

Report

Stage 2 Energy and Environmental Standards Statement

Planning Submission

New Victoria Office

Commercial Development

Sweco UK Limited

Sweco Manchester,
Abbey House,
4th Floor
33 Booth Street
Manchester,
M2 3LW
+44 161 927 4810

MAY 2022
Project Reference: 65205124
Document Reference: NV-SWE-XXX-XXX-RP-YE-00001
Revision: P03
Prepared For: Toriview Ltd

Status / Revisions

Rev.	Date	Reason for issue	Prepared		Reviewed		Approved	
P01	29.04.22	Draft for Comments	JS	29.04.22	DP	29.04.22	KA	29.04.22
P02	19.05.22	Draft including numbers	LC	24.05.22	DP	24.05.22	KA	24.05.22
P03	30.05.22	Final Report	LC	30.05.22	DP	30.05.22	KA	30.05.22

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1 Executive Summary

This report has been prepared on behalf of Toriview Ltd (the “Applicant”) for the planning application of the New Victoria Development (“the Proposed Development”) for Manchester City Council (“MCC”).

The energy statement (ES) for the proposed development has been developed in accordance with the requirements of MCC Core Strategy 2012-2027 Policies EN4, EN6 and Appendix A, to demonstrate the achievable regulated carbon emission reductions against EN6 Table 12.2, which states a target of a minimum 10% increase on Part L 2010. The Greater Manchester Places for Everyone Joint Development plan supersedes this requirement with a target of at least 19% against Part L 2013, which has been far exceeded by the proposed development.

The ES also takes account of the additional advice provided as part of the Manchester Climate Change Framework (MCCF), Draft Manchester Zero Carbon Framework (DMZCF) and Greater Manchester Places for Everyone Plan (PfE), as evaluated in Section 3 of this statement, and further explored in the sustainability statement (see Section 10). The regulated carbon emissions have been determined through assessment against Building Regulations Part L2A 2013 and reported using SAP 10 figures.

The key headlines for the development from this application document are as follows:

- ‘Fabric first’ approach to low energy and zero carbon development, in accordance with current industry best-practice approaches.
- Energy Hierarchy Stage 1 (passive + energy efficiency) emissions reduction of **24%** against Building Regulations Part L2A 2013.
- Overall regulated emissions reduction of **32%** and **44%** against Building Regulations Part L2A 2013, using SAP12 and SAP10 carbon factors respectively.
- Innovative all electric highly efficient energy strategy, to future proof the development in working towards operational zero carbon by taking advantage of future grid decarbonisation. The strategy perfectly aligns with the MCC goal of achieving net zero carbon by 2038.

BREEAM 2018 New Construction, target of ‘**Outstanding**’ for Office Shell & Core

- Bespoke sustainability strategy, drawing on industry best-practice & benchmarking to create a custom set of sustainability targets.

1.1 Non-domestic Operational Carbon Dioxide Emissions

Policy EN4 of the MCC Core strategy requires the following principles of Energy Hierarchy to be applied within the development’s design:

1. Stage 1: to reduce the need for energy through energy efficient features such as improved insulation and glazing
2. Stage 2: to meet residual energy requirements through the use of low or zero carbon energy generation technologies

The proposed design will be compared against the notional target building (known as the Target Emissions Rate - TER), will have the same size and shape as the proposed development, but with Building Regulations minimum performance values applied to fabric and energy systems from Part L2A.

The results presented below demonstrate the development regulated operational energy and carbon performance based on SAP 10 figures for CO₂ emissions, measured against Building Regulations Part L2A 2013, and in accordance with the MCC Energy Hierarchy approach, and as provided in Section 7 of this report.

Table 1.1: Part L2A 2013 regulated energy consumption & savings based on the MCC EN6 Energy Hierarchy approach for the Proposed Development.

MCC Energy Hierarchy Stage	Regulated energy (kWh/m ² /year)	Savings (kWh/m ² /year)	%Reductions vs. previous stage
Target Emissions Rate (TER)	57.77	n/a	n/a
MCC Energy Hierarchy Stage 1 Energy Efficiency	44.18	13.59	23.5
MCC Energy Hierarchy Stage 2 LZC Technologies	31.67	12.51	28.3

Table 1.2: Part L2A 2013 regulated CO₂ emissions & savings based on the MCC EN6 Energy Hierarchy approach for the Proposed Development.

MCC Energy Hierarchy Stage	Regulated CO ₂ emissions (tonnes)	Total CO ₂ Reductions (tonnes)	% Reduction vs. previous stage
Target Emissions Rate (TER)	198.1	n/a	n/a
MCC Energy Hierarchy Stage 1 Energy Efficiency	149.9	48.2	24
MCC Energy Hierarchy Stage 2 LZC Technologies	110.8	39.1	20

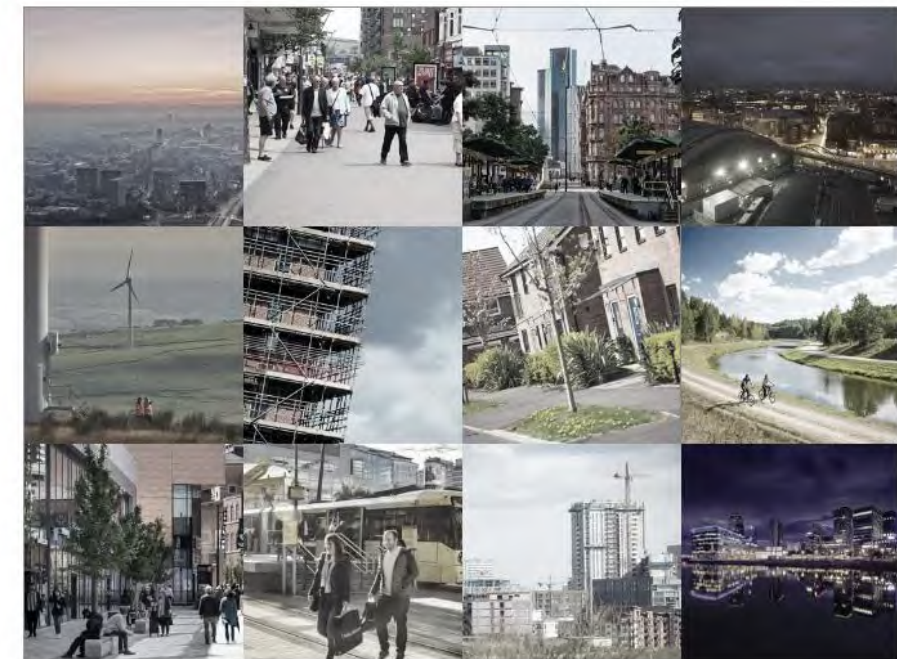
2 Introduction

2.1 Purpose of the Report

Manchester City Council unanimously declared a climate emergency in July 2019, underwriting the acknowledgement of the serious threat presented by climate change to the city and its occupants. The city has also committed to the goal of achieving net zero emissions by 2038, some 12 years ahead of the 2050 net zero target set by the UK Government in July 2019. The built environment, and new development, will have a significant role to play in addressing the climate emergency and responding to the requirements for a zero carbon city.

This report presents the energy strategy and sustainability approach for the Proposed Development in Manchester. The content of this submission document has been informed by the various planning policy documents as listed in Section 3, including the Guide to Development SPD (2007) and the Manchester Core Strategy 2012-2027. In response to the Manchester declaration of a climate emergency, the document also seeks to respond to the issues raised in the Manchester Climate Change Framework 2020-2025 (MCCF), and also the Draft Manchester Zero Carbon Framework 2020-2038 (DMZCF) and Greater Manchester Place for Everyone (GMPfE). This report will set out how the Proposed Development will, where relevant to building design, construction and operation, address the aims, objectives and headline areas of these guidance documents.

Delivery of a market-leading development in Manchester that embraces the ethos of holistic sustainable design in its entirety has been at the top of the pre-planning development agenda. To facilitate this, the development team have reviewed relevant industry sustainability benchmarking schemes that are currently available, in order to shape a robust yet contextually achievable delivery strategy. The outcome of this assessment process was the development of the core sustainability 'themes' for the development, which formed the focus areas around which targets and methodological approaches to sustainable development were established. These 'themes', and their supporting targets, are detailed in Section 10 of this report.



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The figures presented in this report are calculated for the purpose of initial estimates only, using the preliminary information currently available. Hence whilst they can be used to gain an understanding of the benefits of each technology, they must not be taken out of context; establishing the best economic and energy-efficient operation will require more complex analysis of building projected load profiles when these are developed.

2.2 The Energy Statement - Development Baseline Information

In accordance with MCC Core Strategy 2012-2027 Policy EN6 and Appendix A, an Energy Statement (ES) is required to be submitted at the outset of any development with >1,000m² of floorspace. This is to demonstrate the total regulated energy that the final development would use, and the equivalent carbon emissions that this would generate. The development should use the energy hierarchy approach detailed in EN4, EN6 and Appendix A to help determine opportunities for carbon emissions reductions through design and specification of the development and include consideration of a variety of low and zero-carbon (LZC) technologies. Baseline information for the Proposed Development is required to be presented in accordance with Appendix A, and this is set out in the sub-sections below.

Additionally, the Supplementary Planning Document and Planning Guidance (SPD) set out by MCC requires the energy statement to outline how the proposed development meets the environmental standards on energy efficiency, integration of renewable energy systems and water and waste management set out in Chapter 4 of the SPD.

2.2.1 Development Location & Local Context

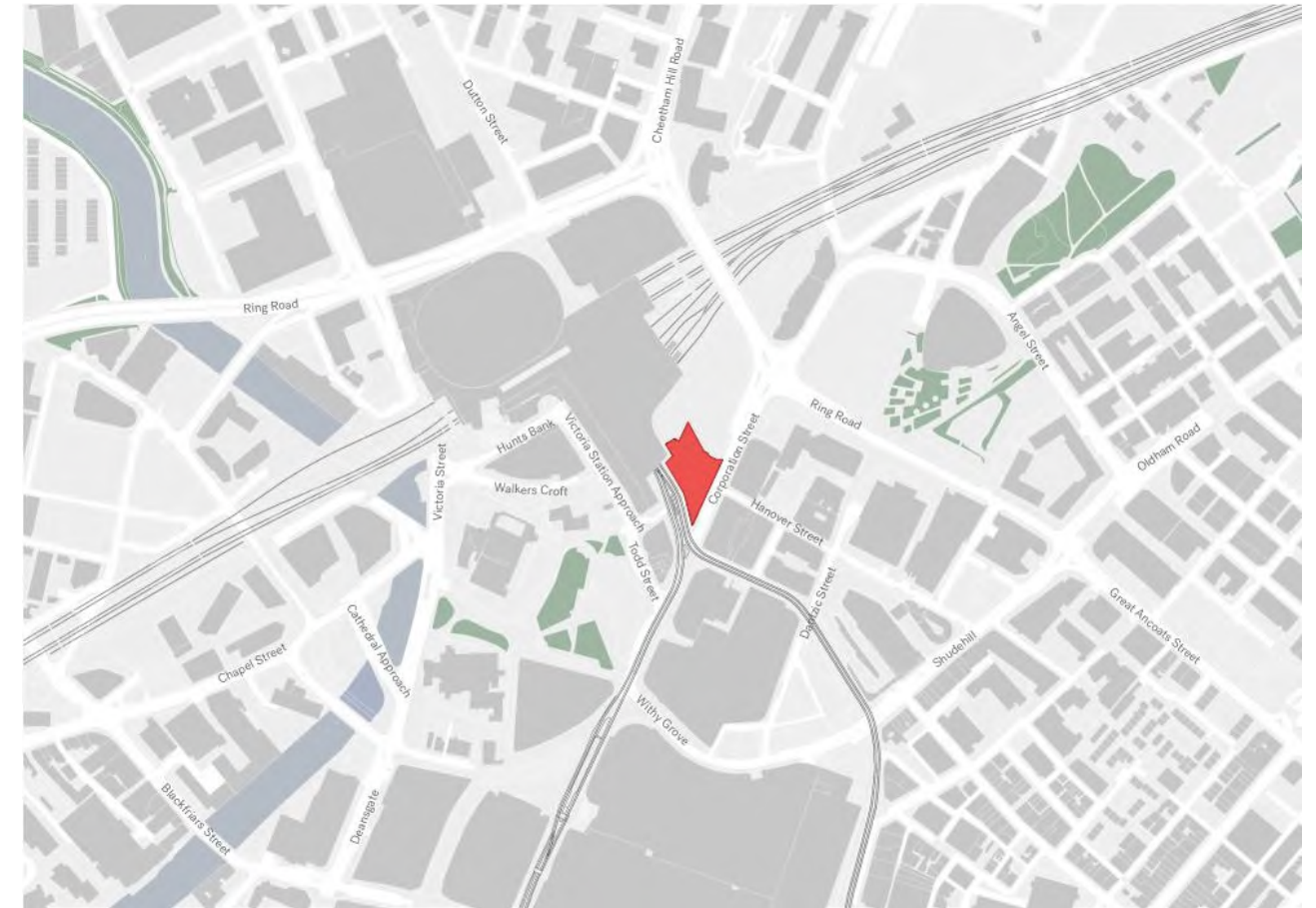
The Proposed Development is bounded by Manchester Victoria train station to the east, the Metrolink tramlines to the southwest, Corporation Street to the west and the Phase 1 New Victoria: residential development to the north.

The site primarily comprises hardstanding, a small number of temporary cabins are present on the site, supporting Phase 1 of New Victoria. The Site is currently partially fenced off restricting access, as it is located within the boundary of the construction

compound for New Victoria Phase 1: residential development and currently accommodates site access, parking and storage facilities. The site benefits from close proximity to a range of amenities including Victoria Train Station.

Construction of a 10 Storey office building plus basement, comprising up to 16,670 m² (GIA) of office accommodation, ground floor commercial units, roof terrace, plant, cycle parking, hard and soft landscaping, access and servicing and other associated works.

