

MSP GREENHEYS REDEVELOPMENT

M&E Stage 3 Environmental and Energy Statement GRE-SLCE-XX-XX-RP-ME-2000

April 2023
Rev 01



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Amendment Record Sheet

Issue/revision 00			
Remarks	Stage 3 Issue		
Revision	Rev 00		
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Signature			
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Signature			
Authorised by	MGS		
Signature			
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Executive Summary

The Greenheys Redevelopment will be a BREEAM Excellent rated reduced Carbon building constructed in compliance with Bruntwood SciTech’s sustainability objectives and the following as stipulated in the Manchester Core Strategy:

- Compliance with Approved Document L (ADL) of the Building Regulations 2021 with 2023 amendments,
- Greater than 10% reduction from maximum CO2 emissions calculated according to ADL 2010 in accordance with Policy EN6 of the Manchester Core Strategy
- Use of Solar Photovoltaic panels
- Bruntwood SciTech’s sustainability objectives.
-
- Increased Biodiversity

1. Introduction

This Environmental Statement has been compiled on behalf of Bruntwood SciTech to demonstrate their commitment to meet the standards described in the 2012 Manchester Core Strategy in the following areas:

- Energy Efficiency
- Renewable Energy
- Environmental Design
- Water Management
- Weather Resilience
- Waste Management
- Construction Management
- Biodiversity

The proposed building will be a 7 – storey building comprising up to 186,000 sqft commercial floorspace across 6 occupiable floors (Use Class E) with plant space above.

The site currently comprises the Greenheys Building, a two to three storey brick building currently used as research and development facility for a range of different science and technology businesses, and comprising office spaces, office clusters, and meeting rooms.

2. Energy Efficiency

The Greenheys Development Building has been designed to provide comfortable, stable environmental conditions suitable for the proposed Laboratory Spaces that will also enhance and promote user comfort. This is achieved using engineering solutions that are intrinsically sustainable and energy efficient.

The building is compliant with Approved Document L (ADL) 2021 incorporating 2023 Amendments, and shows a small improvement over the notional building.

Target CO ₂ emission rate (TER), kgCO ₂ /m ² :annum	6.68
Building CO ₂ emission rate (BER), kgCO ₂ /m ² :annum	6.55
Target primary energy rate (TPER), kWh/m ² :annum	72.92
Building primary energy rate (BPER), kWh/m ² :annum	71.23
Do the building's emission and primary energy rates exceed the targets?	BER <= TER BPER <= TPER

Fig2.1 extract from ADL2 2021 (inc 2023 amendments) BRUKL. A full copy is in Appendix 1 of this report.

The building envelope construction performance is currently modelled in line with that of the Part L notional building. However, the aim is to optimise the thermal performance and improve upon the air permeability beyond that of the notional building through CIBSE TM54 thermal modelling during RIBA Stage 4 as part of the fabric first approach. The façade performance will be based on the LETI minimum recommended values where possible, and as adapted in the table to suit the proposed façade construction details in line with the Clients brief and aspirations for meeting Reduced Carbon in operation.

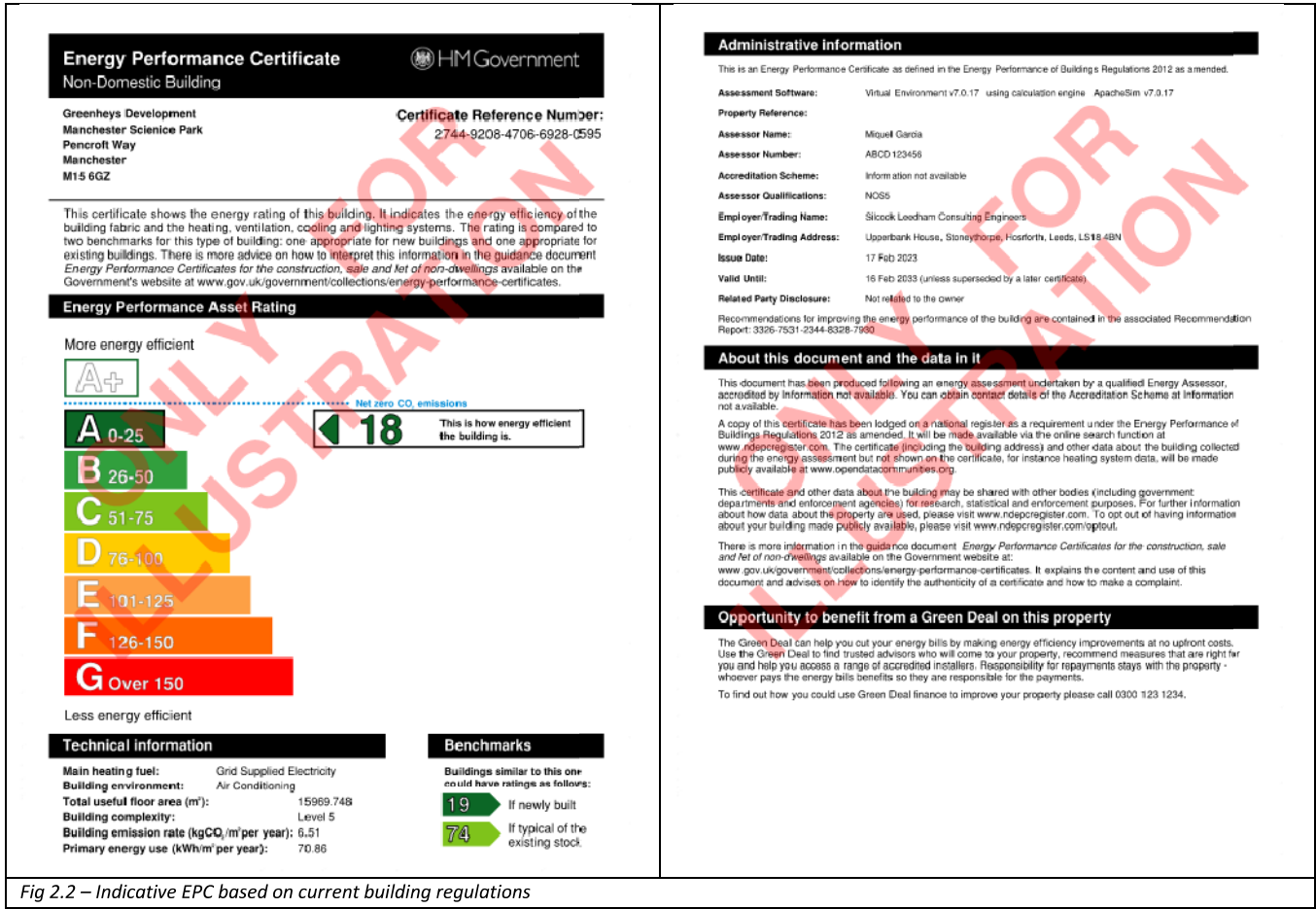


Fig 2.2 – Indicative EPC based on current building regulations

Summary:

Building Emission Rate (BER) = 6.55kg.CO2/m2

Target Emission Rate (TER) 6.68kg.CO2/m2

Building Primary Energy Rate (BPER) 71.23kWh/m2

Target Primary Energy Rate (TPER) 72.92kWh/m2

EPC - 18A

A further ADL compliance calculation has been carried out to demonstrate that the building complies with the requirement for an improvement of at least 10% over the 2010 regulations as stipulated for electricity intense buildings described in EN6 of the Manchester Core Strategy.

1.1	CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	35.8
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	35.8
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	29.3
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

*Fig 2.3 extract from ADL2 2010 BRUKL showing **18% reduction** in CO₂ emissions. A copy of the full document is in Appendix 2 of this report. Note that the figures are significantly greater than the current BRUKL because the CO₂ emission factor for grid supplied electricity reflects the changes made to reduce Carbon emissions from the national grid since 2010*

The Be LEAN – Be CLEAN – Be GREEN – Be SEEN strategic energy approach delivers a fabric first approach and an appropriate blend of technologies which can be tailored to suit the building and the Clients and tenants aspirations. Whilst Building Control compliance is mandatory the aim is to optimise both the predicted EPC rating, but more importantly the EUI, within the realms of affordability and practically. The stepped approach is as follows:

Step 1 - Be LEAN

Reduce building energy use by optimising the building envelope.

- Enhanced fabric with more thermally efficient construction elements
- Well-constructed building targeting a low air leakage rate
- Providing good levels on daylight in deep spaces to enable artificial lighting to be reduced during the daytime
- Optimised size of windows and ratio to the façade and suitable reveal depths to provide appropriate shading to limit overheating risk

Step 2 – Be CLEAN

Design and operate building service systems efficiently.

