictates – including presence detection and absence detection
- Heating, Ventilation System Controls. To ensure that the plant runs efficiently, and rooms are only conditioned when occupancy dictates.
- Heat recovery on ventilation plant to recover energy from exhaust air paths.
- Metering. Provision of meters to aid the energy management of energy including power, lighting and heating.
- Automatic controls that allow the energy in spaces, to be controlled and switched off when the room is not occupied, plant operation to be monitored and plant failure to be quick identified.

3. Proposals for LZC Technologies

A number of low and zero carbon technologies have been considered. A summary of technologies considered are included within Appendix 'A'. To maximise the betterment on Part L, the following LZC technologies are proposed:

- Air Source Heat Pumps (ASHP) for heating for the building.
- Photovoltaic Cells

3.1 Air Source Heat Pumps

An ASHP system shall be utilised to provide heating within the new building. It is proposed that the air source heat pump condensers shall be located within an externally (north elevation) adjacent to the building. Whilst the exact requirement will be set by the final design, it is anticipated that two heat pump units will be installed to serve the buildings heating requirements.

3.2 Photovoltaic Cells

It is proposed that the building shall be served by an array of roof mounted photovoltaic (PV) cells. The PV cells shall be aligned to face due south to maximise the energy output and the feed shall be directed into the building. Whilst the exact requirement will be set by the final design, it is anticipated that approximately 37No 300W PV cells will be installed on the building.

4. CO2 Emissions (ENE06)

The scheme has been modelled and the energy demand and carbon dioxide emission assessments have been carried out using the National Calculation Method outlined in the building regulations Part L2A 2013 BRUKL assessment.

The design of the building has achieved the required compliance of the BRUKL carbon emission providing Photovoltaic panels are installed and this is demonstrated within the initial planning stage BRUKL document for the scheme (see annex B).

5. Adaption to Climate Change (EN8)

The building has been developed to address the required elements of Policy EN8. This has been provided by a series of staged measures that have been applied to all elements of the building design, including such passive design measures such as natural ventilation measures, free cooling and daylight and fabric material choices, all of which are outlined below. The design has also addresses how the building can be modified simply in the future to maintain a comfortable environment, by adapting to changes in the external climate.

The main principals of passive design that have been applied to this proposed building, in order to provide good indoor environmental comfort (temperature, air quality, etc), as well meet the appropriate construction standards are set out below.

Temperature / Air Strategy:

- The building has been developed to maximise, where possible, the daylight potential to the spaces to maximise the ability to harness light and reduce the electrical energy consumption of the artificial lighting systems.
- The specification of the glazing system achieves a high light transmission rate whilst also achieving a low g-value and solar gain rate.
- The concept design stage has been developed and centred around the proposal that the building shall be ventilated wherever possible by natural ventilation with some areas of fully mechanical ventilation where the situation dictated, such as kitchen area and toilet areas.
- The winter draught free ventilation provision is catered for by the proposed use of mechanical ventilation heat recovery units (MVHR) so that the incoming cold air recovers heat from extracted room air, improving occupant comfort, making full use of the free heating and reducing overall heating loads.

Building fabric / form strategy:

- The building form is simple and has a low exposed surface area proportion to volume (has a good 'form factor'); this prevents excess heat loss.
- Building fabric insulation is appropriately specified and exceeds the current government standards.
- Good practice standards of design will be utilised to reduce thermal bridging and improve air tightness rating where possible.

Future Adaptability of the Building:

The current predictions for future climate change indicate that, due to the effects of global warming already instigated by the previous years of uncontrolled greenhouse gas emissions, the global climate will increase in temperature by several degrees during this century, and the current experienced temperatures are recorded as currently already having risen by 1°C on average.

The impact this will have on the global climate, the local microclimate and therefore the proposed building itself cannot be definitively advised, however the general climate models all show that the local environment in which the building will reside will be warmer throughout the summer and the winter months and be liable to higher levels of intensive rainfall and storms.

Obviously, the predicted warmer winter conditions will benefit the building energy consumption by reducing the amount of energy required during peak period to warm the building. However, the warmer summer periods will mean that in order to maintain the current desired summertime maximum temperature levels, the building will potentially need to be modified in the future to maintain pace with the external climate.

It is envisaged that across the building lifetime, there are a number of areas where the building can be modified to achieve the desired adaption to ensure that the building can continue to be used and does not become obsolete. The below list of options is based on the current technology and system available on the market today, however it is envisaged that, as the climate changes and technology advances, newer systems, fabrics, construction techniques and live technologies such as nano-tech systems will be developed that will then provide further options for future development of the building. The important factor is for the buildings to be built today with the ability to incorporate the technology of tomorrow.