Fig. 2.1: Site context drawing (site in red)



Project Title: New Victoria		Date: 10/04/2022		Page: 000002																		
NOTE: All N/A based on assumed NTG conversions, to be approx. numbers indicative																						
Stores		GBA		GBA				GBA				GBA				NTS		Terminal Walkway		Occupancy	VAC	
		m2	N/A	m2	N/A	m2	N/A	m2	N/A	m2	N/A	m2	N/A	m2	N/A	m2	N/A	m2	N/A			
LB01 Roof		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LB01 North Floor	10	764	8,224	764	8,224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LB01 Eighth Floor	9	1,768	13,561	1,768	17,857	644	6,728	0	0	0	0	648	5,775	644	373	3,477	81	0	0	0	0	0
LB01 Seventh Floor	8	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Sixth Floor	7	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Fifth Floor	6	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Fourth Floor	5	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Third Floor	4	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Second Floor	3	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 First Floor	2	1,644	17,689	1,644	16,275	1,210	13,024	0	0	0	0	1,210	13,024	80%	0	0	0	0	0	0	0	0
LB01 Mezzanine	1	1,436	16,113	1,436	11,069	0	0	607	7,117	120	1,262	791	9,467	56%	0	0	0	0	0	0	0	0
LB01 Ground Floor*	1	1,114	15,223	1,328	14,306	0	0	342	3,881	105	1,130	197	4,811	31%	0	0	0	0	0	0	0	0
GBA (Basecase)	<1	1,001	17,689	1,444	15,110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		18,185	158,617	18,185	175,416	13,710	183,147	3,181	10,716	226	2,452	3,016	111,941	72,38%	0	0	0	0	0	0	0	0

* Indicative N/A use to be determined - retail / ancillary office use required

The proposed development is proposed to be completed by late 2024.

The development intends to provide an exceptional low-energy building services strategy, which responds to the climate challenge and is futureproofed to deliver significant carbon savings over the development life. The services strategy and provision of energy efficient building systems is described in detail in Section 5 of this report, and therefore is not repeated in full within this section. This section is primarily intended for completeness of the requirements of MCC Core Strategy Policy EN6/Appendix A with respect to provision of information for the ES . A brief overview of the building services solutions employed for this application are as follows:

- Sweco UK Limited
Sweco Manchester,
Abbey House,
33 Booth Street
Manchester,
M2 3LW
+44 161 927 4810

2.3 Methodology

The determination of carbon figures set out within this ES is derived from assessment against the requirements of Building Regulations Part L 2013 (incorporating 2016 amendments), specifically Part L2A for new-build commercial development. This is the latest version of Part L; it should be noted that the targets set out in MCC Core Strategy 2012-2027 Policy EN6 (Table 12.2) asks for carbon reductions against Building regulation Part L 2010, an earlier and less onerous version of this Approved Document. It is appreciated that at the time of Core Strategy approval, only the 2010 version of Part L was available. Further detail on Part L 2013 is included within Section 3.1.3 of this document.

Sweco UK uses Integrated Environmental Systems’ (IES) VE Compliance software to demonstrate Part L2A compliance for the non-domestic areas.

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) software package. As part of its approval process, the IES software had to demonstrate that it satisfies all of the tests and other requirements defined in accordance with ISO 90003:2004 – ‘Guidelines for the application of ISO 9001:2000 to computer software.

The methodology used by the IES accredited software is summarised below:

- A three-dimensional software model of the proposed non-domestic areas of the building is generated using the software’s Model IT component. This model is based on the architectural drawings and is an accurate geometric representation of the building.
- The building usage is defined for the building as a whole in line with the National Calculation Method’s (NCM) various definitions for building uses.
- The building systems are defined and allocated to each of the rooms within the building.
- The software calculates a Building Emissions Rate (BER) based on the geometry of the building, its use and the efficiency of the building systems defined.
- The software automatically generates a notional building using the geometry for the proposed building, but allocating glazing coverage, U-values and plant efficiency in accordance with the Elemental Method as defined in NCM modelling Guide 2013.
- The software calculates an Emissions Rate for the Notional building, which is the Target Emission Rate (TER) for the actual building.

It is also appreciated that the carbon factors used to determine carbon emissions within the Part L 2013 document are now out of date, due to the significant decarbonisation of grid-supplied electricity in the last 5 years. The emissions factor for electricity has more than halved compared to the factors used for Part L analysis (see section 3.1.3.1 and Table 3.1). This is why all carbon emissions have been reported using SAP 10 figures.

2.4 Architectural Design

The architectural design for the Proposed Development is based upon Piercy & Co Stage 2 information.

2.5 Energy Assessors

The energy assessment has been carried out and approved by CIBSE Energy Registered Low Carbon Energy Assessors based at Sweco UK – 1 Bath Road, Maidenhead, SL6 4AQ.

Mr Kartik Amrania

Head of Energy and Sustainability Department
CEng, BEng, MSc, LCC, LCEA

CIBSE LCEA Registration No: LCEA 133950

Email: Kartik.amrania@sweco.co.uk

3 Legislation and Planning Policies

3.1 Legislation

3.1.1 Climate Change Act 2008 (2050 Target Amendment)

The Climate Change Act sets legally binding greenhouse gas emission reductions targets of 100% by 2050 (with an interim target of 26% by 2020) against a 1990 baseline, which are to be achieved through action taken in the UK and abroad. It contains provisions to enable the Government to require public bodies and statutory undertakers to carry out their own risk assessment and make plans to address the risk of climate change.

In May 2019, the Climate Change Committee recommended a new emissions target for the UK: net-zero greenhouse gases by 2050 to respond to the Paris Agreement commitments. The recommendation has been adopted by the government and the targets have been amended accordingly in June 2019.

3.1.2 Building Regulations Part L 2013

The development will need to conform to the requirements set out in Part L (Conservation of Fuel and Power) of the Building Regulations 2013.

The Approved Documents are issued by the Secretary of State to provide guidance on compliance with specific aspects of building regulations in some of the more common building situations. They set out what, in ordinary circumstances, may be accepted as a reasonable provision for compliance with the relevant requirement(s) of the Building Regulations to which they refer.

Approved Document Part L of the Building Regulations covers the carbon emissions that are attributable to buildings in use, resulting from lighting, heating, cooling and ventilation, excluding small power. This is known as 'regulated' energy, and therefore emissions reduction results derived from a Part L assessment are for regulated energy only. Regulated emissions are required to be reported for the Proposed Development as per MCC Core Strategy 2012-2027 Appendix A, which accords with Policy EN6.

The Proposed Development will need to conform to the requirements set out in Approved Document L of the Building Regulations 2013 (incorporating 2016 amendments). In summary:

- Non-domestic developments come under Part L2A of the Building Regulations 2013 for new buildings.
- A rigid calculation methodology is set out to show compliance. This is the National Calculation Method (NCM) for non-domestic buildings.
- The required maximum carbon emissions can be achieved by any mixture of passive design features (i.e. reducing energy demand) and energy efficiency measures, but minimum standards of thermal performance apply.

In all cases, the carbon emissions achieved are calculated by comparing the proposed design specified in this application (Building Emissions Rate – BER) against the emissions rate from a

notional target building (known as the Target Emissions Rate - TER), which is the same size and shape as the proposed development, but with Building Regulations minimum performance values applied to fabric and energy systems from Part L2A.

3.1.2.1 *Applicability of Part L 2013 and accounting for future decarbonisation*

The development will be assessed under Building Regulations Part L2A 2013, as is appropriate for new non-domestic buildings. This document supersedes the Building Regulations Part L 2010 document that is specifically required for assessment of regulated carbon emissions reduction as part of MCC Core Strategy 2012-2027 Policy EN6 Table 12.2.

It is a requirement under Part L2A 2013 of the Building Regulations that the building meets the minimum performance requirements in terms of the façade U-values, minimum values for energy efficiencies and minimum values for CO₂ reductions as listed within the Part L requirements, and as shown in the following section, 'Baseline Carbon Emissions – TER'. Additional performance requirements for carbon emissions reductions are set out in MCC Core Strategy 2012-2027 Policy EN6, but these are again against the 2010 Building Regulations and not the 2013 version. The performance requirements of the notional building in Part L 2013, which creates the TER as described in 3.1.3, are more onerous than the 2010 version, and therefore any emissions reduction declared against the 2013 regulations is reflective of a larger emissions reduction under 2010 regulations. As described in the later sections of this report, the intent is to significantly exceed the suggested target emissions reduction (currently based on Part L 2010 assessment) within MCC Core Strategy, even when using the more onerous 2013 regulation modelling methodology, as a demonstration of the development team's approach and commitment to driving towards a zero carbon development of the future.

Fuel CO₂ emission factors are based on SAP 2012 and the NCM document for Part L 2013 compliance, considered within the energy model to calculate the CO₂ emissions that will be produced as a result of the running of the systems, as outlined within the report.

Carbon emission factors are used to calculate the equivalent carbon dioxide emissions associated with different fuels. For example, 1 kWh of power from grid electricity will have a different environmental impact than 1 kWh of power from natural gas as presented in the table below.

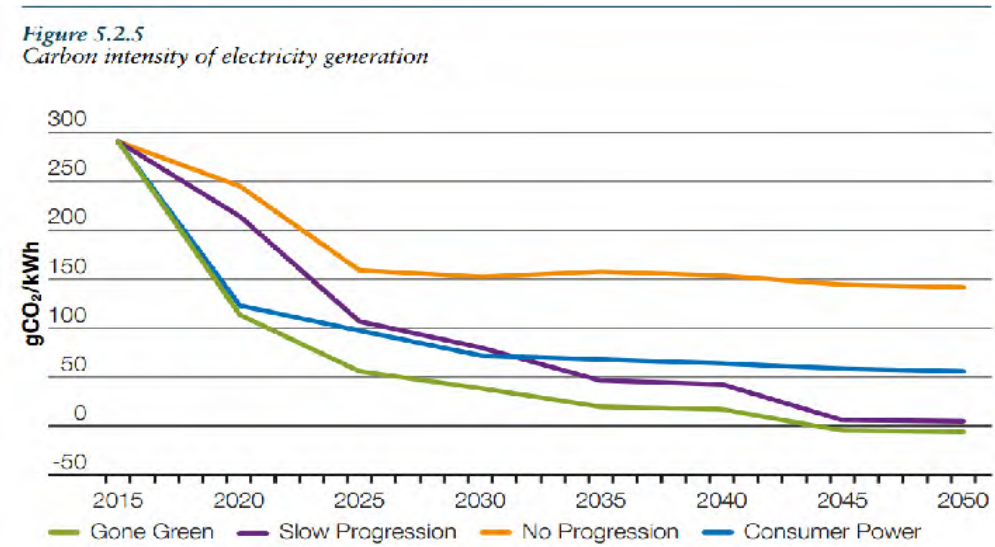
As described in Section 2.3, grid electricity has significantly decarbonised since the last update of Part L in April 2014, and in July 2018, the Government published updated carbon emission factors (SAP 10) demonstrating this.

Table 3.1: Fuel factors for Part L 2013 and SAP 10, demonstrating the level of grid decarbonisation for grid electricity in particular.

System	Fuel Source	Emission Factor (KgCO ₂ /kWh)	
		SAP 2012	SAP 10
LTHW Heating Energy	Natural Gas	0.216	0.210
Chiller Energy	Grid Electricity	0.519	0.233
Lighting Energy	Grid Electricity	0.519	0.233
Pump / Fan Energy	Grid Electricity	0.519	0.233
DHW Energy	Natural Gas	0.216	0.210

The above carbon factors in Table 3.1 reflect the SAP 10 carbon factors as of 2018, and are provided here to show an example of the step change in electricity carbon factors. An all-electric energy strategy is part of the development futureproofing strategy, in that grid carbon emissions are reducing over time and therefore an ell-electric approach is able to capitalise on this. Further underlining this fact, the National Grid released grid decarbonisation factors to 2050 as part of the Future Energy Scenarios (FES), which can be used to demonstrate diminishing emissions from the grid-supplied electricity thanks to increased input from renewable sources. Even under a ‘slow progression scenario’, as is required for reporting in the RICS Whole Life Carbon methodology, there is expected to be a very significant downward trend of grid-associated carbon emissions, as shown in Figure 3.1 below.

Fig. 3.1: graph to show National Grid’s Future Energy Scenarios, demonstrating the reduction of the carbon factor associated with grid electricity to 2050 (via National Grid).



The wider integration of these themes into the delivery of the energy strategy at the Proposed Development, including how our choice of benchmarking facilitates this, is described in within the Sustainability Statement (Section 10).

3.2 Planning Polices

3.2.1 National Planning Policy Framework (NPPF), England

In July 2021, the Ministry of Housing, Communities, and Local Government revised the issue of National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England, and how development should happen in the country.

This framework aims to achieve sustainable development according to the three pillars: economic, social and environmental for both plan-making and decision-making. Local planning authorities must incorporate the visions of this framework within their local development plans. Therefore, by complying with the requirements of the Local Plan and Core Strategies, a development is also compliant with the NPPF. The term sustainable development is defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.

Chapter 14: “Meeting the challenge of climate change, flooding and coastal change” is NPPF’s relevant section to this energy and sustainability statement. That chapter provides a framework for local authorities to address the following issues as regards planning applications: (Only relevant clauses)

The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

- New development should be planned for in ways that:
 - a) Avoid increased vulnerability to the range of impacts arising from climate change. When a new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
 - b) Can help to reduce greenhouse gas emissions, such as through its location, orientation, and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
 - To help increase the use, and supply of renewable, and low carbon energy, and heat, plans should:
 - a) Provide a positive strategy for energy from these sources, that maximises the potential for a suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape, and visual impacts);
 - b) Consider identifying suitable areas for renewable, and low carbon energy sources, and supporting infrastructure, where this would help secure their development;

- c) Identify opportunities for development to draw its energy supply from decentralised, renewable, or low carbon energy supply systems, and for co-locating potential heat customers, and suppliers.