- Low energy ventilation strategy with high efficiency heat recovery
- The use of Air Source Heat Pumps (ASHPs) to deliver heating, cooling and Domestic Hot Water (DHW)
- Variable speed pumping and on/off zone controls strategies for the heating systems
- Variable Air Volume (VAV), mixed mode and mechanical ventilation using heat recovery where applicable

Step 3 - Be GREEN

- Provide LZC Technology energy sources to provide onsite renewable energy generation and further reduce the carbon impact of the building. This includes the solar Photo Voltaic installation on the roof.

Step 4 - Be SEEN

- Monitor and report actual energy use.

3. Renewable Energy

The Low to Zero Carbon (LZC) Feasibility Study undertaken at RIBA Stage 2, and updated at RIBA Stage 3 recommended the use of the following technologies:

- Solar PV
- Air Source Heat Pumps (reverse cycle providing heating and cooling)

The MEP design includes these LZC technologies, and the details can be seen within the Stage 3 report.

4. Environmental Design

This will be Reduced Carbon in operation development. Whilst there are defined targets for Office buildings produced (LETI and Paris Proof Targets) there are currently no defined targets for Laboratory buildings. The Energy Strategy centres around delivering a building with an Office building equivalent Energy Use Intensity (EUI) in line with LETI/Paris Proof target of 55 kWh_e/m², or lower. Working in conjunction with the client and their consultant team we have agreed an alternative EUI target for laboratory buildings of 300 kWh_e/m² and this has been used as the benchmark for Laboratory use.

The ZED Greenheys Redevelopment Energy Audit Report ref 3280127 appended to this document contains a full description of the calculations carried out to determine the Energy Usage Intensity.

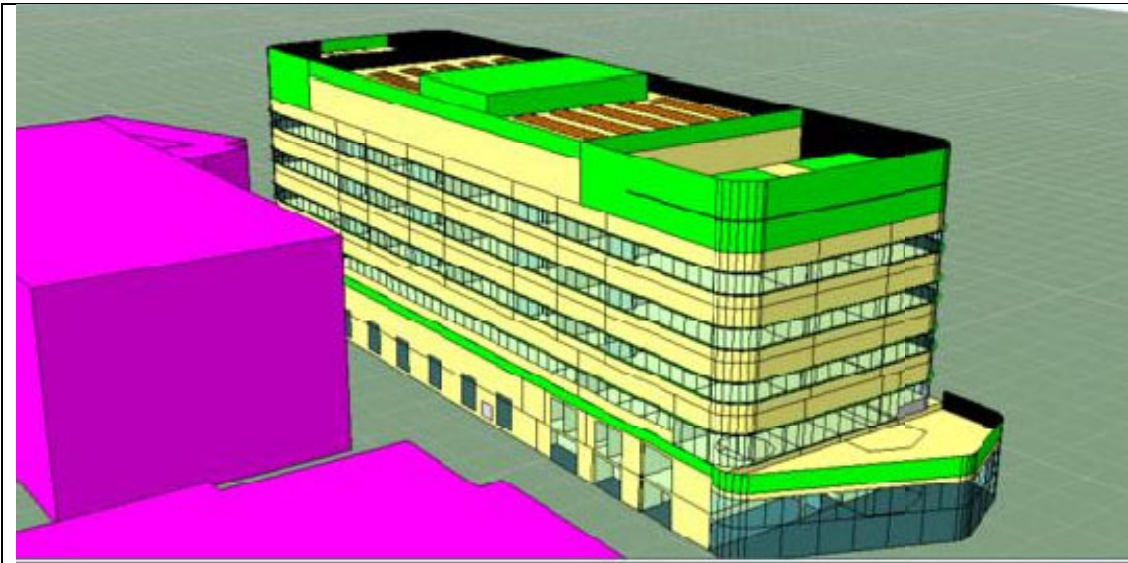


Fig 4.1 – image of IES Virtual Environment model used to calculate Energy Usage Intensity (EUI) figures

5. Water Management

The development will comply with Policy EN14 as described in the site wide Flood Risk Assessment has been produced by DW Consulting and is included in their Drainage Strategy which is appended to this report. However, a site wide FRA has been produced and this accompanies this drainage strategy.

- Foul and surface water drainage within the site will be kept separate.
- Foul water will discharge into the existing Adopted combined in Greenheys Lane, via United Utilities Adopted Manhole ref 2204 located within the adjacent BASE Building site to the South. Approval from UU is to be sought.
- Surface water from the building roof areas, hard landscaped areas and the service road is to discharge from site into the culverted Corn Brook on the far side of Greenheys Lane. Approval from Manchester City Council is to be sought.
- The surface water discharge rate off the site will be restricted to ‘Green Field’ rates. This restriction is facilitated by using a flow restrictor fitted in the final surface water manhole, together with underground storm water storage and a ‘blue’ roof to a large part of the main building.

- The surface water attenuation and blue roof are designed to accommodate a 1 in 100-year storm plus 40% increase for Climate Change, in accordance with current regulations.

6. Weather Resilience

The development will comply with Policy EN 8 – Adaptation to Climate Change with the following:

- Minimal flood risk due to location
- Reduction in urban heat island effect through Green Walls and enhanced landscaping
- Passive design to reduce solar overheating
- Enhanced natural habitats

The site is in Flood Zone 1, above any localised 1 in 1000-year river or stream flood events as shown on the Environment Agency Flood Map for Planning and as such a site specific Flood Risk Assessment is not needed as the site is also well below 1 Ha in size as described in the DW Consulting drainage Strategy appended to this document

The building has been designed with deep reveals to the glazing to provide some solar shading, and the lower floors will feature a green wall and new native trees will be incorporated into the landscaping to reduce the urban heat island effect as described in the Architectural and Landscape Architects’ reports.

Enhanced Natural Habitats are described in Section 9.

7. Waste Management

Construction and demolition waste will be minimised, and recycled on site where possible in accordance with Policy EN 19.

8. Construction Management

The project team will endeavour to minimise any disruption to occupiers of Manchester Science Park and the local community during the construction works and ensure that all Contractors and Subcontractors comply with all relevant legislation, codes of practice, good practice guidelines and local environmental requirements as described in the Bruntwood SciTech Construction and Environmental Management Plan ref 00168434-002-MSPGH-XX-GD-Z-003, a copy of which is appended to this report.

9. Biodiversity

The development will comply with Policy EN15. Habitats within currently on the site comprise hardstanding, introduced shrub and buildings, all of which are of negligible ecological importance.

The scattered trees on-site are of local ecological importance, but new native trees will be included within the site as part of the detailed landscape scheme to increase the biodiversity of the site

The Potential effects on protected and priority species and mitigation measures that will be carried out as a minimum prior to redevelopment of the site and during construction can be summarised as:

Table 9.1 – Actions to mitigate potential effect on protected and priority species		
Species	Potential Effect	Mitigation
Bats	Building 2 - Low Bat Roosting Potential, while Buildings 4&5 - Moderate Bat Roosting Potential.	Further Nocturnal Bat Surveys will be required to determine any impacts to roosting bats prior to planning determination. Note that there is limited foraging and commuting value for bats due to the developed nature of the site and surrounding habitat
Birds	Limited suitable breeding habitat for birds, restricted to the low numbers of scattered trees and introduced shrub.	Through pre-clearance checks of any vegetated areas prior to removal. New native trees will be planted to prevent any negative impacts to birds
Hedgehogs	Very limited potential for hedgehog on-site due to the developed nature of the site and surrounding area, however, the introduced shrub does provide some cover for the species.	Precautionary Working Methods for hedgehog during the clearance of the introduced shrub are therefore recommended, and;
Badgers, reptiles, amphibians (incl. great crested newts), water vole and otter	Negligible potential for these species to be present on-site due to the developed nature of the site and surrounding area.	Not required

Appendix 1 – BRUKL Report (2021)

BRUKL Output Document

Compliance with England Building Regulations Part L 2021



Project name	Greenheys Development	As designed
Date: Mon Feb '23 13:44:28 2023		

Administrative information

Building Details	Certification tool
Address: Greenheys Development, Manchester, M15 6GZ	Calculation engine: Apache
	Calculation engine version: 7.0.17
	Interface to calculation engine: ES Virtual Environment
	Interface to calculation engine version: 7.0.17
	BRUKL compliance module version: v6.1.c.0
Certifier details	
Name: Miquel Garcia	
Telephone number: 0113 393 3329	
Address: Upperbank House, Stoneythorpe, Leeds, LS18 4BN	
	Foundation area [m²]: 1993.74