System	How can the system be incorporated into the building?	Can be included within the building (yes/no)
Relaxation of the current internal temperatures	As the external temperatures rise it is expected that the internal design temperatures will also rise as occupants become acclimatised to working within a warmer environment, therefore the building could be fully operational in a warmer environment without any further modifications due to natural changes in the occupant's comfort criteria.	Yes
Improvement of the façade performance	The existing building is a proposed as a steel framed construction therefore the façade can be removed and replaced in future years with a newer and more technologically advanced, higher performing façade to provide sufficient extra benefit to offset the changes in climate.	Yes
Improved ventilation	Along with the modifications to the external façade, the openable natural ventilation areas can be increased at the same time to improve the level of natural ventilation provision to the rooms and building to offset the changes in the climate.	Yes

Phase change materials	Additional thermal mass can be retrofitted into the building to improve the performance of the night cooling. Simple phase change material sheets or blocks can be installed around the building and rooms to increase the level of stored energy coolth that can then be released throughout the next day.	Yes
Limiting gains from lighting and equipment	Both installed lighting systems and equipment have both a limited lifespan and a continued development to reduce the energy consumed by their use. These developments will continue such that when these systems are due to be replaced in 15 to 20 years' time, the new installations will be more energy efficient and therefore will naturally aid in the efforts to combat the effects of the climate change.	Yes
Mixed mode ventilation	The effectiveness of the natural ventilation systems will decrease as the external temperatures rise, however there is the ability to start to introduce at this stage boost extract fans to assist the natural ventilation strategies as local systems in each room.	Yes

6. Conclusions

Preliminary calculations of the energy demand and carbon dioxide emissions have been carried out using the National Calculation Method outlined in the building regulations Part L2A 2013 BRUKL calculation software.

Energy efficient design techniques have been adopted to ensure that passive design measures are maximised in the first instance as follows

- Low U-values
- Low air permeability

Low energy lighting, energy efficient controls and high efficiency plant selection have been incorporated to reduce carbon dioxide emissions of the proposed development.

The use of low and zero carbon technologies also supplement the scheme with the proposed use of air source heat pumps and photovoltaic cells. The review looked at the possibilities for including further LZC technologies but these were discounted.

The result of this combined approach is that the design has been shown to achieve a betterment of the Building Regulation emissions as indicated in Annex B, exceeding the requirements of Core Policy ENE06, whilst the design also meets the requirements set out for compliance of ENE04 and EN8.

Appendix A - Renewable Technologies Considered

The following table summarises the LZC technologies considered for this project.

Sustainable Design Option	Suitability for site	Reason for acceptance or rejection of option	Export of energy feasible?	Cost for Carbon Emission Reduction
Biomass boiler	No	Site location (close to housing) and logistics (e.g. fuel stores and flue emissions) preclude this option	No	High
Ground source heat pumps	Yes	Made up ground conditions anticipated as being restrictive to operational efficiencies	No	High
Air source heat pumps	Yes	Suitable for site logistics and application	No	Medium
Bio-diesel Generator	No	Site location (close to housing) and logistics (e.g. fuel stores and flue emissions) preclude this option	No	High
Solar water heating	No	Insufficient hot water demand within the building	No	Medium
Photovoltaic cells	Yes	PV cells can be incorporated	Yes – can be linked to grid electricity	Medium
Combined heat and power plant	No	Insufficient base heat demand	No	Medium
Hydro-power	No	No local water courses	No	High

Appendix B – Part L2 & EPC Report 2021



Storage World, Ambrose Street, Manchester

Building Regulations Part L2A & EPC Report

October 2022

Waterman Building Services Limited

6th Floor Trinity Court | 16 John Dalton Street | Manchester M2 6HY
www.watermangroup.com

Client Name: Storage World

Document Reference: 63061-WBS-B1-ZZ-RP-Z-1000

Project Number: 14558

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and ISO 45001:2018)

Issue	Date	Prepared by	Checked by	Approved by
P01	28/10/22	Andy Warren Mechanical Engineer	Tim Davies Director	Tim Davies Director
P02	31/10/22	Andy Warren Mechanical Engineer	Tim Davies Director	Tim Davies Director

Comments

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1.0 Executive Summary

1.1 Part L Volume 2021 Edition

Based on the parameters detailed in this report, the analysis of the building satisfies Part L Volume 2021 edition.

Building Emission Rate (BER) must not exceed the Target Emissions Rate (TER).			
Target Emission Rate kgCO ₂ /m ² /yr.	Building Emission Rate kgCO ₂ /m ² /yr.	Reduction in CO ₂ Emissions	Status for Criterion 1a
2.64	-4.94	287.1%	PASS

Building Primary Energy Rate (BPER) must not exceed the Target Primary Energy Rate (TPER).			
Target Emission Rate kWh/m ² /yr.	Building Emission Rate kWh/m ² /yr.	Reduction in Energy Rate	Status for Criterion 1b
144.78	-30.31	310.5%	PASS

1.2 EPC

The predicted EPC score for this building is **A+ -28**.