Local planning authorities should support community-led initiatives for renewable, and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

- In determining planning applications, local planning authorities should expect new development to:
 - a) Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved, and its design, that this is not feasible or viable; and
 - b) Take account of landform, layout, building orientation, massing, and landscaping to minimise energy consumption.
- In determining planning applications, local planning authorities should expect new development to:
 - a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and
 - b) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

The Local Planning Policies are based on this framework and adapted to account for regionally specific requirements. The concept design of the Proposed Development takes into account the NPPF guidelines and comply with all the above-listed ethos.

3.3 Local Policies

3.3.1 Manchester Core Strategy 2012-2027

The Manchester Core Strategy was adopted by Manchester City Council on 11th July 2012, and it is the key document in Manchester's Local Development Framework. The strategy describes the vision for Manchester in 2027 and contains planning policies that should be implemented in order to support the delivery of that vision. With respect to the wider Greater Manchester Strategy (GMS), and in reference to the relevance of this document, there is a recognition of the fact that climate change is an issue that must be addressed, and that growth will only be sustainable if it includes measures to mitigate the levels of CO₂ that accompany it. The Core Strategy supports this, with the vision of making Manchester a "sustainable and accessible city" which meets the challenge of climate change at the forefront of environmental initiatives and improvements. There is a drive to continue to deliver sustainable development and more effective green infrastructure.

Strategic Objective 6 (SO6) is particularly relevant to the context of this application. SO6 includes the majority or relevant policies that are referenced throughout this report. The Core Strategy describes the aims of SO6 as:

"Protect and enhance both the natural and built environment of the City and ensure the sustainable use of natural resources, in order to mitigate and adapt to climate change, support biodiversity and wildlife, improve air, water and land quality, recreational opportunities and provide networks of high quality green infrastructure, ensuring that the City is inclusive and attractive to residents, workers, investors and visitors".

Specific requirements are set out by the policies that follow the opening statements of SO6, and those that are most relevant to this application document are established below. Many of these policies are directly addressed within the sustainability strategy section of this document (refer to Section 10), and are not expanded upon in full within this section. Dependant on their scope and intent, they have been included within relevant sub-sections of that strategy piece. The policies relevant to the delivery of a compliant energy strategy are covered in the sections below.

3.3.1.1 Policy EN4

Policy EN4 is particularly relevant, as it covers development design for reducing CO₂ emissions by enabling low and zero carbon development. The policy states that all developments must provide an energy strategy for planning submission which follows the principles of the Energy Hierarchy (refer to following EN6 section), and should include features that:

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

Policy EN4 is mainly a recognition of the climate change issues that Manchester will face in the future, and how the development is located, accessed, designed and constructed to address this.

The policy requires consideration of futureproofing to be made in respect of plant location and technologies employed, and consideration of future connection to low-energy district schemes, where these may be available in the vicinity of the development and subject to applicability to the development under consideration. This also links with some of the requirements set out in EN7, as applicable to the location of the application development.

EN4 also requires consideration of use of building materials with low embodied carbon, The full approach to this is covered in the 'Materials' section of the sustainability strategy (Section 10.6).

3.3.1.2 Policy EN6 & Appendix A

Policy EN6 is the key policy which requires completion of an energy statement (ES) to be submitted at the outset of the proposed development. The policy also links closely with Appendix A of the MCC Core Strategy 2012-2027, which sets out the methodology for how an energy statement should be conducted. The baseline information is set out within Section 2.2 of this statement. The calculation methodology for determination of the CO₂ emissions reductions is set out in Section 2.4.

Policy EN6 also includes the key project targets in respect of CO₂ emissions reductions against Part L of the Building Regulations. Applications of >1000 m² of floorspace are expected to comply with the minimum CO₂ reductions requirements set out in table 12.2 (as applicable to non-domestic development in Manchester). This is subject to determination of the right performance band for the development in question, based on the Appendix A section “which target applies to my development?”. An extract of Table 12.2 from Policy EN6 is set out below for reference.

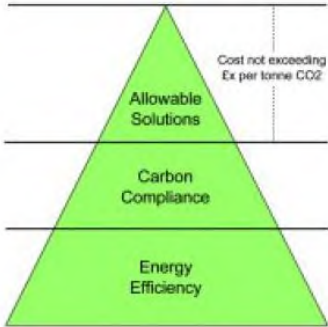
Table 3.2: extract of Table 12.2 from the MCC Core Strategy 2012-2027 EN6 section (p.181), demonstrating CO₂ emissions reduction targets against Part L 2010 of the Building Regulations.

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 CO2/m2))	+10%increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

The Greater Manchester Places for Everyone Joint Development plan supersedes this requirement with a target of at least 19% against Part L 2013.

Policy EN6 and Appendix A also carry a requirement for emissions reduction opportunities to follow the 'Energy Hierarchy' approach, as set out in Figure 12.3 of the MCC Core Strategy 2012-2027 (and shown as Figure 3.2 below). As per Appendix A, the energy hierarchy should be applied in order to identify opportunities for carbon emissions reductions through design and specification of the development. The energy statement should set out the carbon savings that are achieved by applying each measure within the hierarchy. The development should consider how to minimise energy use and increase use of efficient systems, while providing futureproofing and operational monitoring facilities such as advanced metering strategies and Building Management Systems (BMS).

Fig. 3.2: MCC Core Strategy 2012-2027 EN6 Energy Hierarchy approach.



It is important to note that the Policy EN6 and Appendix A required reductions in CO₂ emissions are calculated based on **regulated energy only**. The results tables that can be observed in the following sections only cover the regulated energy consumption and associated emissions. However, the development team appreciate that unregulated energy and emissions can be significant in the overall energy and operational carbon of a development, and should not be ignored. Engagement with a CIBSE TM54 advanced operational energy modelled exercise (see Section 10.3 of this report), facilitated by the project target of BREEAM 'Outstanding' under the 2018 scheme for the office, will ensure that unregulated energy and emissions will be given due consideration for this scheme at RIBA Stage 3 of design.

EN6 and Appendix A also ask the applicant to consider the application of appropriate low and zero carbon (LZC) technologies to site; those that should be considered are set out in Point F of MCC Core Strategy 2012-2027 Appendix A. Section 7 of this report covers the assessment of appropriate LZC technologies for this application development.

3.3.1.3 Other relevant MCC Core Strategy policy

There are numerous other policies set out in MCC Core Strategy 2012-2027 that are applicable to this application document. The Sustainability Statement has also been established to directly address the requirements of these policies, seeking to exceed the expectations contained within and push them forward for compliance with later and more onerous aspirations as set out in MCCF and DMZCF. Alongside EN4 and EN6, this includes focus on EN8 (adaptation to climate change), as well as EN9, EN14, EN16, EN18, EN19, EN20 and T1.

In the more general sustainability context, the statement also references compliance with Policy DM1 – Development Management, which itself contains policy guidance for a development that encourages appropriate materials, mitigates the impacts of air/noise/light pollution, provides development led by health & wellbeing initiatives and encourages urban greening and biodiversity improvements. DM1 also contains the statement on BREEAM, which notes that for new commercial developments, sustainable best practice will include the application of BREEAM standards. There is no specific requirement to achieve a certain BREEAM rating or apply a specific scheme methodology under Policy DM1. The highest possible standards of BREEAM under the latest and most onerous version of the scheme methodology, BREEAM 2018 New Construction v3, are applied to this application. Please refer to the BREEAM section within the sustainability statement for further details.

3.3.2 Draft Manchester Zero Carbon Framework 2020-2038 (DMZCF)

As part of the adoption of new science-based carbon targets for Manchester, and in recognition of the urgent action required locally to address the impacts of climate change, the Draft Manchester Zero Carbon Framework (DMZCF) was released in February 2019. The primary aim of this document is to ensure that:

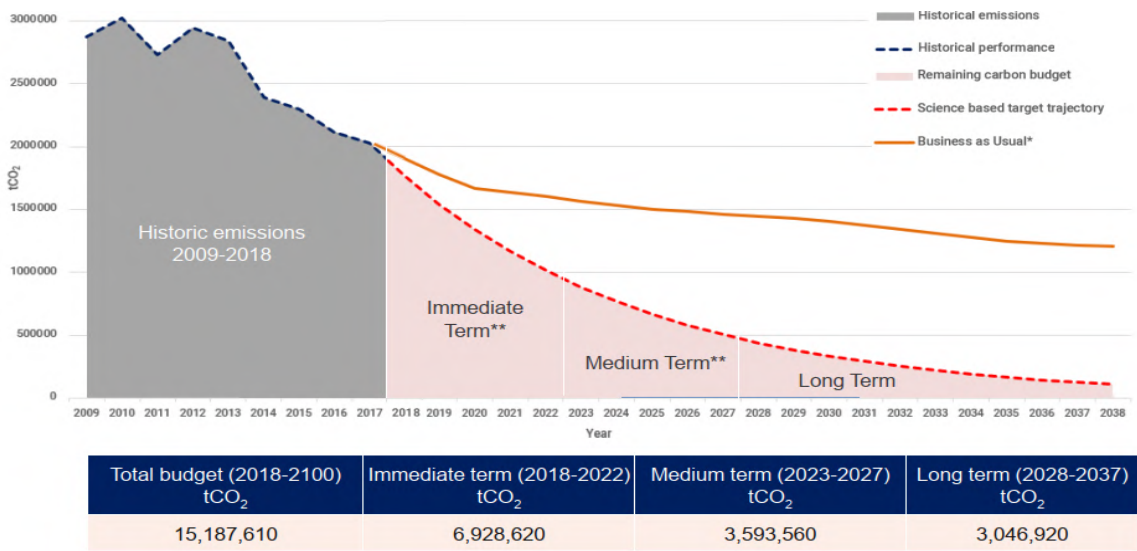
“Manchester will play it’s full part in limiting the impacts of climate change, locally and globally, by acting in line with the latest climate science, the Paris Agreement, and the views of the city’s residents and businesses.”

The DMZCF sets out three core objectives, which can be briefly summarised as environmental, social and economic measures, in accordance with what the National Planning Policy Framework calls ‘the presumption in favour of sustainable development’. These three core themes create the ‘golden thread’ of holistic sustainable design. The core objectives cover the following key items, with objectives 1 & 2 being particularly relevant to the context of this application document.

Objective 1 – Carbon reduction & contributing to the Paris Agreement

Manchester has adopted a c.15m tonne carbon budget from 2018-2100, with what is described as ‘deep and urgent cuts’ required over the next few years to achieve the required reductions set out in this document. This includes a 50% total reduction by 2022 vs. 2018 levels, and an aim to be ‘zero carbon’ by 2038, although it is unclear how the delivery of these targets at the independent building level is supported by the City, or how this might be achieved in the context of new development in Manchester. This objective is particularly relevant to the energy strategy of this application, but also to many aspects within the sustainability statement, particularly the Whole Life Carbon approach being taken for this development.

Fig. 3.3.: Manchester’s carbon emissions pathway consistent with 2°C Paris Agreement targets (via DMZCF).



Objective 2 – Improving residents’ health, wellbeing and quality of life

This objective is focused on delivering a healthy future city for residents, in conjunction with the changes being made with regards to CO₂ emissions reduction. With regards to new development, this would be associated with providing developments that are designed encourage health and wellbeing initiatives, create a safe and healthy operational environment, provide outside space, consider and mitigate impacts on noise/air/light pollution and provide measures to encourage sustainable travel. Much of the work done for this application to address this objective is evidenced within the sustainability statement. Focus on measures to improve health is also a key aspect of “living and working in a zero carbon Manchester”.

Objective 3 – creating good jobs, supporting successful businesses and attracting investment

Focus on supporting business to succeed and attract investment by developing the ‘green’ sector and enabling other city sectors to reduce CO₂ emissions to zero. Manchester will use climate change and sustainable development credentials to attract investors, students and workers from around the world. This very much aligns with what the application development is hoping to provide – by pushing the boundaries of what is possible to achieve for a new development in the current market, the outcome is likely to attract high-end tenants who will support Manchester’s growth and sustainability approach. The development team fully expects potential tenants of the office to have sustainability considerations high on their requirements list prior to leasing a workspace (as is becoming common in the marketplace), and therefore delivery of a development with high sustainability credentials will attract the kind of tenants that Manchester needs to support this objective.

The DMZCF also highlights new development as a key action area, given that such new development generally equates to more energy-consuming buildings, increases in the movement of people and goods, the consumption of more materials and the generation of increased levels of waste. The document sets out four key actions that should be considered to support sustainable and low-carbon development.

1. New buildings need to generate zero emissions when occupied and have significantly less emissions embodied in their materials at the construction stage.
2. Renewable energy generated within the city and city region, and the supplies for the National Grid, are needed to power buildings and the transport system.
3. Well-connected walking and cycling routes, public transport and electric vehicle charging points need to be key components of all new development.
4. Materials and waste will need to come from a new circular economy, involving the reuse and recycling of materials already in circulation, and significantly increased use of sustainable and renewable materials.

How the application is working towards these goals is set out in the following sections of this report, and in a greater level of detail within the supporting sustainability statement section of this document.

3.3.3 Manchester Climate Change Framework 2020-2025 (MCCF)

To assist with and build upon the information and key actions set out in the DMZCF, MCC released the Manchester Climate Change Framework 2020-2025 (MCCF) in February 2020 (v1). The core aim of this document is established as follows:

“Manchester will play its full part in limiting the impacts of climate change and create a healthy, green, socially just city where everyone can thrive.”