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m²annum	6.68
Building CO ₂ emission rate (BER), kgCO ₂ /m²annum	6.55
Target primary energy rate (TPER), kWh/m²annum	72.92
Building primary energy rate (BPER), kWh/m²annum	71.23
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 _o Limit	U _o Calc	U _o Date	First surface with maximum value
Walls*	0.26	0.26	0.28	00000012:Surf[4]
Floors	0.10	0.16	0.10	00000034:Surf[0]
Pitched roofs	0.16	-	-	No Pitched roofs in building
Flat roofs	0.18	0.16	0.16	00000029:Surf[0]
Windows** and roof windows	1.6	1.44	1.6	0000000A:Surf[3]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.6	1.6	0000003C:Surf[8]
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 _o calc = Calculated maximum individual element U-values [W/(m²K)]				
U _o limit = Limiting area-weighted average U-values [W/(m²K)]				
U _o calc = Calculated area-weighted average U-values [W/(m²K)]				
* Automatic U-value check by the tool does not apply to certain 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		
m³/(h.m²) at 50 Pa	8	3		

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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	YES
Whole building electric power factor achieved by power factor correction	>0.9

1- * FCU AHU w/HR Offices					
	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4	0	1.6	0.73
Standard value	2.5*	N/A	N/A	2*	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
* Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

2- * Heating battery AHJ w/HR_WC-Store					
	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.2	-	0.73
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

3- * Heating battery AHJ_no HR					
	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- * Heating & Cooling AHU w/HR_Labs					
	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	4	0	1.6	0.73
Standard value	2.5*	4.5**	N/A	2*	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
** Standard shown is for air-cooled chillers >=100 kW. For chillers <100 kW, limiting SEER is 4.					
* Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

5- * DX w/NV_Server					
	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4	0	-	-
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					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

*No HWS in project, or hot water is provided by HVAC system"

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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	ID of system type	SFP [W/(l/s)]									HR efficiency	
	Standard value	A	B	C	D	E	F	G	H	I	Zone	Standard
00_G03a WCs	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G03d Acc WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04a Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04b Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04c Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04d Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04e Dis WC/Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G04g Acc Shower	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G10a WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G10b WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G10d WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G44 Goods	-	-	-	1.6	-	-	-	-	-	-	-	N/A
00_G44b WC Goods	-	-	-	1.6	-	-	-	-	-	-	-	N/A
01_F08a WCs	-	-	-	1.6	-	-	-	-	-	-	-	N/A
01_F08b WCs	-	-	-	1.6	-	-	-	-	-	-	-	N/A
01_F12a Acc WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
01_F51a Acc WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
01_F51b WCs	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S11a WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S11b WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S11c WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S14a WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S14b WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S14c WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S15 Acc WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S41a WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S41b WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S41c WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S44a WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A
02_S44b WC	-	-	-	1.6	-	-	-	-	-	-	-	N/A

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		
02_S44c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
02_S51 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T11a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T11b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T11c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T14a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T14b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T14c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T15 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T41a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T41b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T41c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T44a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T44b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T44c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
03_T51 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T11a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T11b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T11c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T14a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T14b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T14c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T15 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T41a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T41b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T41c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T44a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T44b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T44c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
04_T51 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T11a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T11b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T11c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T14a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T14b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T14c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T15 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T41a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T41b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T41c WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T44a WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T44b WC	-	-	-	1.6	-	-	-	-	-	-	N/A
05_T44c WC	-	-	-	1.6	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
05 T51 Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
Standard value		95		80	0.3
00_G02 Reception		130		100	1.35
00_G02 Scitech Lab Hub		130		-	-
00_G03a Grab & Go Store		100		-	-
00_G03b WCs		100		-	-
00_G03d Acc WC		100		-	-
00_G04a Shower		100		-	-
00_G04b Shower		100		-	-
00_G04c Shower		100		-	-
00_G04d Shower		100		-	-
00_G04e Dis WC/Shower		100		-	-
00_G04f Cleaners Store		100		-	-
00_G04g Acc Shower		100		-	-
00_G05 FM Office		130		-	-
00_G06 Storage Room -20°C		100		-	-
00_G07 Storage Room +4°C		100		-	-
00_G09 Cycle Store		100		-	-
00_G09a Circulation		100		-	-
00_G10 Circulation WCs		100		-	-
00_G10a WC		100		-	-
00_G10b WC		100		-	-
00_G10d WC		100		-	-
00_G11 Touch down space		130		-	-
00_G13 Reformatting Lab		130		-	-
00_G13a Manual Processing Lab		130		-	-
00_G13b Picking Lab		130		-	-
00_G14 Gowning Lobby		130		-	-
00_G16a General Purpose Lab Lobby		100		-	-
00_G16b General Purpose Lab		130		-	-
00_G16c Analysis Lab		130		-	-
00_G16d Shipping Lab		130		-	-
00_G16e Sample Receipt Lab		130		-	-
00_G25 Main Storage: -80°C		130		-	-
00_G40 Ambient Storage		100		-	-
00_G43 Liquid Nitrogen Sample Store		100		-	-
00_G44 Goods		100		-	-
00_G44a Goods Office		130		-	-
00_G44b WC Goods		100		-	-
00_G45 Goods		100		-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
Standard value		95		80	0.3
00_G45c UPS Room		100		-	-
00_GCR01 Circulation		100		-	-
00_GCR02 Circulation		100		-	-
00_GCR04 Circulation		100		-	-
00_GCR05 Circulation		100		-	-
00_GCR06 Circulation		100		-	-
00_GCR07 Circulation		100		-	-
00_GCR08 Circulation		100		-	-
00_GCR09 Circulation		100		-	-
00_GCR10 Circulation		100		-	-
00_GCR11 Circulation		100		-	-
00_GPR01 DNO Substation		100		-	-
00_GPR02 Plant		100		-	-
00_GPR03 Landlord Comms Room		100		-	-
00_GPR04 Landlord Incoming Water Services		100		-	-
00_GPR05 Landlord Compressor House		100		-	-
00_SW01 Escape Stairs		100		-	-
00_SW02 Escape Stairs		100		-	-
01_Circulation		100		-	-
01_F04 Meeting Room		130		-	-
01_F05 Meeting Room		130		-	-
01_F08 Circulation		100		-	-
01_F08a WCs		100		-	-
01_F08b WCs		100		-	-
01_F09 Seminar Room		130		-	-
01_F09a Storage		100		-	-
01_F10 Kitchen		130		-	-
01_F12a Acc WC		100		-	-
01_F12b Circulation		100		-	-
01_F13 Plant		100		-	-
01_F16 Exhibition Space		130		-	-
01_F19 Facilities-Transient Storage		100		-	-
01_F21 Plant		100		-	-
01_F35 Data Centre		100		-	-
01_F35 IT Storage		100		-	-
01_F36 IT Build		100		-	-
01_F43 Plant		100		-	-
01_F44 Laundry		130		-	-
01_F51 Circulation		100		-	-
01_F51a Acc WC		100		-	-
01_F51b WCs		100		-	-
01_F51c Cleaners Store		100		-	-
01_F55 Estates and Tech Services Office		130		-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
01_F55a Single Person Office	130	-	-	-	-
01_FCR01 Circulation	130	-	-	-	-
01_FCR02 Circulation	130	-	-	-	-
01_FCR03 Circulation	130	-	-	-	-
01_FCR04 Circulation	130	-	-	-	-
01_FCR05 Circulation	130	-	-	-	-
01_FCR06 Circulation	130	-	-	-	-
01_FCR07 Circulation	130	-	-	-	-
01_FPR02 Plant	130	-	-	-	-
01_SW01 Escape Stairs	130	-	-	-	-
01_SW02 Escape Stair	130	-	-	-	-
02_S04 Collaborative Working Space	130	-	-	-	-
02_S05 Hub & Exhibition Space	130	-	-	-	-
02_S06 Collaborative Working Space	130	-	-	-	-
02_S10-S15 Bookable Multi-Use Space	130	-	-	-	-
02_S11 Circulation WCs	130	-	-	-	-
02_S11a WC	130	-	-	-	-
02_S11b WC	130	-	-	-	-
02_S11c WC	130	-	-	-	-
02_S11d Cleaners Store	130	-	-	-	-
02_S12 Board Room	130	-	-	-	-
02_S14 Circulation WCs	130	-	-	-	-
02_S14a WC	130	-	-	-	-
02_S14b WC	130	-	-	-	-
02_S14c WC	130	-	-	-	-
02_S15 Acc WC	130	-	-	-	-
02_S20a Small meeting room	130	-	-	-	-
02_S20b Comms Room	130	-	-	-	-
02_S20c Small meeting room	130	-	-	-	-
02_S20d Cloakroom	130	-	-	-	-
02_S24 General Open Plan Office N	130	-	-	-	-
02_S24 General Open Plan Office S	130	-	-	-	-
02_S24e Informal Meeting & Collaboration	130	-	-	-	-
02_S31a Print and Storage	130	-	-	-	-
02_S31b BHyper-focus office	130	-	-	-	-
02_S31d BHyper-focus office	130	-	-	-	-
02_S31e BHyper-focus office	130	-	-	-	-
02_S31k BHyper-focus office	130	-	-	-	-
02_S41 Circulation	130	-	-	-	-
02_S41a WC	130	-	-	-	-
02_S41b WC	130	-	-	-	-
02_S41c WC	130	-	-	-	-
02_S44 Circulation	130	-	-	-	-