Energy Performance Certificate
Non-Domestic Building



Ambrose Street Storage World
Ambrose Street
Manchester
M12 5DD

Certificate Reference Number:
4457-6407-4637-4488-5726

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

A 0-25

B 26-50

C 51-75

-28

This is how energy efficient the building is.

Net zero CO₂ emissions

1.3 Local Authority Requirement

The Manchester Core Strategy Policy EN6: *Target Framework for CO₂ Reductions from Low or Zero Carbon Energy Supplies* requires a 15% improvement on Part L 2010 where a CHP/district heating anchor or connection is not feasible.

This development is demonstrating a 208% reduction in CO₂ emissions based on 2010 regulations and therefore meets this target.

2.0 Introduction

The purpose of this report is to demonstrate that the energy efficiency of the proposed building is compliant with the approved document Part L Volume 2 2021.

This project comprises of a new five storey warehouse storage building, which consists of storage spaces, reception, offices, meeting room, kitchenette and welfare facilities.

Note: The Storage parts of the building is unheated so is excluded from the results.

2.1 Limitations of this Report

To comply with building regulations, the building work must meet all relevant requirements of the Building Regulations Part L Volume 2021 edition. This document covers the following sections:

- Section 1: Calculating the target primary energy rate and target emission rate.
- Section 2: Calculating the building primary energy rate and building emission rate.
- Section 3: Consideration of high-efficiency alternative systems.
- Section 4: Limiting heat gains and losses.
- Section 5: Minimum building services efficiencies and controls.
- Section 6: System specific guidance

All other relevant sections are not covered in this report and have to be satisfied by a Builders Submission.

2.2 Methodology

Calculations have been performed using IES Virtual Environment v2022.1.2.0.

The IES VE Compliance software has been approved by the Department for Communities and Local Government (DCLG) for use as a Dynamic Simulation Model (DSM).

2.3 Building Type and Location

The building usage is defined for the building as B8 Warehouse or Storage in line with the National Calculation Method's (NCM) definitions for building uses.

This building is located on Ambrose Street in Manchester. The ManchesterTRY weather file has been selected for the simulation as the local weather file.

2.4 Architectural Information

The 3D geometry has been based on the Bate and Taylor Architects drawings.

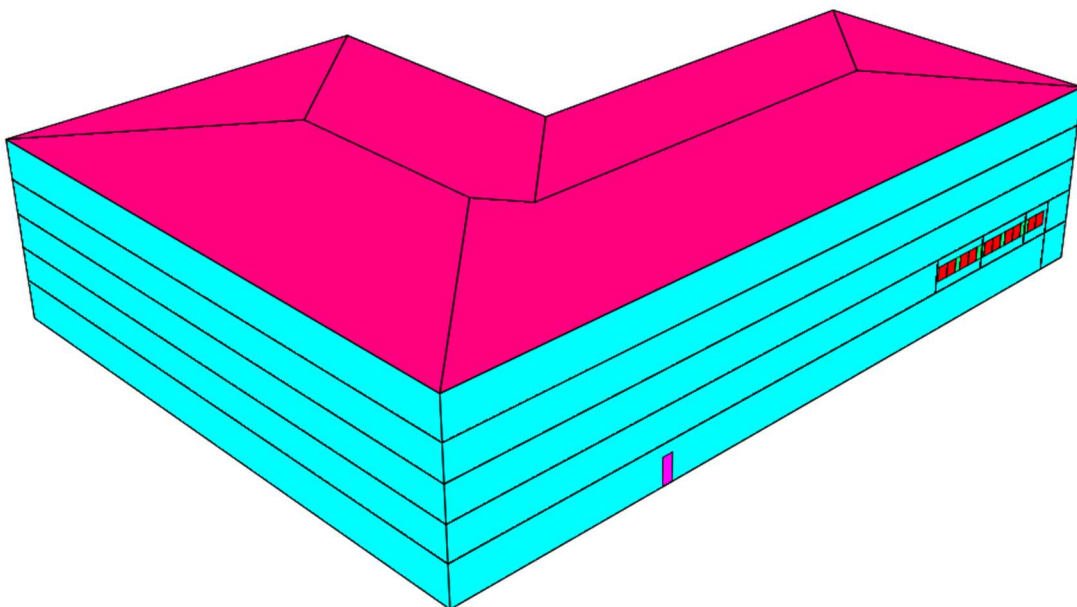
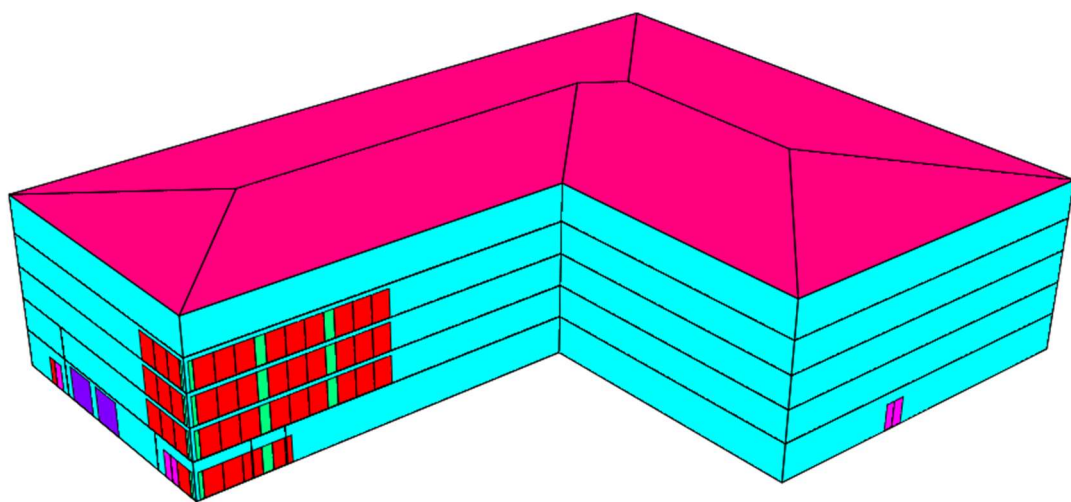
2.5 Design Air Permeability