There are eight 'key principles' that filter through and inform the document to guide the delivery of the MCCF, as follows:

1. Setting our objectives and targets in line with the latest science and the Paris Agreement.
2. Contributing to Manchester's social, environmental and economic goals.
3. Ensuring that social justice is at the heart of our approach.
4. The need for urgent action by everyone who lives, works and studies in Manchester, from our young people to our older people.
5. Everyone who lives, works and studies in Manchester enabled to act through support, incentives, standards and infrastructure provided by Manchester City Council, Manchester's strategic partners, Greater Manchester Combined Authority, UK Government and their agencies.
6. Advice, guidance and progress monitoring from independent experts.
7. Contributing to Greater Manchester, UK and international commitments.
8. The need for Manchester's growth and development to be zero carbon and resilient to the changing climate.

Following on closely from the eight key principles are four headline objectives, which are informed by the studies conducted as part of the DMZCF and uphold the principles of the document. Most of these objectives are relevant for the purposes of this application, as their content can be applied to new development. A summary of the four key objectives is given below; please refer to the MCCF for more expansive details.

Objective 1 – Staying within our carbon budgets

The carbon budgets are as per those reflected in the DMZCF document, as covered in section 3.3.2 of this report, in line with the Paris Agreement targets and achieved through addressing indirect/consumption-based CO₂ emissions, as relevant to this application submission. Covering both direct and indirect emissions, a Whole Life approach can be taken to carbon emissions reduction, which is the most robust strategy to achieving overall carbon emissions reduction from new development. The sub-objective for direct CO₂ emissions, covering operational energy consumption, is to reduce emissions by 50% between 2020-20205; new development should play its part in working towards this target. There is also a sub-objective related to interrogating and understanding indirect/consumption-based emissions, but the sub-objective does note that this is more difficult to assess accurately. However, by utilising the whole life carbon approach to development as set out in the sustainability statement of this application, which covers embodied carbon (a 'consumption' emission associated with materials), this application does intend to address and quantify those emissions as well.

Objective 2 – Climate adaptation and resilience

Building on the policy set out in MCC Core Strategy 2012-2027 Policy EN8, this objective requires assessment and appreciation of the potential climate change impacts on Manchester assets, and identification of measures that will mitigate those impacts. This includes futureproofing measures and design for future adaptability, as well as increasing urban green infrastructure cover, which has associated benefits for mitigating the Urban Heat Island (UHI) phenomenon, air quality, surface water runoff and even carbon reductions through vegetation uptake. The delivery of this objective is supported by the BREEAM 2018 New Construction credit Wst05 (Adaptability to Climate Change), which requires formal and methodological assessment of potential climate change risks and impacts on new development during the early project stages. Ensuring that this credit section is targeted will assist with upholding the key actions of the objective.

Objective 3 – Health & Wellbeing

Strongly linked to Objective 2 of the DMZCF, this objective aims to improve the health and wellbeing of Manchester residents through actions that also contribute to the objectives for CO₂ reductions, adaptation and resilience. This includes promoting sustainable transport, focusing on our ability to be climate-resilient (see also MCCF Objective 2), increasing the amount of green space to enable better physical and mental wellbeing and improving energy efficiency for a more affordable outlook. New development can contribute positively to health and wellbeing of building occupants in many ways, from architectural and services design to provision of amenity spaces and facilities which encourage sustainable travel. There is a focus on measures employed in this application that facilitate a strong wellbeing-led approach, as set out in the sustainability statement.

Objective 4 – Inclusive, Zero Carbon and Climate Resilient Economy

This objective primarily looks to ensure that the climate-resilient economy in Manchester is inclusive, where everyone can contribute and play a role in the decarbonisation of the city. The city's businesses all have a part to play in this, and can see the economic benefits of driving towards a climate-resilient economy. Many of the core actions for 2020-2025 are not directly relevant to this application document (but are to the application as a whole), but creating a futureproofed, climate-resilient development which attracts tenants with like-minded attitudes to the city is an attractive prospect, so this development will play its part in contributing to this objective in its own way.

New buildings also come up as an area of urgent action in Section 6 of the MCCF. There is a requirement for new buildings to be built to zero carbon standards as soon as possible, and that this should ideally be realised through the UK Government establishing a national zero carbon methodology for implementation, followed by MCC implementing this policy. At the time of this application no such policy exists, and the new MCC Local Plan is not yet available. However, it should be demonstrated how a new development can work towards delivery of this, and the intent of this application is to show how other available industry schemes from RIBA, UKGBC, LETI, BBP and more have been used to set benchmark targets, understand impact and drive towards low whole life carbon development. References to this approach to address this area will refer to “**MCCF Section 6 item 1**”.

Generation and use of renewables is also highlighted as an urgent action area for development in Manchester. This includes increasing the use of PV panels in the city, assisting in decarbonising the national grid, and looking at ‘power purchase agreements’. Additionally, there is mention of a move away from gas-based combustion and its associated emissions, moving towards electric heating, heat pumps etc. This also includes working on increasing building efficiencies and taking a ‘fabric first’ approach to building design, reducing consumption in the first instance. This idea forms a core approach of the application energy stagey, both with the fabric-first approach to building design and passive design efficiencies, but also in the all-electric, heat-pump-led services design. References within this document to address this area will refer to “**MCCF Section 6 item 2**”.

Increasing use of sustainable transport is another urgent action area within the MCCF documentation, including reducing the use of private vehicles, providing measures that encourage walking and cycling (and providing sufficient facilities to accommodate and support this), and increase use of public transport. A new development can assist in supporting this aim, and where this is noted within this document (most specifically the ‘Transport’ section of the sustainability statement), the document will refer to “**MCCF Section 6 item 3**”.

‘Things we buy and throw away’ is linked to the consumption of products and materials within the development construction and over its design life. The consumption-based emissions can be a

significant proportion of a city's emissions, but are poorly understood, so it is important that new development helps to begin quantifying this. The approach noted in the MCCF aligns very closely with how whole life carbon assessments are undertaken, focusing on ‘use less’ before looking at sustainable materials and opportunities for recycling. There is very good evidence that this application supports the general approach noted in this section of the MCCF at the larger building scale. References within this document to address this area will refer to “**MCCF Section 6 item 5**”.

Finally, the last urgent action area in the MCCF is the encouragement of green infrastructure and nature-based solutions, and recognition of the fact that actions in this area often have dual benefits, such as improving air quality, reducing surface water runoff etc. There is a suggestion that urban green infrastructure should be increased by 10% by 2038, against 2018 levels of urban greening. For the purposes of this application, the BREEAM 2018 New Construction Ecology Framework will be used to determine existing site condition, and the % improvements vs. existing condition provided by the new development. References within this document to address this area will refer to “**MCCF Section 6 item 6**”.

3.4

Greater Manchester Places for Everyone

The Greater Manchester Places For Everyone Joint Development Plan August 2021 sets out proposals to support Greater Manchester to achieve the ambition to be carbon neutral by 2038 with a key element being to ensure all new development is carbon neutral by 2028. Key proposals include:

Policy JP-S-1 Sustainable Development

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

The current site was a city centre brownfield carpark site

Policy JP-S-2 Carbon and Energy

The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures. Key amongst these is the requirement that new development will be net zero carbon from 2028 by following the energy hierarchy, which in order of importance seeks to:

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

With an interim requirement that all new dwellings should seek a minimum **19% carbon** reduction against Part L of the 2013 Building Regulations. The proposed overall carbon reduction based on the current Building Regulations 2013 SAP factors result in a 33% reduction in emissions compared to the notional building and so have considerably exceeded the target.

There is also a requirement for new developments to achieve BREEAM Excellent for ENE 01. The scheme is being designed to achieve BREEAM Outstanding and so will require a higher performance than the current target.

Policy JP-S-3 Heat Networks

The provision of decentralised energy infrastructure is critical to the delivery of our objectives for low carbon growth, carbon reductions and an increase in local energy generation.

There currently is no viable heat network within the locality but space within the plant area and riser has been allowed for to enable a future connection for a theoretical future network connection. Refer to Section 8 for further details.

Policy JP-S-4 Resilience

Development will be managed to increase considerably the capacity of its citizens, communities, businesses and infrastructure to survive, adapt and grow in the face of physical, social, economic and environmental challenges, including climate change. Key measures will include:

- Ensuring that developments make appropriate provision for response and evacuation in the case of an emergency or disaster
- Providing adaptable buildings and places that can easily respond to changing needs, future climate impacts and new technologies
- Designing indoor and outdoor environments to provide a reduction and respite from more extreme temperatures and winds associated with climate change and greater urbanisation
- Taking an integrated catchment-based approach to managing flood risk
- Supporting healthier lifestyles and minimising potential negative impacts on health including air pollution

The fire strategy details the proposed evacuation of the building.

The scheme is based on providing on floor air handling units with localised louvre connections which enhances the level of adaptability for the floor space. The heating and cooling loads will be assessed against CIBSE future design summer year weather files to ensure the scheme is capable of catering for future climate change and the anticipated weather variations.

The scheme is provided with a rainwater attenuation system to limit runoff from the site to ease the pressure on the existing utility infrastructure.

The scheme is based on an all electric solution to prevent and localised emissions. There is also significant cyclist facilities and no car parking space to ensure sustainable transport to the site is encouraged.

Policy JP-S-5 Flood Risk and Water Environment

An integrated catchment based approach will be taken to protect the quantity and quality of water bodies and managing flood risk, by developments to manage surface water runoff through sustainable drainage systems and as close to source as possible (unless demonstrably inappropriate) so as to not exceed greenfield run-off rates or alternative rates specified in district

local plans, such as those identified for areas with critical drainage issues. Conserving water and maximising water efficiency in new development.

The scheme design will include ambitious targets to restrict the usage of water from fittings in the first instance. There will also be provided a grey water system to recycle the water which is utilised. There will also be the provision of a rainwater tank. These steps will assist to limit the flood risk and water environment. Refer to section 10.4 and 10.5 for further details.

Policy JP-S-6 Clean Air

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

- Locating and designing development, and focusing transport investment, so as to reduce reliance on forms of transport that generate air pollution
- Promoting actions that help remove pollutants from the air, such as enhancing the green infrastructure network and using innovative building materials that capture air pollutants
- Development should be located in areas that maximise the use of sustainable travel modes and be designed to minimise exposure to high levels of air pollution, particularly for vulnerable users.

The scheme is based on an all electric solution to prevent and localised emissions. There is also significant cyclist facilities and no car parking space to ensure sustainable transport to the site is encouraged. Refer to Section 10.9 for further details.

Policy JP-S-7 Resource Efficiency

The achievement of a circular economy and a zero-waste economy will play a key role in meeting Greater Manchester’s ambition of becoming a leading green city region by 2038. The following measures will help achieve this Ensuring the design of all new development incorporates storage space to facilitate efficient recycling and where appropriate, processing of waste on site; Using sustainable design and construction techniques to reduce carbon emissions, adapt and future proof to the impact of climate change, reduce and recycle waste and minimise water use.

Refer to Section 10.6, 10.7 and 10.8 for details on how the scheme will comply with these requirements.

3.5

Compliance of the energy strategy with MCC Policy

This energy strategy is primarily concerned with setting out how the application development will meet and exceed the requirements of MCC Core Strategy Policies EN4 and EN6 (+ Appendix A). The minimum targets as per this documentation are:

- Achieve minimum regulated CO₂ emissions reduction of 19% over a Building Regulations Part L 2013-compliant development. (As per Places for Everyone)
- Follow the MCC energy hierarchy approach.
- Provision of information for the energy strategy as per the set requirements of Appendix A.

Section 4 onwards covers each stage of the energy hierarchy set out in EN6, from setting a baseline for comparison (Part L ‘target’ building), then assessing the reduction of energy and carbon through passive design and energy efficiency measures, to reductions associated with implementation of LZC technologies and ‘allowable solutions’. The energy strategy looks to report the regulated emissions, as per the requirements of the policy, and also the total regulated energy consumption of the development at each stage of the hierarchy.

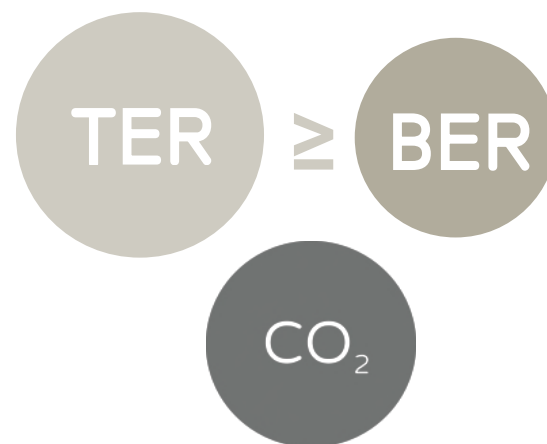
However, it is important that the other key messages and latest industry and Manchester-specific sustainability/zero carbon documentation does not get missed out from this approach. There will also be comment on how the statement supports and facilitates alignment with the relevant sections of the DMZCF and MCCF aims and objectives set out in Section 3.3.2 and 3.3.3 of this report.

4 'Baseline' Carbon Emissions (TER)

As described in Section 3 of this application document, the first task is to establish the target performance for the development against Building Regulations Part L2A 2013. This will provide us with the baseline condition through which compliance with MCC Core Strategy 2012-2027 Policy EN6 and Appendix A can be realised, and the baseline state for comparison using the Energy Hierarchy approach. The 'baseline' building represents a development which just meets the minimum standards of regulated CO₂ emissions reduction (i.e. the Building Emissions Rate (BER) is equal to the Target Emissions Rate (TER), as defined by Part L of the Building Regulations 2013).

Allowances for energy consumption not included under Part L have been made by reference to published material or by calculation. These include small power (energy use for electrical appliances). The energy breakdown and carbon dioxide emissions by end-use and area are shown in the tables in this section.

As part of the study for the commercial areas of the building, a thermal model of the building was developed and analysed using the approved IES Virtual Environment (VE) Software (Version 7.0.8). This software models the carbon dioxide emission rates produced by a building in accordance with Part L2A of the Building Regulations (2013, including 2016 amendments). The software is approved for use by the Department for Communities and Local Government (DCLG) as a Dynamic Building Simulation Modelling Package (DSM). The full methodology for calculation is set out in Section 2.3 of this energy statement.