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General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
02_S44a WC	100	-	-	-	-
02_S44b WC	100	-	-	-	-
02_S44c WC	100	-	-	-	-
02_S45 Tea point and break-out	130	-	-	-	-
02_S51 Am WC	100	-	-	-	-
02_S52 Quiet Lounge	130	-	-	-	-
02_SCR01 Circulation	100	-	-	-	-
02_SCR02 Circulation	100	-	-	-	-
02_SCR03 Circulation	100	-	-	-	-
02_SCR04 Circulation	100	-	-	-	-
02_SCR05 Circulation	100	-	-	-	-
02_SW01 Stair	100	-	-	-	-
02_SW02 Escape Stair	100	-	-	-	-
03_SW01 Stair	100	-	-	-	-
03_SW02 Escape Stair	100	-	-	-	-
03_T05 Communal Space	130	-	-	-	-
03_T10 Suite 1	130	-	-	-	-
03_T10 Suite 2	130	-	-	-	-
03_T11 Circulation WCs	100	-	-	-	-
03_T11a WC	100	-	-	-	-
03_T11b WC	100	-	-	-	-
03_T11c WC	100	-	-	-	-
03_T11d Cleaners Store	100	-	-	-	-
03_T12 Suite 1	130	-	-	-	-
03_T12 Suite 2	130	-	-	-	-
03_T14 Circulation WCs	100	-	-	-	-
03_T14a WC	100	-	-	-	-
03_T14b WC	100	-	-	-	-
03_T14c WC	100	-	-	-	-
03_T15 Acc WC	100	-	-	-	-
03_T16 Suite 1	130	-	-	-	-
03_T16 Suite 2	130	-	-	-	-
03_T18 Suite 1	130	-	-	-	-
03_T18 Suite 2	130	-	-	-	-
03_T22 Suite 1	130	-	-	-	-
03_T22 Suite 2	130	-	-	-	-
03_T24 Suite 1	130	-	-	-	-
03_T24 Suite 2	130	-	-	-	-
03_T33 Suite 1	130	-	-	-	-
03_T33 Suite 2	130	-	-	-	-
03_T35 Suite 1	130	-	-	-	-
03_T35 Suite 2	130	-	-	-	-
03_T41 Circulation	100	-	-	-	-

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General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
03_T41a WC		100	-	-
03_T41b WC		100	-	-
03_T41c WC		100	-	-
03_T44 Circulation		100	-	-
03_T44a WC		100	-	-
03_T44b WC		100	-	-
03_T44c WC		100	-	-
03_T51 Acc WC		100	-	-
03_TCR01 Circulation		100	-	-
03_TCR02 Circulation		100	-	-
03_TCR03 Circulation		100	-	-
03_TCR04 Circulation		100	-	-
03_TCR05 Circulation		100	-	-
03_TCR06 Circulation		100	-	-
04_SW01 Stair		100	-	-
04_SW02 Escape Stair		100	-	-
04_T05 Communal Space		130	-	-
04_T10 Suite 1		130	-	-
04_T10 Suite 2		130	-	-
04_T11 Circulation WCs		100	-	-
04_T11a WC		100	-	-
04_T11b WC		100	-	-
04_T11c WC		100	-	-
04_T11d Cleaners Store		100	-	-
04_T12 Suite 1		130	-	-
04_T12 Suite 2		130	-	-
04_T14 Circulation WCs		100	-	-
04_T14a WC		100	-	-
04_T14b WC		100	-	-
04_T14c WC		100	-	-
04_T15 Acc WC		100	-	-
04_T16 Suite 1		130	-	-
04_T16 Suite 2		130	-	-
04_T18 Suite 1		130	-	-
04_T18 Suite 2		130	-	-
04_T22 Suite 1		130	-	-
04_T22 Suite 2		130	-	-
04_T24 Suite 1		130	-	-
04_T24 Suite 2		130	-	-
04_T33 Suite 1		130	-	-
04_T33 Suite 2		130	-	-
04_T35 Suite 1		130	-	-
04_T35 Suite 2		130	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
04_T11 Circulation		100	-	-
04_T41a WC		100	-	-
04_T41b WC		100	-	-
04_T41c WC		100	-	-
04_T44 Circulation		100	-	-
04_T44a WC		100	-	-
04_T44b WC		100	-	-
04_T44c WC		100	-	-
04_T51 Acc WC		100	-	-
04_TCR01 Circulation		100	-	-
04_TCR02 Circulation		100	-	-
04_TCR03 Circulation		100	-	-
04_TCR04 Circulation		100	-	-
04_TCR05 Circulation		100	-	-
04_TCR06 Circulation		100	-	-
05_SW01 Stair		100	-	-
05_SW02 Escape Stair		100	-	-
05_T05 Communal Space		130	-	-
05_T10 Suite 1		130	-	-
05_T10 Suite 2		130	-	-
05_T11 Circulation WCs		100	-	-
05_T11a WC		100	-	-
05_T11b WC		100	-	-
05_T11c WC		100	-	-
05_T11d Cleaners Store		100	-	-
05_T12 Suite 1		130	-	-
05_T12 Suite 2		130	-	-
05_T14 Circulation WCs		100	-	-
05_T14a WC		100	-	-
05_T14b WC		100	-	-
05_T14c WC		100	-	-
05_T15 Acc WC		100	-	-
05_T16 Suite 1		130	-	-
05_T16 Suite 2		130	-	-
05_T18 Suite 1		130	-	-
05_T18 Suite 2		130	-	-
05_T22 Suite 1		130	-	-
05_T22 Suite 2		130	-	-
05_T24 Suite 1		130	-	-
05_T24 Suite 2		130	-	-
05_T33 Suite 1		130	-	-
05_T33 Suite 2		130	-	-
05_T35 Suite 1		130	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
05_T35 Suite 2		130	-	-	-
05_T41 Circulation		130	-	-	-
05_T41a WC		130	-	-	-
05_T41b WC		130	-	-	-
05_T41c WC		130	-	-	-
05_T44 Circulation		130	-	-	-
05_T44a WC		130	-	-	-
05_T44b WC		130	-	-	-
05_T44c WC		130	-	-	-
05_T51 Acc WC		130	-	-	-
05_TCR01 Circulation		130	-	-	-
05_TCR02 Circulation		130	-	-	-
05_TCR03 Circulation		130	-	-	-
05_TCR04 Circulation		130	-	-	-
05_TCR05 Circulation		130	-	-	-
05_TCR06 Circulation		130	-	-	-
06_SW01 Stair		130	-	-	-
06_SW02 Escape Stair		130	-	-	-
06_X20 Internal Plant		130	-	-	-
06_XCF01 Circulation		130	-	-	-
06_XCF02 Circulation		130	-	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00_G02 Reception	NO (-22.8%)	NO
00_G02 Scitech Lab Hub	YES (+168.5%)	YES
00_G05 FM Office	N/A	N/A
00_G11 Touch down space	N/A	N/A
00_G13 Reformatting Lab	NO (-75%)	YES
00_G13a Manual Processing Lab	NO (-50.8%)	YES
00_G13b Picking Lab	NO (-96.6%)	NO
00_G14 Gowning Lobby	N/A	N/A
00_G16a General Purpose Lab	NO (-81%)	YES
00_G16b Analysis Lab	NO (-78.1%)	YES
00_G16d Shipping Lab	NO (-80%)	YES
00_G16e Sample Receipt Lab	NO (-80.7%)	YES
00_G25 Main Storage: -80C	NO (-93.3%)	YES
00_G44a Goods Office	N/A	N/A
00_GPR03 Landlord Comms Room	N/A	N/A
01_F04 Meeting Room	NO (-99.2%)	NO
01_F05 Meeting Room	NO (-98.7%)	NO
01_F09 Seminar Room	NO (-99.7%)	NO
01_F10 Kitchen	N/A	N/A