Air leakage of 5 m³/hour/m² at 50 Pa is applied to the building. This will require testing and certification upon completion of the build to demonstrate that the target was achieved.

2.6 Fabric

Construction

- WEA External Wall Cladding U=0.18 (STD_WAL5)
- WEA External Window U=1.4 G:0.4 (GXTR0002)
- WEA Glazed Door U=1.4 G:0.4 (STD_EXT2)
- WEA Ground Floor U=0.18 (WGRN0001)
- WEA Internal Ceiling/Floor U=0.15 (STD_CEI1)
- WEA Internal Floor (WNTR0001)
- WEA Internal Partition Lightweight insulated (GNTR0000)
- WEA Internal Partition Office / WH U=0.18 (GNTR0002)
- WEA Lookalike Panel U=1.4 (NCMR0021)
- WEA Vehicle Access Door U=1.5 (NCM_CN21)
- WEA Warehouse Roof U=0.15 (NCM_CN23)



3.0 Building Services

This section is based on the Inside Outside Engineering design and drawings received.

3.1 Building Management

This building will have power factor correction and therefore has a power factor of >0.95.

The building is to have provisions for separate metering to Lighting & HVAC services with no warnings for out-of-range values at the central BMS.

3.2 Mechanical

3.2.1 Heating & Cooling

Heating and cooling to the reception and office spaces is to be provided by an air source heat pump. The system has been set with a SCOP of 4.20 and SEER of 7.20. The WCs are to be heated with electric panel heaters.

3.2.2 Ventilation

The building is to be provided with a central MVHR unit as per the schedule below.

Fan	Location	SFP (W/l/s)	Heat Recovery %
Nuaire XBC25HA	Ground Floor	0.8	83%
Nuaire XBC15HA	First Floor	1.1	83%

3.2.3 Domestic Hot Water

Hot water to the building is to be provided by an unvented electric water heater.

The storage of the unit is 30l with a standing loss of 0.023kWh/l/day.

3.3 Electrical

3.3.1 Lighting

Luminaire	Location	W	Lumens	Llm/cW
B – Whitecroft Cascade	WCs, Meeting Rooms, Office, Reception, Kitchenette	42	4195	99.9
F – Thorn Novaline	Stairs, Stores	13	1900	146.2

- Absence detection is provided to the meeting rooms, offices, reception and kitchenette.
- Presence detection is provided to the WC, Stairs and Stores.
- Daylight dimming is not included in the project.

3.3.2 Solar PV

A roof top solar PV array has been included with the following parameters:

- 9.1 kWp array.
- 37No. panels – module efficiency 20%.
- 59.2m².
- 98% efficiency inverter.

As per the BRUKL document, the predicted energy needs of this building is 27.08kWh/m² for primary energy and 30.67kWh/m² for equipment, this is a total of 57.75kWh/m².

For the building area of 144.6m² this equates to 8,351kWh/year.

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.85	4.1
Cooling	2.62	2.14
Auxiliary	3.17	2.82
Lighting	11.68	10.92
Hot water	4.75	2.86
Equipment*	30.67	30.67
TOTAL**	27.08	22.84

* 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.

The PV array as described generates 9,844kWh/year.

Generated: 9,844 / Building Energy: 8,351 = **118% of prediction energy from renewables.**

4.0 Part L Volume 2 2021

Based on the parameters detailed in this report, the analysis of the building satisfies Part L Volume 2021 edition.