5 EN6 Energy Hierarchy Stage 1 – Energy Efficiency

5.1 Introduction

This stage of the Energy Hierarchy covers the application of passive design measures and active energy efficiency solutions to establish emissions reduction potential, in accordance with the requirements of MCC Core Strategy Policy EN6. There is generally a common approach to this, which begins with a passive design-based ‘fabric first’ approach to design & operation.

The ‘fabric first’ approach is widely recognised as the cornerstone of low and net zero carbon operational buildings and is the go-to starting point under frameworks such as the UKGBC Net Zero Carbon Framework and LETI’s Climate Emergency Design Guide . This is a focus on passive design measures to reduce heating and cooling demand of the development prior to the application of energy efficiency measures and LZC technologies. This approach intends to reduce consumption and consequent emissions as far as possible using only the building fabric in the first instance, before supplementing this with highly efficient services solutions (not including LZC tech, which is covered under the next stage of the hierarchy approach).

The development design team has been highly engaged in the passive design process. During the pre-planning stages, the team discussed minimum fabric performance standards that would be required to facilitate the success of the ‘fabric first approach, based on Sweco portfolio of successful projects and guidance on performance set out within recent industry documentation. The team also undertook solar shading and solar gains analysis to optimise the building facades in respect of glazing-to-opaque façade components, and how perimeter solar gains would impact cooling loads compared to notional BCO targets and benchmarks.

5.2 Passive Design Features: Regulated Energy Use

5.2.1 Building Envelope

The external envelope of a building acts as an important climatic modifier, with a well-designed façade significantly reducing the buildings energy demand and contributing to a comfortable internal environment by minimising cold draughts and excessive solar heat gains in summer.

It is therefore imperative to set onerous building fabric performance targets, which at the very least exceed the ‘limiting values’ of Part L2A of the Building Regulations for commercial developments, in order to facilitate strong passive design performance in the first instance. Additionally, the applied fabric performance values should also seek to exceed the values applied to the ‘notional’ building, i.e. those values that are applied to the model which generates the ‘TER’ as described in Section 4 of this report. During the early stages of design, the development design team have discussed the relative merits of enhancing U-values, g-value and building air-tightness, alongside undertaking façade optimisation exercises in respect of window to wall ratios and finding a ‘balance’ between strong solar performance and good levels of daylighting/visual light transmittance.

The ‘target values’ set out in Table 5.1 overleaf are those that are currently reflected in the energy models and BRUKL output documents included in Appendix A, providing the emissions results in this and later sections of this ES. The values are seen to be in accordance with the overall aims of the project to drive down energy consumption in the first instance through focus on strong passive design measures. The values also show the % improvement over the ‘notional’ value (where relevant) that is applied to the model which created the TER in Section 4.

Table 5.1: Building Fabric Thermal Performance Non-Domestic Areas

Parameter		Limiting Value	Notional Value	% Improvement	Target Values
Building Airtightness (@ 50Pa)		10 m³/h/m²	3 m³/h/m²	-	3 m³/h/m²
U-values	External Wall	0.35 W/m²K	0.26 W/m²K	31%	0.18 W/m²K
	Roof	0.25 W/m²K	0.18 W/m²K	25%	0.12 W/m²K
	Floor	0.25 W/m²K	0.22 W/m²K	33%	0.12 W/m²K
	Curtain wall	2.2 W/m²K	1.6 W/m²K	25%	1.2 W/m²K (overall: glazing + frame)
Glazing U-value		2.2 W/m²K	1.6 W/m²K	25%	1.2 W/m²K (including frame and openings)
Pedestrian glazed doors		2.2 W/m²K	2.2 W/m²K	18%	1.8 W/m²K
High-usage entrance doors		3.5 W/m²K	2.2 W/m²K	0%	2.2 W/m²K
Glazing g-value (BS EN 410)		Office elevations			g = ≤ 0.28
		Ground floor/mezzanine elevations			g = ≤ 0.40
Glazing Visible Light Transmittance		-	71%	-	≥ 65%
Thermal Bridging (y-value)		To be calculated by specialist			

Notes on Table 5.1:

- 1. The “Target Values” are the construction parameters applied to the Actual Building simulation model and should be reflective of the average of the actual building element U-value.
- 2. Glazing g-value can vary based upon exposure to sunlight, in order to balance daylighting against the cooling loads. G-values will be confirmed after load calculations and Part L Criterion 3 check.

5.2.2 Facade Optimisation

During the pre-application stages of design, Piercy & Co and Sweco undertook a series of facade optimisation exercises to ensure that the building envelope performance was fit for purpose, in respect

of responding to the energy performance targets set for the RIBA Climate Challenge and the MCCF/DMZCF, and also to facilitate occupant health and wellbeing through good levels of daylighting.

The outcome was a façade that responds to the exposure, orientation and layout of each elevation, focusing on the provision of passive design measures that limited incident solar gains. Sun path and solar gains analyses were conducted for the development during early design, which helped to determine where the key pressure points were in respect of potentially excessive solar gains and overheating, which could lead to increased use of mechanical cooling having a significant negative impact on operational energy consumption. IES VE was used to run sun path analysis and also solar gains/overheating modelling exercises, the early results of which were used to inform design progression. Minimum targets were set against BCO perimeter gains guidance, with more onerous project-specific targets set to assist in the drive towards a passive design strategy that supported a zero carbon trajectory approach. The results of these studies, undertaken in tandem and through close collaboration within the design team, were instrumental in developing a strategy which responded challenge.

Fig. 5.1: Sweco solar energy targets during pre-application stages.

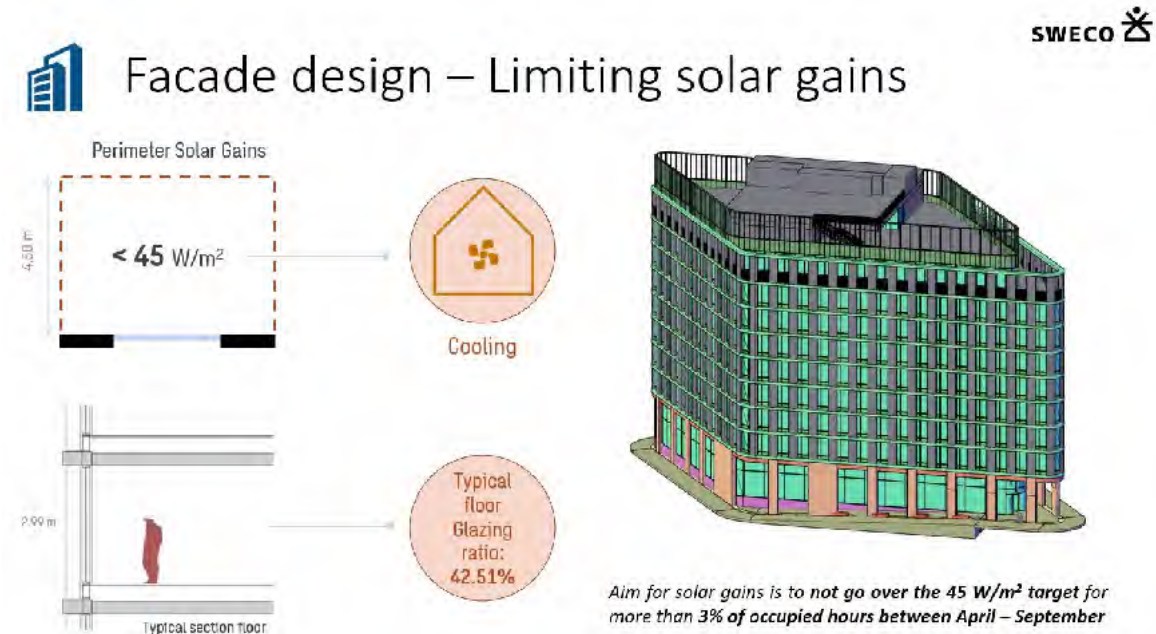


Fig. 5.2: Sweco solar path analysis (via IES VE).

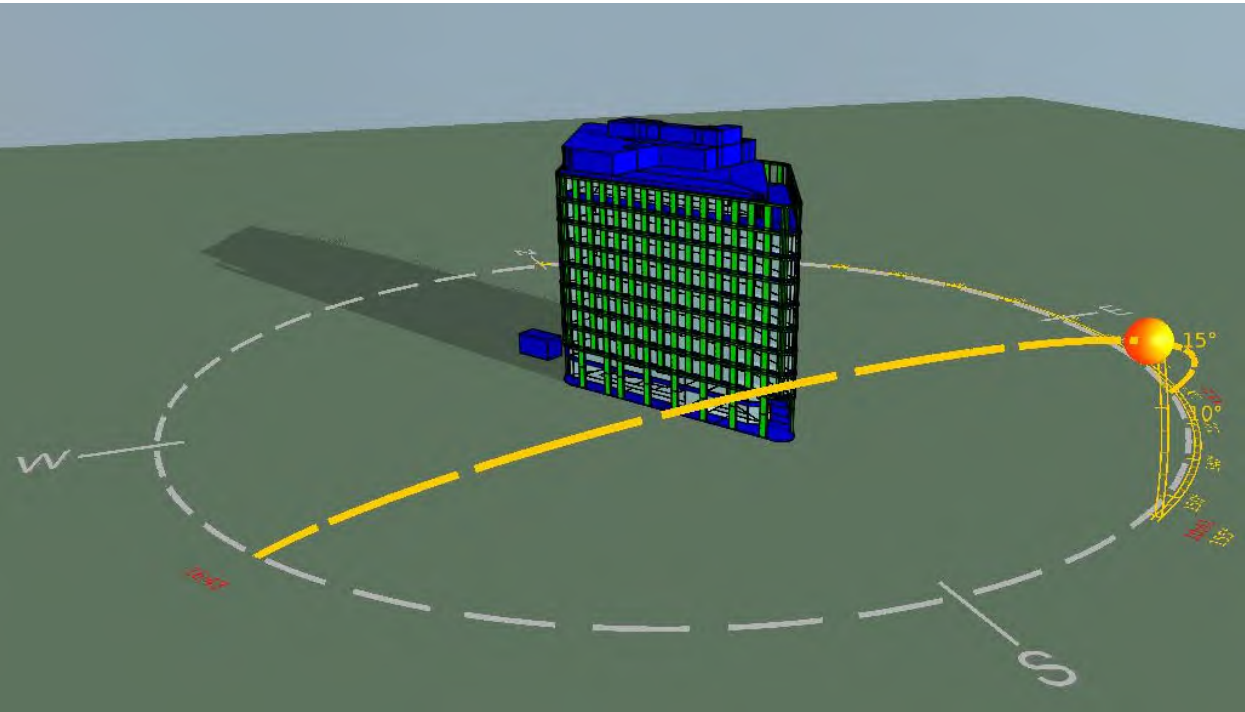
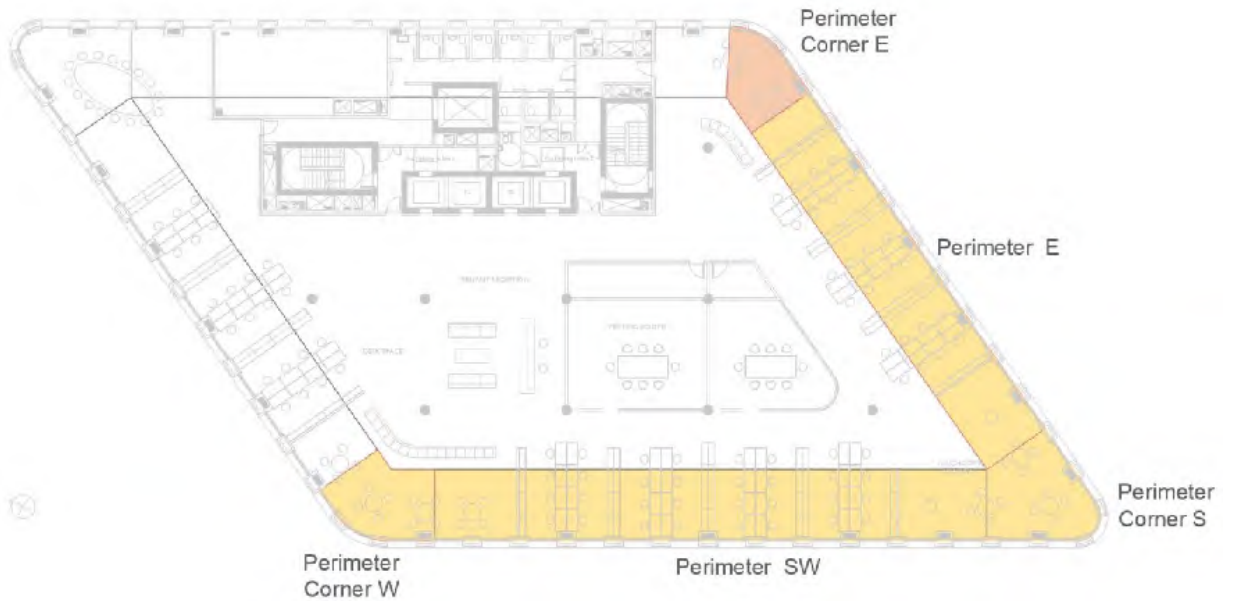


Fig. 5.3: Example of Sweco perimeter solar gains analysis for façade optimisation, to limit overheating risk and reduce cooling demand, using BCO guidance and setting more onerous project-specific performance targets.



The use of these complimentary techniques resulted in a facade performance that was optimised to limit overheating and unwanted solar gains, and therefore had a net positive impact on building cooling loads (and consequently carbon emissions reduction). This was supplemented by the application of high-performance solar control glass, with a g-value of ≤0.28 applied to all office elevations at the time of application.