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Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_F16 Exhibition Space	NO (-70%)	YES
01_F35 Data Centre	NO (-92.2%)	YES
01_F55 Estates and Tech Services Office	NO (-93.3%)	YES
01_F55a Single Person Office	NO (-74.6%)	YES
02_S34 Collaborative Working Space	NO (-21.7%)	YES
02_S35 Hub & Exhibition Space	YES (+58%)	YES
02_S36 Collaborative Working Space	YES (+4.8%)	YES
02_S10-S15 Bookable Multi-Use Space	NO (-33.3%)	YES
02_S12 Board Room	YES (+1%)	YES
02_S20a Small meeting room	N/A	N/A
02_S20b Comms Room	N/A	N/A
02_S20c Small meeting room	N/A	N/A
02_S20d Boardroom	N/A	N/A
02_S24 General Open Plan Office N	NO (-29%)	YES
02_S24 General Open Plan Office S	NO (-9.7%)	YES
02_S24e Informal Meeting & Collaboration	NO (-92.1%)	NO
02_S31a Print and Storage	N/A	N/A
02_S31b BHyper-focus office	N/A	N/A
02_S31d BHyper-focus office	N/A	N/A
02_S31e BHyper-focus office	N/A	N/A
02_S31k BHyper-focus office	N/A	N/A
02_S45 Tea point and break-out	NO (-22.2%)	YES
02_S52 Quiet Lounge	NO (-16.4%)	YES
03_T05 Communal Space	NO (-3.6%)	YES
03_T10 Suite 1	NO (-26.7%)	YES
03_T10 Suite 2	NO (-35%)	YES
03_T12 Suite 1	NO (-9.9%)	YES
03_T12 Suite 2	NO (-12.4%)	YES
03_T16 Suite 1	NO (-37.2%)	YES
03_T16 Suite 2	NO (-36.7%)	YES
03_T18 Suite 1	NO (-21.5%)	YES
03_T18 Suite 2	NO (-16.2%)	YES
03_T22 Suite 1	NO (-37.1%)	YES
03_T22 Suite 2	NO (-36.5%)	YES
03_T24 Suite 1	NO (-28.1%)	YES
03_T24 Suite 2	NO (-26.2%)	YES
03_T33 Suite 1	NO (-20.6%)	YES
03_T33 Suite 2	NO (-27.3%)	YES
03_T35 Suite 1	NO (-27.6%)	YES
03_T35 Suite 2	NO (-35.9%)	YES
04_T05 Communal Space	NO (-1.3%)	YES
04_T10 Suite 1	NO (-25.2%)	YES
04_T10 Suite 2	NO (-33.6%)	YES
04_T12 Suite 1	NO (-6.6%)	YES
04_T12 Suite 2	NO (-7.7%)	YES
04_T16 Suite 1	NO (-36%)	YES
04_T16 Suite 2	NO (-35.3%)	YES
04_T18 Suite 1	NO (-14.2%)	YES
04_T18 Suite 2	NO (-10.6%)	YES

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Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_T22 Suite 1	NO (-35.8%)	YES
04_T22 Suite 2	NO (-35.6%)	YES
04_T24 Suite 1	NO (-17.8%)	YES
04_T24 Suite 2	NO (-15.5%)	YES
04_T33 Suite 1	NO (-12.2%)	YES
04_T33 Suite 2	NO (-13.4%)	YES
04_T35 Suite 1	NO (-25%)	YES
04_T35 Suite 2	NO (-31.6%)	YES
05_T05 Communal Space	NO (-1.3%)	YES
05_T10 Suite 1	NO (-25.2%)	YES
05_T10 Suite 2	NO (-33.6%)	YES
05_T12 Suite 1	NO (-6%)	YES
05_T12 Suite 2	NO (-5.7%)	YES
05_T16 Suite 1	NO (-35%)	YES
05_T16 Suite 2	NO (-35.3%)	YES
05_T18 Suite 1	NO (-8.2%)	YES
05_T18 Suite 2	NO (-7.3%)	YES
05_T22 Suite 1	NO (-35.8%)	YES
05_T22 Suite 2	NO (-35.6%)	YES
05_T24 Suite 1	NO (-8.1%)	YES
05_T24 Suite 2	NO (-7.7%)	YES
05_T33 Suite 1	NO (-4.9%)	YES
05_T33 Suite 2	NO (-6.5%)	YES
05_T35 Suite 1	NO (-25.9%)	YES
05_T35 Suite 2	NO (-34.6%)	YES

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?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area Building Type	
Floor area [m ²]	15969.7	15969.7	Retail/Financial and Professional Services	
External area [m ²]	13531.7	13531.7	Restaurants and Cafes/Drinking Establishments/Takeaways	
Weather	MAN	MAN	Offices and Workshop Businesses	
Infiltration [m ³ /h/m ² @ 50Pa]	3	5	99 General Industrial and Special Industrial Groups	
Average conductance [W/K]	5277.98	4340.95	Storage or Distribution	
Average U-value [W/m ² K]	0.39	0.32	Hotels	
Alpha value* [%]	25.17	10	Residential Institutions: Hospitals and Care Homes	
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging			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	
			1 Others: Miscellaneous 24hr Activities	
			Others: Car Parks 24 hrs	
			Others: Stand Alone Utility Block	

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	2.01	1.24
Cooling	18.31	12.76
Auxiliary	15.59	16.55
Lighting	14.02	17.82
Hot water	1.71	1.07
Equipment*	123.31	123.31
TOTAL**	52.14	49.44

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
 ** Total is net of any electrical energy displaced by O₂ generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	5.13	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	5.13	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	221.92	225.18
Primary energy [kWh/m ²]	71.23	72.92
Total emissions [kg/m ²]	6.55	6.68

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	0	14531.5	0	1378.1	0	3.92	2.99	4	4
Notional	0	14709.7	0	882.2	0	2.78	4.53	----	----
[ST] Constant volume system (variable fresh air rate), [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	13.7	1.8	1.2	0.2	88.6	3.29	2.53	3	4
Notional	2.6	2.4	0.3	0.1	92.7	2.78	4.53	----	----
[ST] Central heating using water: convectors, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	14.7	0	1.4	0	17.4	2.82	0	3	0
Notional	135.7	0	13.6	0	3.9	2.78	0	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	33.5	138.5	23	14	8.4	4.06	2.74	4	4
Notional	9.4	171.5	0.9	10.3	10.2	2.78	4.53	----	----
[ST] Central heating using water: convectors, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	49.4	0	4.9	0	3.7	2.82	0	3	0
Notional	54.8	0	5.5	0	1.9	2.78	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

Appendix 2 – BRUKL Report (2010)

BRUKL Output Document



Compliance with England and Wales Building Regulations Part L 2010

Project name

Greenhays Development

As designed

Date: Mon Mar 27 13:58:45 2023

Administrative information

Building Details

Address: Greenhays Development, Manchester, M15 6GZ

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: Miquel Garda

Telephone number: 0113 393 3329

Address: Upperbank House, Stoneythorpe, Leeds, LS18 4BN

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	35.8
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	35.8
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	29.3
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 _{Limit}	U _{Calc}	U _{Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.26	0.28	00000000:Surf[3]
Floor	0.25	0.16	0.16	00000034:Surf[0]
Roof	0.25	0.16	0.16	00000029:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.44	1.44	00000047:Surf[0]
Personnel doors	2.2	1.6	1.6	00000017:Surf[0]
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 _{Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{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 certain 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	3		

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	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- * FCU AHU w/HR_Offices [Ten]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
4	4	1.6	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

2- * FCU AHU w/HR_Offices [LL]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
4	4	1.6	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

3- * Heating battery AHU w/HR_WC-Store [LL]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	-	-	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

4- * Heating battery AHU w/HR_WC-Store [Ten]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	-	-	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

5- * Heating battery AHU_no HR [LL]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

6- * Heating & Cooling AHU w/HR_Labs [Ten]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	4	1.6	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

7- * DX w/NV_Server [LL]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
4	4	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

8- * Heating battery AHU_no HR [Ten]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

9- * DX w/NV_Server [Ten]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
4	4	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

10 * Heating & Cooling A-IU w/HR_Labs [LL]

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3	4	1.6	0.73
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