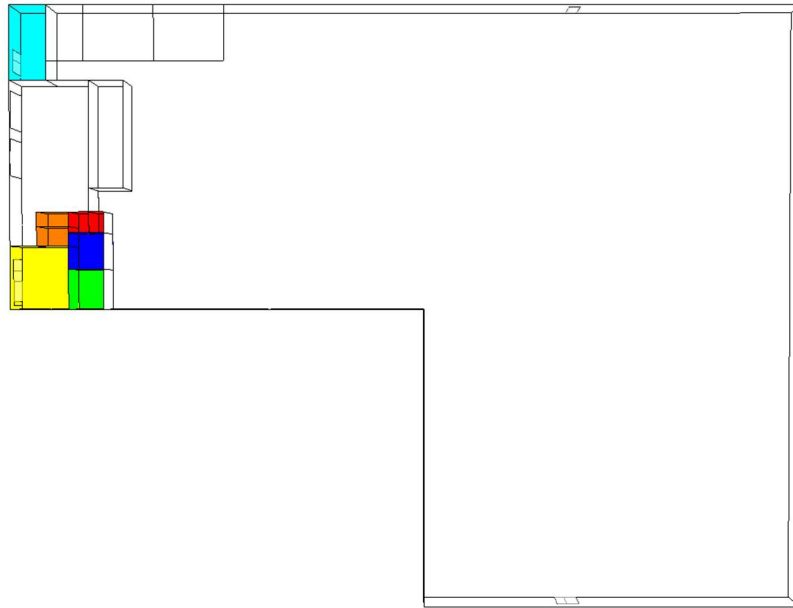
Building Emission Rate (BER) must not exceed the Target Emissions Rate (TER).			
Target Emission Rate kgCO ₂ /m ² /yr.	Building Emission Rate kgCO ₂ /m ² /yr.	Reduction in CO ₂ Emissions	Status for Criterion 1a
2.64	-4.94	287.1%	2.64

Building Primary Energy Rate (BPER) must not exceed the Target Primary Energy Rate (TPER).			
Target Emission Rate kWh/m ² /yr.	Building Emission Rate kWh/m ² /yr.	Reduction in Energy Rate	Status for Criterion 1b
144.78	-30.31	310.5%	PASS

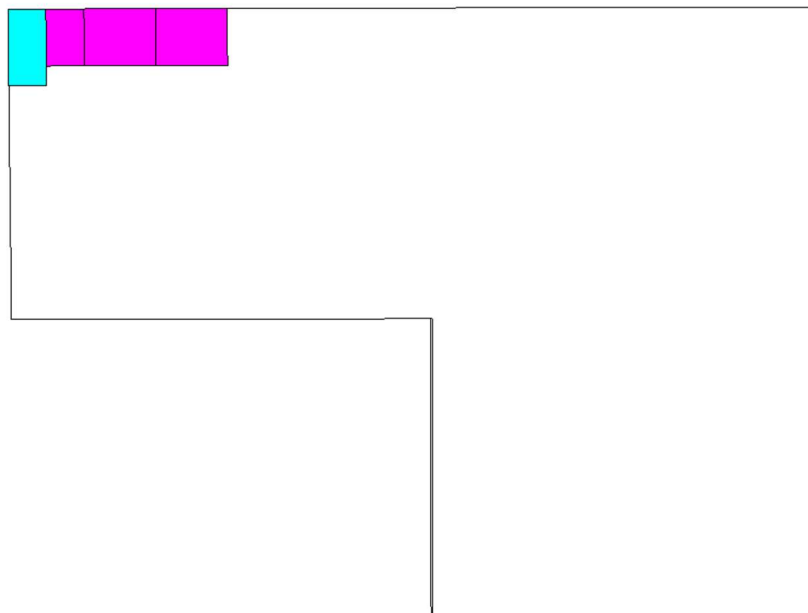
4.2 NCM Room Activity

NCM Activity

-  NCM Ware: Circulation area
-  NCM Ware: Cupboard
-  NCM Ware: Office
-  NCM Ware: Office (Warehouse: Meeting)
-  NCM Ware: Office (Warehouse: Tea)
-  NCM Ware: Reception
-  NCM Ware: Toilet