The façade also includes reveals between the glazed elements which assist with passive shading, further reducing the incident solar gains and positively impacting the development’s cooling demand. During the façade optimisation process, these reveals have been modified, relocated and applied to different parts of the façade system depending on the outcomes of the results analysis, which demonstrates how these exercises have formed the design process and benefited the overall passive design strategy. The application design reflects the results of this exercise.

5.2.3 Thermal mass and free cooling potential

At the time of application, the structural design is based upon concrete slabs, which will be fully exposed to the internal environment to store the heat building up during the day and reduce fluctuations in temperature.

5.2.4 Daylight Strategy

As stated previously, the external façades have been optimised to minimise direct solar gains whilst maximising daylight provision into the occupied areas.

As well as improving occupant comfort by increasing natural daylight provision and visual stimulus, this will reduce the dependency on artificial lighting, thus resulting in energy consumption savings.

Internal daylighting levels are maximised in the perimeter zones across the majority of the floors, and levels of daylighting are continually improved as the building progresses upwards due to increased distancing from the surrounding obstructions. Generous floor to ceiling height is proposed to allow for deeper daylight penetration.

The daylighting benefits of removing the soffits/suspended ceiling systems, allowing high-level daylight into the office spaces not only improves the level of daylight to the space, but it also removes a material from the design and opens up the opportunity for using exposed slabs as thermal mass, which has significant potential benefits for both operational and embodied carbon outputs.

The need for good daylighting has also been balanced against the need to control solar gains for the facades. The applied g-values will need to be balanced against the visual light transmittance of the window, and this will be an important factor in the specification of the glazing units to support passive design and daylighting potential. The values set out in Table 5.1 of this report are established to assist with this aim.

5.2.5 Cooling and Overheating

The proposed building is a commercial speculative office building. In order to achieve low noise levels and industry set comfort requirements for office environment, mechanical cooling is selected to mitigate summertime overheating within the occupancy spaces.

The proposed buildings form and massing has been developed in response to the surrounding buildings, micro-climate and planning thresholds. An appreciation of the surrounding buildings has influenced the location of the cores. The façade glazing percentages, solar performance and external façade reveals have been developed to respond to their orientation and the associated direct solar gains taking into account the surrounding buildings.

Detailed computer modelling analysis (using the DCLG approved dynamic simulation software (DSM)) has been used during the early design process to ensure good levels of natural daylight penetration whilst limiting unwanted solar gain and heat loss.

As well as improving occupant comfort by increasing natural daylight provision and visual stimulus, this will reduce the dependency on artificial lighting, thus resulting in energy consumption savings.

Due to the extensive modelling and development of the facades, the proposed design and performance will greatly reduce the heating and cooling demands of the proposed office type building compared to the notional Part L2A figures. All the mechanically cooled occupancy areas pass the Part L2A Criteria 03 indicating effectiveness of the proposed design in mitigating unwanted solar gains and thus minimising the mechanical cooling energy of the building.

Refer to the Appendix A for the BRUKL report for compliance with Criteria 03.

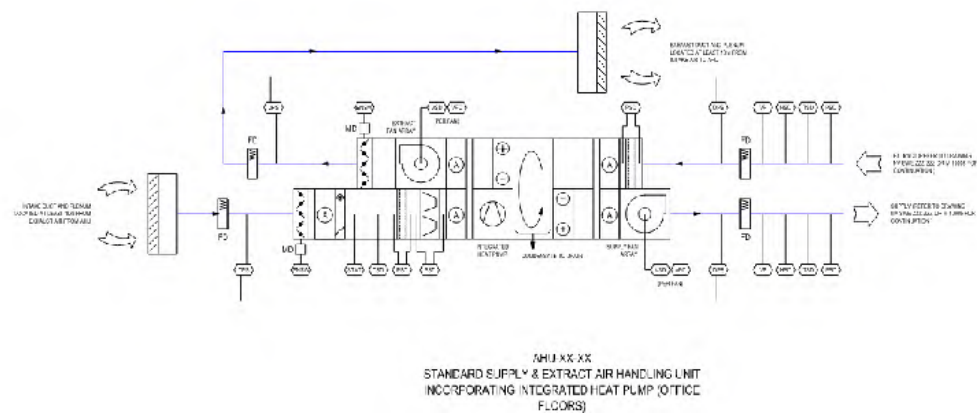
5.3 **Active Energy Efficiency Measures**

To complete the exercise for modelling the first stage of the MCC Core Strategy Policy EN6 energy hierarchy, and to achieve the strong energy efficiency performance of the development required to achieve the overall project goals in respect of zero carbon trajectory, the below sets out the building services design strategy, focusing on those non-Low & Zero Carbon technology features which support this stage of the hierarchy. As with the passive and building fabric section, clear performance requirements for energy efficient services and complementary features have been set out. The performance values established in Tables 5.2 and 5.3 have been reflected in the IES VE energy model used to demonstrate compliance with Building Regulations Part L2A, as per the BRUKL reports included in Appendix A of this application document.

5.3.1 Heating, Cooling and Ventilation Strategy

The primary ventilation of the office tenancies will be provided locally to the floor. Air will be drawn via the façade to on floor air handling units (AHU). The units will be provided with heating and cooling from the centralised air sourced heat pumps and include thermal wheels. The units will distribute fresh air internally via the floor void displacement vent systems which will be controlled by CO2 sensors within the space. The exhaust air will be removed from high level to be discharged externally.

Fig. 5.6: Sweco early design schematic showing the development of the ventilation system through the façade.



The heating and cooling will primarily be provided by roof mounted air cooled, four pipe reverse cycle heat pumps. The units will include air to water and water to water heat exchangers to provide simultaneous heating and cooling with the potential to use heat recovery from the water side to maximise the overall heating/cooling efficiency of the building systems.

On a typical office floor the AHU will provide heated/cooled fresh air to the internal zones to cater the heating/cooling loads. The perimeter zone will be provided minimum levels of required fresh air and provided with additional fan assisted trench heating and cooling.

5.3.2 Building Management System and Metering

The development will be provided with a microprocessor based digital Building Management System (BMS).The BMS will automate the building services systems within the building, helping building managers understand how the building is operating and allow them to control and adjust systems to optimise performance, in a simple, efficient manner.

BMS control of landlord plant and equipment will be designed with energy efficiency as the key driver. Some examples of the energy efficient controls include;

Demand led control strategies - The BMS shall use demand led strategies where appropriate, demands for heating/cooling shall be monitored by the BMS, evaluated and processed, prior to commanding systems operational.

Time program control - The BMS shall provide time schedules that can be programmed to define when an operation signal is to be sent to the controlled plant. The time schedules shall allow different on/off times for building/plant control strategies to be defined throughout the year.

Optimisation Control - The BMS shall provide individual optimisation programmes for the time schedules associated with temperature control of a space/zone, to enable the operation of the related heating and/or cooling systems prior to normal operating periods, in order to bring the zones within

comfortable temperatures at the start of normal occupancy times. The optimisation programme shall be self-adaptive using an iterative process after each period of operation to improve its performance.

Seasonal Operation - Plant controls shall be pre-programmed for seasonal operation, allowing plant start-up routines and temperature control set points to be determined and automatically adjusted based on the season of operation.

5.3.3 Energy Metering and Billing

All landlord meters shall be connected and interfaced with the building management system (BMS) to enable energy consumption data to be collated, analysed and distributed as required by the metering and billing strategy.

The energy metering and sub metering strategy will be in line with best practice as outlined in CIBSE TM31, 39 and 46 to ensure compliance with current legislation, together with Parts L2A of the Building Regulations.

The strategy will be compliant with the EU Energy Efficiency Directive. All notifications and assessments as required by the regulations shall be made by the Contractor.

5.3.4 EC Motors for Mechanical Ventilation Heat Recovery Units

The current Part L Building Regulations set stringent efficiencies for the fans used in all air conditioning and mechanical ventilation systems. Recent advances in fan motor technology have resulted in substantial reductions in energy consumption, and otherwise significant proportion of building energy use. EC (electronically commutated) motors will be used in place of conventional AC motors.

5.3.5 High-Efficiency Variable Speed Drives

By varying the fan and pump speeds for the water and air distribution systems to match the building load profiles, fan and pump energy consumption will be considerably reduced. This functionality will be afforded and managed via the intelligent Building Management System (BMS).

5.3.6 Ventilation Heat Recovery

The energy required to heat or cool the incoming fresh air supply to the buildings will be significantly reduced by using an efficient heat recovery system. The heat recovery systems will utilise the thermal properties of the return air to transfer 'free' heat/cooling to the incoming fresh air supply. These will be controlled so as to minimise the demand for any heating and cooling of the fresh air supply.

Heat recovery between the return/exhaust air and outside air shall be provided on all supply and extract units via a plate heat exchanger with efficiencies of at least 78%. The efficiencies will conform to the European Directive 2009/125/EC, which requires increased efficiencies from 1st January 2018.

5.3.7 High-Efficiency Air Source Heat Pumps

Mechanical cooling will be minimised through the use of passive design features, as discussed earlier within this report. Having limited loads, the intention is to provide a central system using high-efficiency mechanical ventilation heat recovery units supplying fresh air to the tenancies. Heating and cooling will be derived from high efficiency air sourced heat pumps.

5.3.8 Low Energy Lighting

A full lighting installation will be provided throughout the landlord and common areas of the buildings, generally comprising LED luminaires, with functional lighting. All luminaires will be provided with dimmable control gear (addressable) to suit its type and application. All landlord lighting will be controlled through the addressable lighting control system.

Lighting will be provided to the external areas, including public space at ground floor and on the external terraces. External luminaires will generally comprise suitably IP-rated LED luminaires to suit the architectural design. Luminaires will be provided with DALI-addressable dimmable control gear. All external lighting will be controlled through the building lighting control and management system and minimised wherever possible to avoid light pollution. Lighting levels are listed in the next table.

Table 5.2: applied lighting parameters for the application.

System	Parameter	Applied Value
Lighting Efficiency ¹ :	Office Areas	6 W/m ² Lighting level: 300-500 Lux
	Entrance	8 W/m ²
	Storage Areas	95 lm/W
	Toilet Areas	95 lm/W
	Circulation Areas	95 lm/W
	Plant Areas	95 lm/W
Lighting Controls	Transient Spaces	Presence Detection On/Off
	Occupied Spaces	Presence Detection On/Off Daylight Dimming Control

Note 1: All installed Lighting will be LED and all-day lighting areas to have daylight dimming controls with local sensors with presence detectors. All transient areas will have presence detectors.

5.3.9 Automatic Monitoring and Targeting

The Building Regulations Approved Document L2A identifies that the provision of automatic monitoring and targeting with alarms for out of range values, can provide significant savings in energy consumption of the building services systems. A saving in energy consumption of 5% is awarded for complete installations that measures, records, transmits, analyses, reports and communicates meaningful energy management information to enable the operator to interrogate and manage the energy it uses.

5.3.10 Power Factor Correction

The Building Regulations Approved Document L identifies that the provision of power factor correction to the building electrical supply can provide significant savings in electrical consumption. A saving in electrical energy consumption of 1% is awarded for power factor correction to 0.9 and a saving of 2.5% awarded for power factor correction to 0.95 power factor. This development intends to have a power factor correction of 0.95 as a minimum.

5.3.11 Efficient HVAC Parameters

The following design parameters were assigned to the base building to establish its CO₂ emission rate over a year.

Table 5.3: Applied HVAC Parameters for Main Central Plant

System	Parameter	Applied Value
Cooling System	Nominal Efficiency (SEER)	4.43
Heating System	Nominal Efficiency (SCOP)	3.43
Air Handling Units	SFP	1.56-1.60 W/l/sec
	Ventilation Heat Recovery Efficiency	76% (Thermal Wheel)
	Demand Control Ventilation	Yes
WC Mechanical Ventilation Heat Recovery	SFP	1.3 W/l/sec
	Ventilation Heat Recovery Efficiency	76% (Thermal Wheel)
	Demand Control Ventilation	Yes
Pumps	Pump Type	Variable speed multiple pressure sensors
General Domestic Hot Water	System type	Instantaneous electrical system
	Storage Losses	0.004 (kWh/(l.day))
	Circulation Losses	5 W/m
	DHW Controls	Timed Control
Basement Domestic Hot Water	System type	Water to Water Heat Pump
	Storage	25000 L
	Circulation Losses	5 W/m

System	Parameter	Applied Value
Electrical / Metering	DHW Controls	Timed Control
	Power Factor	Greater Than 0.95
	Lighting system have provision for metering	Yes
	Automatic Monitoring of energy Data?	Yes
	Controls	Central Start & Stop Optimum Start & Stop Local time & temperature Control Weather Compensation Control

5.4 Active Design Features: Unregulated Energy Use

It is appreciated that MCC Core Strategy Policy EN6 asks for carbon emissions to be reported for regulated energy emissions only, and therefore this is what has been reported in the following section of this energy statement. Unregulated energy has not been reported in the carbon emissions data. Unregulated energy refers to ‘plug loads’ such as:

- Lifts, escalators;
- Refrigeration systems;
- Computers, laptops, printers, photocopiers, audio visual equipment;
- Server rooms and other electrical loads.

The development team appreciate that unregulated energy use can account for a large portion of the total energy consumption within office buildings according to CIBSE TM54 – prediction of operational energy use (Figure 5.7). Therefore, to bridge the performance gap of design performance versus actual measured performance during operation of the building, it is important to address unregulated energy use as it is not considered under Part L of the Building Regulations.