"No HWS in project, or hot water is provided by HVAC system"

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
00_G03b WCs	1.6	-	-
00_G03d Acc WC	1.6	-	-
00_G04a Shower	1.6	-	-
00_G04b Shower	1.6	-	-
00_G04c Shower	1.6	-	-
00_G04d Shower	1.6	-	-
00_G04e Dis WC/Shower	1.6	-	-
00_G04f Cleaners Store	1.6	-	-
00_G04g Acc Shower	1.6	-	-
00_G06 Circulation	1.6	-	-
00_G07 Circulation	1.6	-	-
00_G07a Acc WC	1.6	-	-
00_G07a WC	1.6	-	-
00_G07b Acc WC	1.6	-	-
00_G07b WC	1.6	-	-
00_G07c WC	1.6	-	-
00_G40 Ambient Storage	1.6	-	-
00_G44 Goods	1.6	-	-
00_G44b WC Goods	1.6	-	-
00_G45 Goods	1.6	-	-
00_G45c UPS Room	1.6	-	-
00_GCR10 Circulation	1.6	-	-
01_F09a Storage	1.6	-	-
01_F09b Storage	1.6	-	-
01_F22a Acc WC	1.6	-	-
01_F22b WC	1.6	-	-
01_F22c WC	1.6	-	-
01_F44 Laundry	1.6	-	-
01_F45 Data Centre	-	-	1.6
01_F51 Circulation	1.6	-	-
01_F51a Acc WC	1.6	-	-
01_F51b WCs	1.6	-	-
01_F51c Cleaners Store	1.6	-	-
01_S20g IT Build	1.6	-	-
02_S11 Circulation WCs	1.6	-	-
02_S11a WC	1.6	-	-
02_S11b WC	1.6	-	-
02_S11c WC	1.6	-	-
02_S11d Cleaners Store	1.6	-	-
02_S14 Circulation WCs	1.6	-	-
02_S14a WC	1.6	-	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
02_S14b WC	1.6	-	-
02_S14c WC	1.6	-	-
02_S15 Acc WC	1.6	-	-
02_S41 Circulation	1.6	-	-
02_S41a WC	1.6	-	-
02_S41b WC	1.6	-	-
02_S41c WC	1.6	-	-
02_S44 Circulation	1.6	-	-
02_S44a WC	1.6	-	-
02_S44b WC	1.6	-	-
02_S44c WC	1.6	-	-
02_S51 Acc WC	1.6	-	-
03_T11 Circulation WCs	1.6	-	-
03_T11a WC	1.6	-	-
03_T11b WC	1.6	-	-
03_T11c WC	1.6	-	-
03_T11d Cleaners Store	1.6	-	-
03_T14 Circulation WCs	1.6	-	-
03_T14a WC	1.6	-	-
03_T14b WC	1.6	-	-
03_T14c WC	1.6	-	-
03_T15 Acc WC	1.6	-	-
03_T41 Circulation	1.6	-	-
03_T41a WC	1.6	-	-
03_T41b WC	1.6	-	-
03_T41c WC	1.6	-	-
03_T44 Circulation	1.6	-	-
03_T44a WC	1.6	-	-
03_T44b WC	1.6	-	-
03_T44c WC	1.6	-	-
03_T51 Acc WC	1.6	-	-
04_T11 Circulation WCs	1.6	-	-
04_T11a WC	1.6	-	-
04_T11b WC	1.6	-	-
04_T11c WC	1.6	-	-
04_T11d Cleaners Store	1.6	-	-
04_T14 Circulation WCs	1.6	-	-
04_T14a WC	1.6	-	-
04_T14b WC	1.6	-	-
04_T14c WC	1.6	-	-
04_T15 Acc WC	1.6	-	-
04_T41 Circulation	1.6	-	-
04_T41a WC	1.6	-	-
04_T41b WC	1.6	-	-
04_T41c WC	1.6	-	-
04_T44 Circulation	1.6	-	-
04_T44a WC	1.6	-	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
04_T44b WC	1.6	-	-
04_T44c WC	1.6	-	-
04_T51 Acc WC	1.6	-	-
05_T11 Circulation WCs	1.6	-	-
05_T11a WC	1.6	-	-
05_T11b WC	1.6	-	-
05_T11c WC	1.6	-	-
05_T11d Cleaners Store	1.6	-	-
05_T14 Circulation WCs	1.6	-	-
05_T14a WC	1.6	-	-
05_T14b WC	1.6	-	-
05_T14c WC	1.6	-	-
05_T15 Acc WC	1.6	-	-
05_T41 Circulation	1.6	-	-
05_T41a WC	1.6	-	-
05_T41b WC	1.6	-	-
05_T41c WC	1.6	-	-
05_T44 Circulation	1.6	-	-
05_T44a WC	1.6	-	-
05_T44b WC	1.6	-	-
05_T44c WC	1.6	-	-
05_T51 Acc WC	1.6	-	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
00_G01	540	-
00_G02 Reception	90	100
00_G02 Sirech Lab Hub	1050	-
00_G03a Grab & Go Store	10	-
00_G03b WCs	30	-
00_G03d Acc WC	30	-
00_G04a Shower	10	-
00_G04b Shower	10	-
00_G04c Shower	10	-
00_G04d Shower	10	-
00_G04e Dis WC/Shower	20	-
00_G04f Cleaners Store	10	-
00_G04g Acc Shower	30	-
00_G05 FM Office	60	-
00_G06 Circulation	20	-
00_G07 Circulation	20	-
00_G07a Acc WC	20	-
00_G07a WC	20	-
00_G07b Acc WC	20	-
00_G07b WC	20	-
00_G07c WC	20	-
00_G09 Cycle Store	230	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
00_G09a Circulation	10	-
00_G11 Touchdown space	160	-
00_G12 Gowning Lobby	150	-
00_G13 Reformatting Lab	820	-
00_G16b General Purpose Lab	590	-
00_G16c Analysis Lab	220	-
00_G16d Shipping Lab	240	-
00_G16e Sample Receipt Lab	260	-
00_G25 Main Storage: -80C	5390	-
00_G40 Ambient Storage	50	-
00_G43 Liquid Nitrogen Sample Store	370	-
00_G44 Goods	50	-
00_G44a Goods Office	80	-
00_G44b WC Goods	30	-
00_G45 Goods	30	-
00_G45c UPS Room	30	-
00_GCR01 Circulation	40	-
00_GCR02 Circulation	20	-
00_GCR03 Circulation	30	-
00_GCR04 Circulation	40	-
00_GCR05 Circulation	20	-
00_GCR06 Circulation	60	-
00_GCR07 Circulation	30	-
00_GCR08 Circulation	30	-
00_GCR09 Circulation	50	-
00_GCR10 Circulation	40	-
00_GCR11 Circulation	20	-
00_GPR01 DNO Substation	50	-
00_GPR02 Plant	100	-
00_GPR03 Landlord Comms Room	130	-
00_GPR04 Landlord Incoming Water Services	90	-
00_GPR05 Landlord Compressor House	150	-
00_SW01 Escape Stairs	60	-
00_SW02 Escape Stairs	70	-
01_Circulation	160	-
01_F01	750	-
01_F02 Meeting Room	100	-
01_F05 Meeting Room	100	-
01_F09 Seminar Room	550	-
01_F09a Storage	10	-
01_F09b Storage	10	-
01_F14 Meeting Room	120	-
01_F17 Meeting Room	170	-
01_F18 Meeting Room	130	-
01_F19 Meeting Room	130	-
01_F20 Meeting Room	130	-
01_F21 Meeting Room	140	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
01_F22 Circulation	20	-
01_F22a Acc WC	30	-
01_F22b WC	20	-
01_F22c WC	20	-
01_F23 Kitchen	70	-
01_F41-42 Facilities-Transient Storage	60	-
01_F44 Laundry	50	-
01_F45 Data Centre	670	-
01_F51 Circulation	20	-
01_F51a Acc WC	30	-
01_F51b WCs	20	-
01_F51c Cleaners Store	10	-
01_F55 Estates and Tech Services Office	160	-
01_F55a Single Person Office	70	-
01_FCR01 Circulation	40	-
01_FCR02 Circulation	70	-
01_FCR03 Circulation	40	-
01_FCR04 Circulation	20	-
01_FCR05 Circulation	30	-
01_FCR06 Circulation	70	-
01_FCR07 Circulation	40	-
01_FCR08 Circulation	30	-
01_FPR01 Plant	990	-
01_FPR02 Plant	130	-
01_FPR03 Plant	230	-
01_FPR04 Landlord Switchroom	290	-
01_S20f IT Storage	20	-
01_S20g IT Build	10	-
01_SW01 Escape Stairs	70	-
01_SW02 Escape Stair	70	-
02_Circulation Board Room	130	-
02_Circulation Bookable Space	90	-
02_Circulation Open Plan N	210	-
02_Circulation Open Plan S	220	-
02_Circulation Quiet zone	70	-
02_Circulation Tea Point	90	-
02_S04 Teapoint & Breakout	240	-
02_S05 Visitor Arrival & Lancing Space	320	-
02_S10-S15 Bookable Multi-Use Space	480	-
02_S11 Circulation WCs	20	-
02_S11a WC	20	-
02_S11b WC	20	-
02_S11c WC	20	-
02_S11d Cleaners Store	10	-
02_S12a b Board Room	400	-
02_S14 Circulation WCs	20	-
02_S14a WC	20	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
02_S14b WC	20	-
02_S14c WC	20	-
02_S15 Acc WC	40	-
02_S20d Small meeting room	90	-
02_S20a Small meeting room	130	-
02_S20c Small meeting room	90	-
02_S20b Small meeting room	80	-
02_S24 General Open Plan Office N	1440	-
02_S24 General Open Plan Office S	1390	-
02_S24e Informal Meeting & Collaboration	160	-
02_S31d Hyper-focus office	90	-
02_S31b Hyper-focus office	90	-
02_S31c Hyper-focus office	90	-
02_S31a Hyper-focus office	90	-
02_S41 Circulation	20	-
02_S41a WC	20	-
02_S41b WC	20	-
02_S41c WC	20	-
02_S44 Circulation	20	-
02_S44a WC	20	-
02_S44b WC	20	-
02_S44c WC	20	-
02_S45 Tea point and break-out	400	-
02_S51 Acc WC	30	-
02_S52 Quiet Lounge	430	-
02_SCR01 Circulation	110	-
02_SCR02 Circulation	40	-
02_SCR03 Circulation	40	-
02_SCR04 Circulation	110	-
02_SCR05 Circulation	30	-
02_SW01 Stair	80	-
02_SW02 Escape Stair	80	-
03_SW01 Stair	80	-
03_SW02 Escape Stair	80	-
03_T05 Communal Space	360	-
03_T10a Lab	570	-
03_T10b Office	300	-
03_T11 Circulation WCs	20	-
03_T11a WC	20	-
03_T11b WC	20	-
03_T11c WC	20	-
03_T11d Cleaners Store	10	-
03_T12a Lab	570	-
03_T12b Office	300	-
03_T14 Circulation WCs	20	-
03_T14a WC	20	-
03_T14b WC	20	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
03_T14c WC	20	-
03_T15 Acc WC	40	-
03_T16a Lab	660	-
03_T16a Office	320	-
03_T18b Lab	650	-
03_T18a Office	320	-
03_T22b Lab	510	-
03_T22a Office	370	-
03_T24b Lab	510	-
03_T24a Office	370	-
03_T33b Lab	710	-
03_T33a Office	340	-
03_T35b Lab 1	720	-
03_T35a Office	340	-
03_T41 Circulation	20	-
03_T41a WC	20	-
03_T41b WC	20	-
03_T41c WC	20	-
03_T44 Circulation	20	-
03_T44a WC	20	-
03_T44b WC	20	-
03_T44c WC	20	-
03_T51 Acc WC	30	-
03_TCR01 Circulation	110	-
03_TCR02 Circulation	40	-
03_TCR03 Circulation	140	-
03_TCR04 Circulation	40	-
03_TCR05 Circulation	110	-
03_TCR06 Circulation	30	-
04_SW01 Stair	80	-
04_SW02 Escape Stair	80	-
04_T05 Communal Space	360	-
04_T10a Lab	570	-
04_T10b Office	300	-
04_T11 Circulation WCs	20	-
04_T11a WC	20	-
04_T11b WC	20	-
04_T11c WC	20	-
04_T11d Cleaners Store	10	-
04_T12a Lab	570	-
04_T12b Office	300	-
04_T14 Circulation WCs	20	-
04_T14a WC	20	-
04_T14b WC	20	-
04_T14c WC	20	-
04_T15 Acc WC	40	-
04_T16a Lab	660	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
04_T16a Office	320	-
04_T18b Lab	650	-
04_T18a Office	320	-
04_T22b Lab	510	-
04_T22a Office	370	-
04_T24b Lab	510	-
04_T24a Office	370	-
04_T33b Lab	710	-
04_T33a Office	340	-
03_T35b Lab 1	720	-
04_T35a Office	340	-
04_T41 Circulation	20	-
04_T41a WC	20	-
04_T41b WC	20	-
04_T41c WC	20	-
04_T44 Circulation	20	-
04_T44a WC	20	-
04_T44b WC	20	-
04_T44c WC	20	-
04_T51 Acc WC	30	-
04_TCR01 Circulation	110	-
04_TCR02 Circulation	40	-
04_TCR03 Circulation	140	-
04_TCR04 Circulation	40	-
04_TCR05 Circulation	110	-
04_TCR06 Circulation	30	-
05_SW01 Stair	80	-
05_SW02 Escape Stair	80	-
05_T05 Communal Space	360	-
05_T10a Lab	570	-
05_T10b Office	300	-
05_T11 Circulation WCs	20	-
05_T11a WC	20	-
05_T11b WC	20	-
05_T11c WC	20	-
05_T11d Cleaners Store	10	-
05_T12a Lab	570	-
05_T12b Office	300	-
05_T14 Circulation WCs	20	-
05_T14a WC	20	-
05_T14b WC	20	-
05_T14c WC	20	-
05_T15 Acc WC	40	-
05_T16a Lab	660	-
05_T16a Office	320	-
05_T18b Lab	650	-
05_T18a Office	320	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
05_T22b Lab	510	-
05_T22a Office	370	-
05_T24b Lab	510	-
05_T24a Office	370	-
05_T33b Lab	710	-
05_T33a Office	340	-
05_T35b Lab 1	720	-
05_T35a Office	340	-
05_T41 Circulation	20	-
05_T41a WC	20	-
05_T41b WC	20	-
05_T41c WC	20	-
05_T44 Circulation	20	-
05_T44a WC	20	-
05_T44b WC	20	-
05_T44c WC	20	-
05_T51 Acc WC	30	-
05_TCR01 Circulation	110	-
05_TCR02 Circulation	40	-
05_TCR03 Circulation	140	-
05_TCR04 Circulation	40	-
05_TCR05 Circulation	110	-
05_TCR06 Circulation	30	-
06_SW02 Escape Stair	80	-
06_X23 Internal Plant	3640	-
06_XCR01 Circulation	50	-
06_XCR02 Circulation	20	-
02_S31a Print and Storage	10	-
02_S31f Comms Room	110	-
00_G27 Storage Room +4°C	80	-
00_G22 Storage Room -20°C	80	-
06_SW01 Stair	60	-