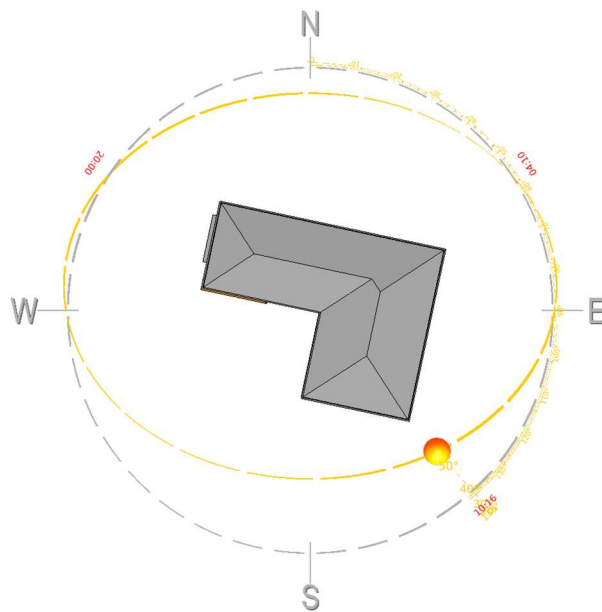
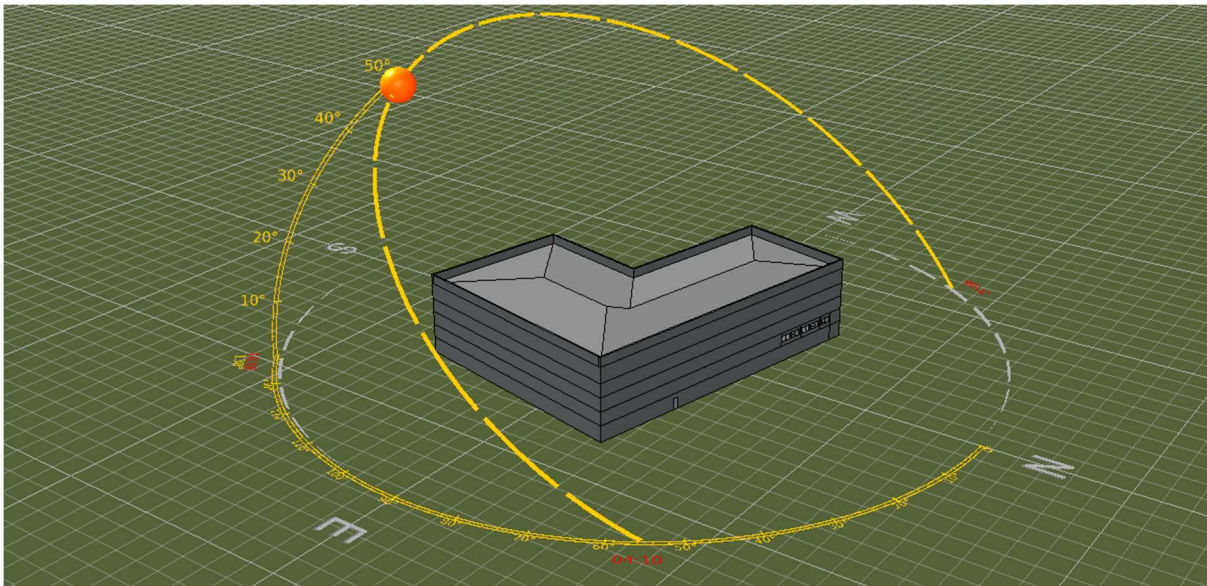
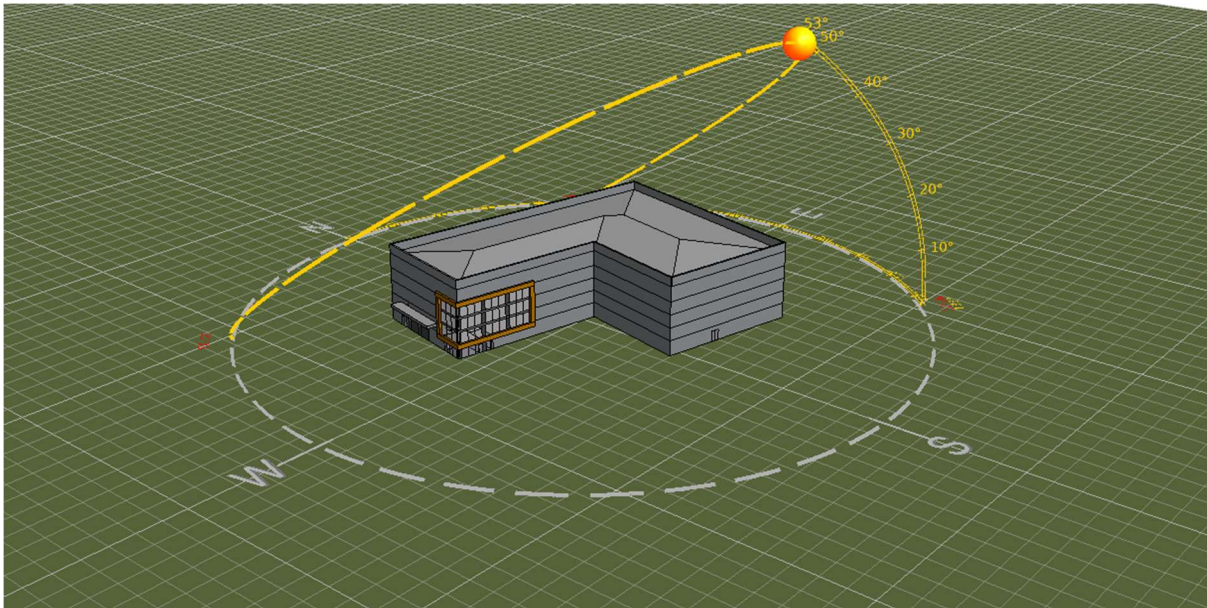