Fig. 5.7: Comparison of operational energy use: Part L versus actual measured energy use (extracted from CIBSE TM54:2013)

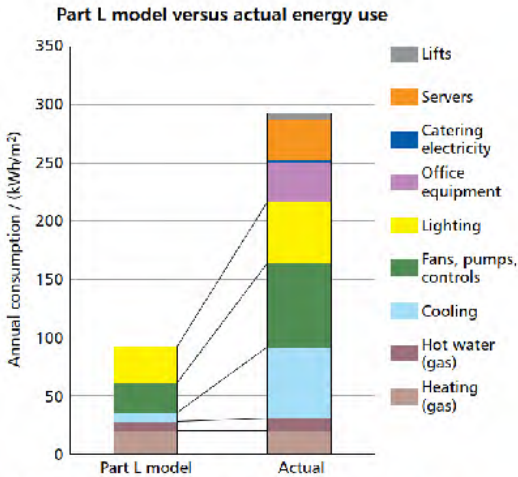


Figure 1 Comparison of AD1.2A calculations and operational performance for a case study

As the development is undertaking BREEAM assessment against the 2018 New Construction scheme, and targeting the highest ‘Outstanding’ rating, the process will need to include formal advanced energy modelling against the CIBSE TM54 methodology. This process will establish total building energy consumption and provide the full picture on carbon emissions, accounting for both regulated and unregulated sources. This process is mandatory for achieving BREEAM ‘Outstanding’, and therefore a commitment to this target also reflects a commitment to undertake the CIBSE TM54 advanced modelling process. The usefulness of this process to understanding actual energy performance, closing the ‘performance gap’ and reporting more accurately on trajectory towards the achievement of zero carbon goals is described in more detail in section 10.3 (sustainability statement). As per the requirements of BREEAM 2018 Ene01, the TM54 process will begin at RIBA Stage 3 (most appropriate stage for this type of modelling to take place), and will involve all design, construction and operation stakeholders in the modelling and scenario development process.

Even before this process begins, it is important to establish at this stage the design measures that will be required to facilitate low unregulated energy consumption. This section summarizes how the Proposed Development will control unregulated energy use which accounts for both regulated and unregulated energy/emissions.

5.4.1 Low Energy Culture

Providing building users and operators with practical guidance on the importance and methods of energy efficiency can lead to effective, cost-free reductions in energy usage and carbon emissions. Savings can be expected in, for example:

- Operating comfort cooling systems efficiently.
- Lighting Energy: a culture of ‘turn-it-off’, providing task lighting wherever possible.
- Small Power: prefer electrical equipment with an Energy Star rating, and avoiding monitors and PCs etc. in stand-by mode.
- Cooling/Heating Energy: widening ‘acceptable’ temperature range.

Training of operators and facility managers is particularly important to provide them with the skills and knowledge to implement and continue to improve an energy management programme.

The amount of energy that can be saved will be dependent upon the motivation of the occupants and the effectiveness of the awareness programmes. The development will actively encourage a low energy culture as part of its building operation and commercial leasing strategy.

5.4.2 Low Energy White Goods

White goods are to be provided with a certified energy label. These are rated from A+++ to D, with D being the least efficient.

Wherever white goods are provided within the development, including washing machines, dryers, dishwashers and fridge/freezers, they will achieve:

- Minimum "A+" for fridges, freezers or fridge-freezers;
- Minimum of "A" for washing machine and dishwasher; and
- Minimum of "B" for washer dryer or tumble dryer.

Information on the EU Energy Efficiency Labelling Scheme of efficient white goods will be provided to the white goods supplied by the developer.



5.4.3 High-Efficiency Vertical Transportation

The vertical transportation systems are to be specified with several energy-saving features intended to reduce energy use both whilst moving and when in standby mode. Such measures can be particularly beneficial when applied to passenger lifts in large workplaces which typically deal with high numbers of people moving in, out and around the building. These measures may include:

- Specification of modern VVVF drive systems.
- Quantity, size and speed of passenger lifts minimised to meet agreed performance benchmarks and thereby minimise base energy load.
- Real-time monitoring of prevailing passenger demand and switching of lifts in and out of service in order to minimise the energy consumption whilst maintaining specified performance benchmarks.
- Energy-efficient lighting.

6 Cooling and Overheating

6.1 Cooling Hierarchy

This section takes inspiration from the Greater London Authority’s (GLA) London Plan, as Manchester does not have any specific guidance on how to address the impacts of overheating for commercial buildings, other than the brief note in Policy EN8 (see Section 6.2). The GLA ask that developments provide narrative evidence that cooling demand is reduced through considered and sustainable design, further underlining the importance of the ‘fabric first’ approach. This is widely considered best-practice to show resilience against overheating and reductions in the significant energy consumption associated with cooling plant and equipment. Table 6-1 below demonstrates the key measures that need to be assessed, and how the Proposed Development addresses these considerations through design.

Table 6-1: Cooling Hierarchy and Proposed Development Strategy

Cooling Hierarchy	Proposed Strategy
1. Minimise internal heat generation through energy-efficient design	Glazing ratio optimised throughout the building to provide sufficient daylight and solar control glass applied to minimise solar gains. LED lighting is proposed to reduce internal heat gains.
2. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls.	The glazing ratio has been derived by data-driven design in limiting solar gains and managing daylight levels and respond to the solar exposure and façade orientation. The glazing has been recessed to assist in providing shading without significantly increasing embodied carbon. Perimeter solar gains analysis has been undertaken to ensure that façade and services systems are optimised.
3. Manage the heat within the building through exposed internal thermal mass and high ceilings	A minimum 2.9m of floor to ceiling height is proposed to the office areas. The floor slabs will be exposed to allow the thermal mass to temper the internal environment.
4. Passive ventilation	Given the site context and external acoustic environment, natural ventilation has been deemed inappropriate.
5. Mechanical ventilation	Highly efficient mechanical ventilation with heat recovery is proposed for fresh air supply all year round.
6. Active cooling systems	All previous measures contributed to reduce peak cooling demand for thermal comfort.

6.2 MCC Core Strategy Policy EN8

MCC Core Strategy Policy EN8 covers adaptation to climate change and includes a requirement for “the need to control overheating of buildings through passive design”. As per Section 5.1 of this report, there has been significant focus on the ‘fabric first approach’. For the purposes of this application, the success of the development in controlling overheating is established through compliance with Part L2A criterion 3. Additionally, an assessment of thermal comfort for building occupants will be completed as per the methodology requirements of the BREEAM 2018 Hea04 process, which requires verification of optimal levels of thermal comfort under current and future weather files. This will be in accordance with CIBSE AM11 and Guide A, and the future weather file demonstrates that suitable levels of thermal comfort can be maintained under an anticipated climate change scenario.

7 EN4 Energy Hierarchy Stage 2 – Low & Zero Carbon Technologies

Further energy and carbon dioxide emissions savings could, in principle, be made through the adoption of renewable technologies. The suitability of available technologies is sensitive to a number of factors, including site constraints, development footprint, surrounding environment, access limitations and development type. MCC Core Strategy Policy EN6 and Appendix A list the potential Low and Zero Carbon (LZC) technologies that could be assessed for the purposes of further reducing the operational carbon impact of the development. The inclusion of these technologies is subject to a feasibility review as part of the energy statement. The potential carbon emissions benefits realised through application of LZC technologies is represented in the energy and emissions results presented as part of Stage 2 of the MCC energy hierarchy approach.

The following renewable energy technologies have been investigated to establish their suitability and feasibility.

7.1 Consideration of Low and Zero Carbon Technologies

7.1.1 Photovoltaic

Photovoltaic panels convert solar energy into electricity and are best placed in an unobstructed location, ideally in a south facing orientation at 30° inclination. When located vertically, the output can be reduced by about 15%. PV panels provide a visible green label for the building and make use of space at the top of the buildings.

At present, as demonstrated within this application document, the development can significantly exceed the carbon emissions reduction requirements of MCC Policy EN6 through the fabric first approach and a carefully considered, all-electric building services solution, without the need for resorting to additional on-site generation to ‘top up’ carbon emissions reduction performance which is considered the optimal position.

There is however balanced against the requirement of the GM Places for Everyone requirement to prioritise PV generation where technically feasible and so:

Photovoltaics have been included in the design.

7.1.2 Wind Turbines

Wind turbines produce electricity directly from the energy in wind. This is then fed into the buildings electrical system via a control gear. Two types of wind turbines are available; horizontal axis and vertical axis. The former tends to be noisy and produce vibration. The latter are quieter in operation and more suited to installation on buildings but are generally less efficient and more expensive.

Although wind turbines are a highly visible form of renewable energy, they can normally provide only a very small contribution to the total electrical consumption of buildings in city and urban locations. Probably visually unacceptable in planning terms, there are also concerns that such a turbine would create unacceptable noise levels during day and night. As a consequence, wind turbines are not considered to be viable for this project.

7.1.3 Solar Hot Water

Solar hot water panels must be in a generally south facing position, ideally at about 30° to the horizontal. If located vertically, output is reduced by about 15%.

Although efficient and cost-effective in implementation, solar hot water systems can only offset a fraction of the domestic hot water demand for the site. Solar hot water panels are therefore not recommended for this development.

7.1.4 Ground Source Heat Pumps

The proposed building is a commercial office type space, designed to balance heating and cooling demand. A heat recovery type energy strategy is adapted with the use of air-source heat-pumps, which adequately balance the heating and cooling demand of the building throughout the year and therefore, provides significant energy efficiency in heating and cooling generation. Therefore, there is no requirement to store energy and hence a GSHP will not be suitable application as part of the energy strategy.

7.1.5 Variable Refrigerant Flow (VRF) Air Source Heat Pumps

Variable Refrigerant Flow (VRF) systems are typically all-electric systems that use heat pumps to provide space heating and cooling to building spaces. They are capable of serving multiple zones in a building, each with different heating and cooling requirements. These systems have the ability to modulate the amount of refrigerant sent to each zone in accordance with conditioning requirements. When these units are used to provide space heating, air source heat pumps (ASHP) work similarly to a fridge, but in reverse. It extracts heat from the outside air in the same way that a fridge extracts heat from its inside. The heat they extract from the air is constantly being naturally renewed.

As the space heating is also provided by the heat pump, they should be considered as a renewable heat sources and included in the ‘Green’ carbon emission.

As mentioned in the Stage 1 section heat pumps will be used to provide space heating and cooling for the building. The hybrid operation and the ability to provide heat recovery will increase the seasonal efficiency of the units which will make the system suitable for similar applications like the building.

Air Sourced Heat Pumps have been included in the design.

7.1.6 Combined Heat and Power (CHP)

As a result of reviewing project location, site context, energy demand and load profiles, CHP technology was not considered in the building design due to facts below;

1. The development aims to have no on-site combustion sources to significantly contribute to improving local air quality.

2. The decarbonization of the grid with increased share of renewable energy in the mix make the on-site generation from natural gas fuelled CHPs a more carbon-intensive process
3. The development is seeking to respond to the MCCF – Section 6 item 2 demonstrates the requirement for Manchester to move away from gas-based combustion energy supply system.
4. The proposed building intends to support a trajectory towards zero carbon in line with the UK electricity grid and therefore, a natural gas run CHP will not be suitable for the proposed energy strategy.

8 EN4 & EN6 – Potential for DHN Connection

8.1 District Heating and Cooling Networks

The MCC Core Strategy Policy EN4 requires new developments establish their location in respect of determining the feasibility to connect to or incorporate future provision to connect to existing/potential decentralised energy schemes. Therefore, connection to such networks must be considered. This is also an important part of the final stage of the energy hierarchy approach, which wants developments to consider “allowable solutions” (see energy hierarchy triangle in Figure 3.2). As per the advice given in MCC Core Strategy Appendix A, this includes investigating the potential for connection to local district heating networks.

The Civic Quarter Heat Network (CQHN), delivered by Vital Energi, is not available for localised connection to the proposed development.

Fig. 8.1: sketch map showing locations of the currently proposed DHN extent (CQHN).



The Proposed Development is designed to allow for future network connections from high or low temperature networks of the future with space allowance in the basement plant and riser allocation.. The building energy strategy allows it to adapt to either heat or energy networks of the future. Should the network expand in the future, a connection can be offered to the proposed building.

9 Conclusion

This report has been prepared on behalf of Toriview Ltd (the “Applicant”) for the planning application of the New Victoria Development (“the Proposed Development”) for Manchester City Council (“MCC”).

The energy statement (ES) for the proposed development has been developed in accordance with the requirements of MCC Core Strategy 2012-2027 Policies EN4, EN6 and Appendix A, to demonstrate the achievable regulated carbon emissions reductions against EN6 Table 12.2. The ES also takes account of the additional advice provided as part of the Manchester Climate Change Framework (MCCF), Draft Manchester Zero Carbon Framework (DMZCF) and Greater Manchester Places for Everyone Plan (PfE). The regulated carbon emissions have been determined through assessment against Building Regulations Part L2A 2013 and reported using SAP 10 figures.

The key headlines for the development from this application document are as follows:

- ‘Fabric first’ approach to low energy and zero carbon development, in accordance with current industry best-practice approaches.
- Energy Hierarchy Stage 1 (passive + energy efficiency) emissions reduction of **24%** against Building Regulations Part L2A 2013.
- Overall regulated emissions reduction of **44%** against Building Regulations Part L2A 2013 for SAP10.

BREEAM 2018 New Construction, target of ‘**Outstanding**’ for Office Shell & Core

- Bespoke sustainability strategy, drawing on industry best-practice & benchmarking to create a custom set of sustainability targets.

9.1 Non-domestic Operational Carbon Dioxide Emissions

The results presented below demonstrate the development regulated operational energy and carbon performance based on SAP 10 figures for CO2 emissions, measured against Building Regulations Part L2A 2013, and in accordance with the MCC Energy Hierarchy approach, and as provided in Section 7 of this report.

Table 1.1: Part L2A 2013 regulated energy consumption & savings based on the MCC EN6 Energy Hierarchy approach for the Proposed Development.