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_G01	NO (-5.1%)	NO
00_G02 Reception	YES (+4.9%)	NO
00_G02 SciTech Lab Hub	YES (+14.5%)	NO
00_G05 FM Office	N/A	N/A
00_G11 Touchdown space	N/A	N/A
00_C12 Cowning Lobby	YES (+70.6%)	NO
00_G13 Reformatting Lab	N/A	N/A
00_G16b General Purpose Lab	NO (-91.6%)	YES
00_C16a Analysis Lab	NO (-86.2%)	YES
00_G16d Shipping Lab	NO (-87.4%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00_G16e Sample Receipt Lab	NO (-88.3%)	YES
00_G25 Main Storage: -80C	NO (-92%)	NO
00_G43 Liquid Nitrogen Sample Store	NO (-86%)	NO
00_G44e Goods Office	NO (-94.8%)	YES
00_GPR33 Landlord Comms Room	N/A	N/A
01_F01	NO (-55.1%)	NO
01_F02 Meeting Room	NO (-93.4%)	NO
01_F05 Meeting Room	NO (-91.7%)	NO
01_F09 Seminar Room	NO (-88.7%)	YES
01_F14 Meeting Room	NO (-90.4%)	NO
01_F17 Meeting Room	NO (-53.6%)	YES
01_F18 Meeting Room	NO (-36.9%)	YES
01_F19 Meeting Room	NO (-37.3%)	YES
01_F20 Meeting Room	NO (-37.9%)	YES
01_F21 Meeting Room	N/A	N/A
01_F23 Kitchen	N/A	N/A
01_F45 Data Centre	NO (-95.4%)	YES
01_F55 Estates and Tech Services Office	NO (-96.4%)	YES
01_F55a Single Person Office	NO (-84.4%)	YES
02_Circulation Board Room	YES (+25.8%)	NO
02_Circulation Bookable Space	YES (+63%)	NO
02_Circulation Open Plan N	NO (-98.1%)	NO
02_Circulation Open Plan S	NO (-97.8%)	NO
02_Circulation Quiet zone	NO (-20.9%)	YES
02_Circulation Tea Point	YES (+15.1%)	NO
02_S04 Teapoint & Breakout	NO (-50.3%)	YES
02_S05 Visitor Arrival & Landing Space	YES (+31.5%)	NO
02_S10-S15 Bookable Multi-Use Space	NO (-61.6%)	YES
02_S12a-b Board Room	NO (-48%)	YES
02_S20d Small meeting room	N/A	N/A
02_S20a Small meeting room	N/A	N/A
02_S20c Small meeting room	N/A	N/A
02_S20b Small meeting room	N/A	N/A
02_S24 General Open Plan Office N	NO (-62.2%)	YES
02_S24 General Open Plan Office S	NO (-57.4%)	YES
02_S24e Informal Meeting & Collaboration	NO (-99%)	NO
02_S31d Hyper-focus office	N/A	N/A
02_S31b Hyper-focus office	N/A	N/A
02_S31c Hyper-focus office	N/A	N/A
02_S31a Hyper-focus office	N/A	N/A
02_S45 Tea point and break-out	NO (-55.6%)	YES
02_S52 Quiet Lounge	NO (-49.1%)	YES
03_T05 Communal Space	NO (-40.9%)	YES
03_T10a Lab	NO (-55%)	YES
03_T10b Office	NO (-61.9%)	YES
03_T12a Lab	NO (-44.5%)	YES
03_T12b Office	NO (-47.7%)	YES
03_T16a Lab	NO (-62.1%)	YES
03_T16a Office	NO (-62.1%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_T18b Lab	NO (-52.1%)	YES
03_T18a Office	NO (-49.3%)	YES
03_T22b Lab	NO (-62.1%)	YES
03_T22a Office	NO (-62.2%)	YES
03_T24b Lab	NO (-55.2%)	YES
03_T24a Office	NO (-55.1%)	YES
03_T33b Lab	NO (-51.7%)	YES
03_T33a Office	NO (-56.3%)	YES
03_T35b Lab 1	NO (-56.3%)	YES
03_T35a Office	NO (-62%)	YES
03_TCR03 Circulation	NO (-99.8%)	NO
04_T05 Communal Space	NO (-39.5%)	YES
04_T10a Lab	NO (-54%)	YES
04_T10b Office	NO (-61.1%)	YES
04_T12a Lab	NO (-42.5%)	YES
04_T12b Office	NO (-44.9%)	YES
04_T16a Lab	NO (-61.4%)	YES
04_T16a Office	NO (-61.4%)	YES
04_T18b Lab	NO (-47.7%)	YES
04_T18a Office	NO (-45.9%)	YES
04_T22b Lab	NO (-61.4%)	YES
04_T22a Office	NO (-61.4%)	YES
04_T24b Lab	NO (-49.9%)	YES
04_T24a Office	NO (-49.3%)	YES
04_T33b Lab	NO (-46.6%)	YES
04_T33a Office	NO (-49.7%)	YES
03_T35b Lab 1	NO (-55.3%)	YES
04_T35a Office	NO (-61.2%)	YES
04_TCR03 Circulation	NO (-99.8%)	NO
05_T05 Communal Space	NO (-39.5%)	YES
05_T10a Lab	NO (-54%)	YES
05_T10b Office	NO (-61.1%)	YES
05_T12a Lab	NO (-42.1%)	YES
05_T12b Office	NO (-43.6%)	YES
05_T16a Lab	NO (-61.4%)	YES
05_T16a Office	NO (-61.4%)	YES
05_T18b Lab	NO (-44%)	YES
05_T18a Office	NO (-44%)	YES
05_T22b Lab	NO (-61.4%)	YES
05_T22a Office	NO (-61.4%)	YES
05_T24b Lab	NO (-44.1%)	YES
05_T24a Office	NO (-44%)	YES
05_T33b Lab	NO (-42.2%)	YES
05_T33a Office	NO (-43.8%)	YES
03_T35b Lab 1	NO (-55.3%)	YES
05_T35a Office	NO (-61.2%)	YES
05_TCR03 Circulation	NO (-99.7%)	NO
02_S31a Print and Storage	N/A	N/A
02_S31f Comms Room	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00_G27 Storage Room +4°C	N/A	N/A
00_G22 Storage Room -20°C	N/A	N/A