Ground Floor



First Floor

4.3 Model Images



4.4 Certificates

Part L 2010 as designed
Part L 2021 as designed
EPC

Project name

Ambrose Street Storage World - PV 2010

As designed

Date: Fri Oct 28 12:18:16 2022

Administrative information

Building Details

Address: Ambrose Street Storage World, Manchester, M12
5DD

Certification tool

Calculation engine: Apache

Calculation engine version: 6.4.0.16

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 6.4.0.16

BRUKL compliance check version: v4.1.h.0

Certifier details

Name: Nicolas Walker

Telephone number: 07980130861

Address: Walker Energy Analysis, Redlands Business
Centre, 3-5 Tipton House Road, Sheffield, S10
5BY

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

1.1	CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	20.1
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	20.1
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	-21.7
1.4	Are emissions from the building less than or equal to the target?	BER ≤ TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

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

2.a Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	00000008:Surf[4]
Floor	0.25	0.18	0.18	00000007:Surf[0]
Roof	0.25	-	-	UNKNOWN
Windows***, roof windows, and rooflights	2.2	1.4	1.4	00000008:Surf[2]
Personnel doors	2.2	1.4	1.4	00000006:Surf[1]
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

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC02: Electric Rad / MVHR

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
1	-	-	0.83
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

2- HVAC01: VRF / MVHR

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
4.2	7.2	-	0.83
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

1- DHW

Heating seasonal efficiency	Hot water storage loss factor [kWh/litre per day]
1	0.023

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
00 Accessible WC	0.8	-	-
00 Meeting Room	0.8	-	-
00 Office / Kitchenette	0.8	-	-
00 Reception	0.8	-	-
00 Visitor WC	0.8	-	-
01 Office 1	1.1	-	-
01 Office 2	1.1	-	-
01 Office 3	1.1	-	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
00 Accessible WC	20	-
00 Meeting Room	60	-
00 Office / Kitchenette	60	-
00 Reception	70	99.9
00 Stair 1	20	-
00 Store 1	0	-
00 Store 2	0	-
00 Visitor WC	20	-
01 Office 1	80	-
01 Office 2	130	-
01 Office 3	130	-
01 Stair 1	20	-

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?
00 Meeting Room	NO (-35%)	NO
00 Office / Kitchenette	N/A	N/A
00 Reception	NO (-23.3%)	NO
01 Office 1	NO (-68.6%)	NO
01 Office 2	NO (-67.1%)	NO
01 Office 3	NO (-66.9%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the 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]	147.8	147.8
External area [m ²]	238.7	238.7
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	5
Average conductance [W/K]	104.57	142.98
Average U-value [W/m ² K]	0.44	0.6
Alpha value* [%]	10.1	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
100	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: 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	4.04	5.84
Cooling	3.22	5.01
Auxiliary	3.19	2.85
Lighting	12.49	24.32
Hot water	4.72	3.43
Equipment*	30.35	30.35
TOTAL **	27.66	41.44

* Energy used by equipment does not count towards the total for 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	67.39	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	112.2	119.99
Primary energy* [kWh/m ²]	80.75	114.02
Total emissions [kg/m ²]	-21.7	20.1

* 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] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	73.8	84.1	5.2	4.6	4.2	3.91	5.11	4.2	7.2
	Notional	72	97.1	7.8	7.1	3.7	2.56	3.79	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	20.5	0	7.1	0	4.4	0.8	0	1	0
	Notional	20.2	0	6.7	0	4.7	0.83	0	----	----
[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 BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.18	00000008:Surf[4]
Floor	0.2	0.18	00000007:Surf[0]
Roof	0.15	-	UNKNOWN
Windows, roof windows, and rooflights	1.5	1.4	00000008:Surf[1]
Personnel doors	1.5	1.4	00000006:Surf[1]
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

Project name

Ambrose Street Storage World**As designed****Date:** Fri Oct 28 09:15:30 2022**Administrative information****Building Details****Address:** Ambrose Street, Manchester, M12 5DD**Certifier details****Name:** Nicolas Walker**Telephone number:** 07980130861**Address:** Walker Energy Analysis, Redlands Business Centre, 3-5 Tapton House Road, Sheffield, S10 5BY**Certification tool****Calculation engine:** Apache**Calculation engine version:** 7.0.17**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.17**BRUKL compliance module version:** v6.1.c.0**Foundation area [m²]:** 1000**The CO₂ emission and primary energy rates of the building must not exceed the targets**