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?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	15965.2	15965.2		A1/A2 Retail/Financial and Professional services
External area [m ²]	13496.2	13496.2		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	MAN	MAN		B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5	99	B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	5357.23	5779.32		B8 Storage or Distribution
Average U-value [W/m ² K]	0.4	0.43		C1 Hotels
Alpha value* [%]	10.07	10		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
			1	Others: Miscellaneous 24hr activities
				Others: Car Parks 24 hrs
				Others: Stand alone utility block

Energy Consumption by End Use [kWh/m ²]		
	Actual	Notional
Heating	1.98	2.1
Cooling	21.45	15.95
Auxiliary	23.94	24.93
Lighting	10.02	25.35
Hot water	2.72	2.48
Equipment*	123.95	123.95
TOTAL**	60.12	70.82

* 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/m ²]		
	Actual	Notional
Photovoltaic systems	3.48	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO ₂ Emissions Summary		
	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	234.66	237.02
Primary energy* [kWh/m ²]	175.93	207.17
Total emissions [kg/m ²]	29.3	35.8

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

HVAC Systems Performance									
System Type	Heat dem [MJ/m ²]	Cool dem [MJ/m ²]	Heat con [kWh/m ²]	Cool con [kWh/m ²]	Aux con [kWh/m ²]	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	0	14532	0	1421.4	0	3.73	2.84	4	4
Notional	0	14643.8	0	1073.4	0	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0	16566.1	0	1539.3	0	3.92	2.99	4	4
Notional	0	16164.6	0	1184.9	0	2.56	3.79	----	----
[ST] Constant volume system (variable fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CF] Electricity									
Actual	10.3	3.9	0.9	0.4	81.2	3.12	2.41	3	4
Notional	8.9	5.9	1	0.4	84.2	2.56	3.79	----	----
[ST] Central heating using water: convectors, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	6.3	0	0.6	0	16.9	2.82	0	3	0
Notional	9	0	1	0	9.3	2.56	0	----	----
[ST] Variable refrigerant flow, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	33.4	211	2.3	21.4	8.7	4.06	2.74	4	4
Notional	20	217	2.2	15.9	23.2	2.56	3.79	----	----
[ST] Central heating using water: convectors, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	64.8	0	6.4	0	3.7	2.82	0	3	0
Notional	77.3	0	8.4	0	1.9	2.56	0	----	----
[ST] Variable refrigerant flow, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	36.4	136.5	2.6	14.5	9.3	3.86	2.61	4	4
Notional	23.5	148.1	2.6	10.9	25	2.56	3.79	----	----
[ST] Central heating using water: convectors, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0.9	0	0.1	0	16.2	2.68	0	3	0
Notional	4.7	0	0.5	0	8.9	2.56	0	----	----
[ST] Central heating using water: convectors, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	7.1	0	0.7	0	3.7	2.68	0	3	0
Notional	6.7	0	0.7	0	1.9	2.56	0	----	----
[ST] Constant volume system (variable fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CF] Electricity									
Actual	26.1	142.2	2.3	16.4	42.9	3.12	2.41	3	4
Notional	20.9	156.5	2.3	11.5	27.7	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/m ²]	= Heating energy demand
Cool dem [MJ/m ²]	= Cooling energy demand
Heat con [kWh/m ²]	= Heating energy consumption
Cool con [kWh/m ²]	= Cooling energy consumption
Aux con [kWh/m ²]	= 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 _{Typ}	U _{Min}	Surface where the minimum value occurs*
Wall	0.23	0.23	00000047:Surf[1]
Floor	0.2	0.16	00000034:Surf[0]
Roof	0.15	0.16	00000029:Surf[0]
Windows, roof windows, and rooflights	1.5	1.44	00000047:Surf[0]
Personnel doors	1.5	1.6	00000017:Surf[8]
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 _{Typ} = Typical individual element U-values [W/(m²K)]		U _{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	3