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	2.64
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	-4.94
Target primary energy rate (TPER), kWh/m ² annum	28.37
Building primary energy rate (BPER), kWh/m ² annum	-59.72
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	00000008:Surf[4]
Floors	0.18	0.18	0.18	00000007:Surf[0]
Pitched roofs	0.16	-	-	No Pitched roofs in building
Flat roofs	0.18	-	-	No Flat roofs in building
Windows** and roof windows	1.6	1.4	1.4	00000008:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.4	1.4	00000006:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No Vehicle access doors in building
High usage entrance doors	3	-	-	No High usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* 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.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC02: Electric Rad / MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	0.83
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- HVAC01: VRF / MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.2	7.2	0	-	0.83
Standard value	2.5*	5	N/A	N/A	N/A
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.

1- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.023
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
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 balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

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	2.3	2	0.5	0.5	0.4	1		
00 Accessible WC		-	-	-	0.8	-	-	-	-	-	-	N/A
00 Meeting Room		-	-	-	0.8	-	-	-	-	-	-	N/A
00 Office / Kitchenette		-	-	-	0.8	-	-	-	-	-	-	N/A
00 Reception		-	-	-	0.8	-	-	-	-	-	-	N/A
00 Visitor WC		-	-	-	0.8	-	-	-	-	-	-	N/A
01 Office 1		-	-	-	1.1	-	-	-	-	-	-	N/A
01 Office 2		-	-	-	1.1	-	-	-	-	-	-	N/A
01 Office 3		-	-	-	1.1	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
00 Accessible WC		100	-	-
00 Meeting Room		100	-	-
00 Office / Kitchenette		100	-	-
00 Reception		100	100	1.351
00 Stair 1		146	-	-
00 Store 1		146	-	-
00 Store 2		146	-	-
00 Visitor WC		100	-	-
01 Office 1		100	-	-
01 Office 2		100	-	-
01 Office 3		100	-	-
01 Stair 1		146	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00 Meeting Room	NO (-14.9%)	NO
00 Office / Kitchenette	N/A	N/A
00 Reception	YES (+7.5%)	NO
01 Office 1	NO (-58.9%)	NO
01 Office 2	NO (-56.9%)	NO
01 Office 3	NO (-56.6%)	NO

Regulation 25A: Consideration of high efficiency 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
Floor area [m ²]	144.6	144.6
External area [m ²]	238.7	238.7
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	5
Average conductance [W/K]	107.26	108.18
Average U-value [W/m ² K]	0.45	0.45
Alpha value* [%]	24.61	10

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

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups

100 Storage or Distribution

Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 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	4.85	4.1
Cooling	2.62	2.14
Auxiliary	3.17	2.82
Lighting	11.68	10.92
Hot water	4.75	2.86
Equipment*	30.67	30.67
TOTAL **	27.08	22.84

* 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	68.08	3.67
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>68.08</i>	<i>3.67</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	112.33	75.73
Primary energy [kWh/m ²]	-59.72	28.37
Total emissions [kg/m ²]	-4.94	2.64

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] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	90.5	69.1	6.4	3.8	4.2	3.91	5.11	4.2	7.2
	Notional	56.2	51.1	5.6	3.1	3.7	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	21	0	7.3	0	4.4	0.8	0	1	0
	Notional	17.9	0	3.5	0	4.7	1.41	0	----	----
[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

Energy Performance Certificate

Non-Domestic Building



Ambrose Street Storage World
Ambrose Street
Manchester
M12 5DD

Certificate Reference Number:

4457-6407-4637-4488-5726

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

<-28

This is how energy efficient the building is.

Net zero CO₂ emissions

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m ²):	147.773
Building complexity:	Level 5
Building emission rate (kgCO ₂ /m ² per year):	-4.79
Primary energy use (kWh/m ² per year):	-57.93

Benchmarks

Buildings similar to this one could have ratings as follows:

16 If newly built

63 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software: Virtual Environment v7.0.17 using calculation engine ApacheSim v7.0.17

Property Reference: UPRN-000000000000

Assessor Name: Nicolas Walker

Assessor Number: LCEA185238

Accreditation Scheme: CIBSE Certification Limited

Assessor Qualifications: NOS5

Employer/Trading Name: Walker Energy Analysis Ltd

Employer/Trading Address: Redlands Business Centre, 3-5 Tipton House Road, Sheffield, S10 5BY

Issue Date: 28 Oct 2022

Valid Until: 27 Oct 2032 (unless superseded by a later certificate)

Related Party Disclosure: Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 4127-4278-8407-0838-5276

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by CIBSE Certification Limited. You can obtain contact details of the Accreditation Scheme at www.cibsecertification.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.



*Project Office