MCC Energy Hierarchy Stage	Regulated energy (kWh/m²/year)	Savings (kWh/m²/year)	%reductions vs. previous stage
Target Emissions Rate (TER)	57.77	n/a	n/a
MCC Energy Hierarchy Stage 1 Energy Efficiency	44.18	13.59	23.5
MCC Energy Hierarchy Stage 2 LZC Technologies	31.67	12.51	28.3

Table 1.2: Part L2A 2013 regulated CO2 emissions & savings based on the MCC EN6 Energy Hierarchy approach for the Proposed Development.

MCC Energy Hierarchy Stage	Regulated CO2 emissions (tonnes)	Total CO2 Reductions (tonnes)	% reduction vs. previous stage
Target Emissions Rate (TER)	198.1	n/a	n/a
MCC Energy Hierarchy Stage 1 Energy Efficiency	149.9	48.2	24
MCC Energy Hierarchy Stage 2 LZC Technologies	110.8	39.1	20

10 Environmental Standards

10.1 Sustainable Development at New Victoria

10.1.1 Introduction

Climate change is a global issue, but one that percolates from the international level to local and individual, with every stakeholder needing to play their part in combating this challenge. Underwritten by international commitments such as the Paris Agreement, significant steps are now being taken to mitigate future impact and keep to the 2°C global average temperature increase target. However, without clear and decisive action at every level and from every key stakeholder, achieving these onerous targets becomes more and more difficult. The City of Manchester have formally declared a climate emergency in 2019; there is now an urgent need for the city to respond. The significance of the task faced at the local scale has been established in the supporting documents referenced in Section 3, including the Draft Manchester Zero Carbon Framework (DMZCF) and the following Manchester Climate Change Framework (MCCF). Without an urgent focus on sustainability and low-carbon action, Manchester will not be able to maintain its downward trajectory and achieve the deep cuts and step changes it has established as required to meet the aims of the Paris Agreement.

The built environment is one of the key stakeholders in the fight against climate change. It is estimated that ~40% of global emissions are associated with the built environment, and therefore the ability for the industry to adapt and change will have a significant impact on the achievability of climate change targets at every level. There has been a step change, even within the last 4-5 years, on how we approach building design, construction and operation, with sustainability now being at the forefront of the development agenda. This has been assisted by many industry bodies either formally declaring a 'climate emergency' or issuing key statements of intent to galvanise industry to respond, including RIBA, UKGBC, RICS, ICE and CIBSE. The broad and multidisciplinary nature of industry commitments to understand, tackle and mitigate climate change underline the urgency of the situation, and how the industry feels it should act in accordance with the proportion of emissions it commands.

Ensuring that new development is constructed with sustainability at the top of the agenda, construction and operation of a building are critical measures to support mitigation of climate change. It is therefore important that key steps for sustainable outcomes and project-specific targets are defined at the very start of the development process, based on industry best-practice methodologies and benchmarks, and that progress against these core aims are monitored through the process and into operation. It is also important not to become siloed simply to assessment of carbon; sustainable development is holistic in its very nature, therefore sustainable outcomes must also be holistic and respond to the myriad of factors that influence a successful outcome. Using third-party sustainability certification schemes such as the Building Research Establishment's Environmental Assessment Methodology (BREEAM) allows this to be realised in a rounded way, with consideration not just given to carbon emissions but also to sustainable transport, waste, water use, ecological enhancement and construction management. When used as a complementary tool alongside industry benchmarking, such schemes allow a development to become truly holistic in their approach to sustainable and low-carbon development.

10.1.2 Development Sustainability Strategy

From the development outset, ensuring that the application represented the highest levels of sustainable design, construction and operation was established as a critical component of the process, and of core importance to planning. The application would need to demonstrate how it not only meets and exceeds current policy related to sustainability and climate change resilience, but also how it is responding to new MCC publications such as the MCCF and DMZCF. In addition, the application would need to be made in respect of current industry best-practice sustainability benchmarking and research, and should reflect local, national and international progress in sustainable development.

The project team defined 4 key steps that would need to be taken to ensure that the sustainability strategy for the Proposed Development is able to uphold the onerous requirements set to achieve the overall goal. These can be summarised as follows:

- 1 Define the sustainable outcomes during project briefing stage and align UN SDGs to the built environment.**
- 2 Utilise best-practice and knowledge from industry sustainable certification and benchmarking schemes.**
- 3 Adopt soft landing principles as a basis for reality-checking outcomes at building handover.**
- 4 Verify sustainable outcomes during operation through post-occupancy evaluation methods.**

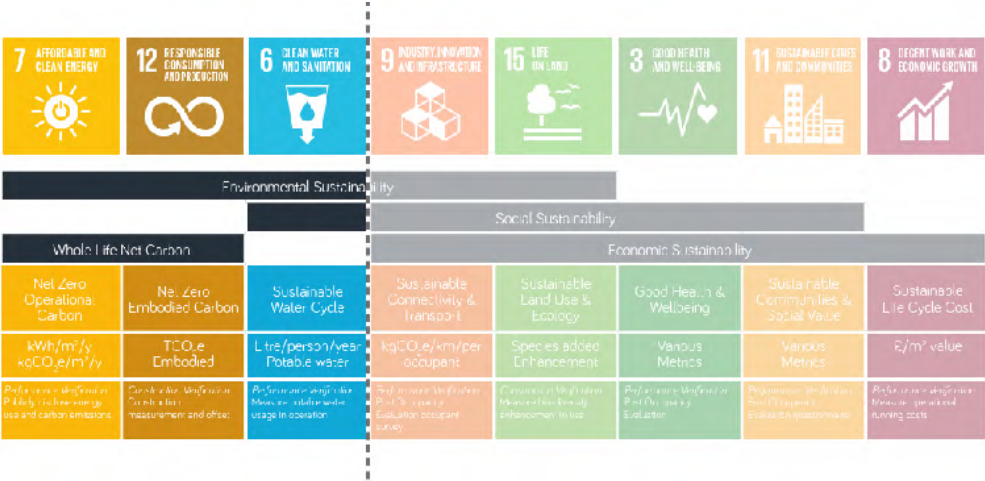
The process began at the highest level, with a review of the UN Sustainable Development Goals (SDGs) by the project design team in conjunction with the RIBA Sustainable Outcomes Guide, which takes the 17 UN SDGs and assists the industry by highlighting and defining which goals are relevant to sustainability of the built environment. The publication highlighted 9 SDGs as relevant to sustainable outcomes for the built environment, as shown in Figure 10.1 below.

Fig. 10.1: 9 UN SDGs highlighted as relevant to the built environment in the RIBA Sustainable Outcomes Guide.



Through this sustainability statement, all of the above measures will be assessed or captured by the strategy in one form or another, which focus on the aspects of environmental, social and economic sustainability. These are important themes for sustainable development and align with the NPPF's 'presumption in favour of sustainable development', and the direction of the DMZCF and MCCF (see section 3 of this document). However, there are three measures in here that are seen as being of core importance to the realisation of sustainable outcomes from this development. These are the SDGs related to clean water & sanitation (6), affordable & clean energy (7), and responsible consumption & production (12).

Fig. 10.2: highlighting the core goals relevant to sustainable outcomes for this application which form the basis of project targets.



Goal 13 (climate action) does not appear in Figure 10.2 because it is the overarching goal that underwrites this whole process, and through engagement with other goals and the actions taken in this statement, the goal is addressed. The three core goals selected by the project team relate to tackling the energy consumed & carbon emitted by our development during its operations, a focus on tackling the emissions related to consumption of products materials (and therefore addressing the gap identified by MCCF and DMZCF for understanding of indirect/consumption emissions in Manchester), and managing water resource appropriately. The three core aims were selected because they all represent life cycle operations and ongoing resource use and emissions through a development's life cycle, and therefore are deemed to be the most significant sustainability impacts over the development life.

The development team have drawn on best-practice from a wide variety of industry publications and documentation, primarily to determine which key sustainability factors should be ingrained into design, construction and operation to drive success and provide futureproofed sustainable design in a constantly evolving market. The strategy considers key recent documents from the capital, including the London Energy Transformation Initiative's (LETI) Climate Emergency Design Guide (the content of which is applicable to all UK development) and the Greater London Authority's (GLA) intend-to-publish London Plan, which arguably provides the most robust and onerous sustainability policy available to date in the UK. Although it is recognised that this development is in Manchester and not London, the policy is significantly more advanced than that currently available elsewhere in

the UK in respect of detailing robust methodologies for answering key sustainability questions, and therefore, where relevant, best-practice will be used to help steer this sustainability strategy.

Literature review of the SDGs, available industry publications and best-practice allowed for core sustainability 'themes' to be determined. These themes form the basis of the sustainability approach for the Proposed Development and resulted in agreement on a set of project targets and goals that work together to support sustainable and climate-resilient development in Manchester.

The chosen themes are non-exhaustive but have been selected as the key benchmarks against which the Proposed Development will be assessed. They include holistic sustainability assessment such as BREEAM, which covers a myriad of sustainable design, construction and operational items, as well as more specific and current sustainability considerations such as operational energy, embodied carbon, urban greening, and health and wellbeing.

The icons overleaf demonstrate the key proposed targets and approaches against each core sustainability theme, which will be reflected and expanded upon throughout the latter subsections of Section 10. Successful implementation will be delivered through continuation of the strong cross-collaborative efforts of the development team in realising sustainable outcomes.



Sustainability Certification

Target of BREEAM 2018 New Construction 'Outstanding'
Implement features of the IWBI's WELL Building Standard



Operational Energy & Carbon Emissions

Achieve a minimum of 35% emissions reduction against Part L 2013
Reduce carbon emissions by 10% through passive design alone.



Water Resources

Target a 40% reduction in potable water consumption compared to the BREEAM 2018 baseline (equal to 3 no. BREAM Wat01 credits).
Integrate Sustainable Drainage Systems (SuDS) into design.



Waste Management

Engage in circular economy activities.
Target a diversion of 95% of non-hazardous construction and demolition waste from landfill.
Target construction waste of <6.5 tonnes per 100m² GIA.



Ecology & Urban Greening

Target an increase in ecological value compared to pre-development site (based on BREEAM 2018 Ecology Framework)
Encourage and support urban greening of terraces and roof spaces.



10.1.3 Sustainability & Wellbeing

Ensuring that sustainable design does not just focus on the ‘hard’ targets such as carbon is very important to ensure that holistic sustainability is achieved for the development. During the pre-application stages this focused on six key areas;

- air
- water
- light
- fitness,
- comfort
- mind

To reflect the work undertaken by the project team to ingrain these key factors into the sustainability approach, these icons appear in the relevant individual sections of this sustainability statement, where a design feature or project approach at the pre-application stage helps to facilitate strong performance in this area. Demonstrating a strong sustainable approach to improving health and wellbeing is also raised as a core requirement in both the DMZCF (Objective 2) and the MCCF (Objective 3).

10.1.4 Manchester Planning Policy and Frameworks

In addition to providing a bespoke sustainability approach and set of aims for this development, the sustainability statement also seeks to show how the progress at pre-application stage meets and exceeds relevant planning policy as set out in the MCC Core Strategy 2012-2027. Further to this, the statement also intends to show where the strategy assists in supporting the aims and objectives of the DMZCF, MCC SDP, MCCF and GM Places for Everyone, as this is a crucial component of futureproofed sustainable design in Manchester that responds to the latest findings. The requirements of and references to these documents are set out in detail in section 3 and are therefore not repeated here – please refer to Section 3 for detail.

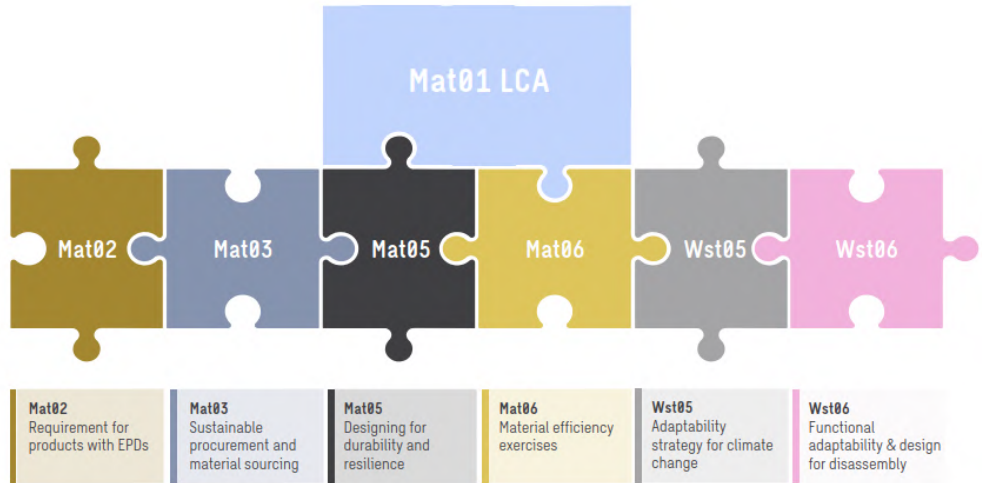
10.2 Third Party Sustainability Assessment

The development team have chosen to support the bespoke project sustainability approach with BREEAM assessment. BREEAM is a third-party verified holistic sustainability assessment and certification scheme, operated by the Building Research Establishment (BRE). It is the most established sustainability scheme in the world, with more than 550,000 developments certified and 2.3 million developments registered. The BREEAM New Construction assessment methodology is split into 9 environmental categories, with individual credits and criteria within those categories, where credits are awarded based on compliance with best-practice environmental and sustainability performance indicators.

BREEAM assessment forms a key component of the sustainability strategy, and the various credits available in the scheme have been purposely selected to support the project targets set out in Section 10.1. The development team recognise that, when used in a framework approach, BREEAM assessment is a powerful tool to underwrite and provide established methodologies for completion

of core tasks that deliver sustainable development. BREEAM should always be viewed as framework rather than a box-ticking exercise, with significant interconnectivity between credits allowing sustainable performance to be gauged in consideration of the myriad of impacting factors.

Fig. 10.5: Puzzle diagram demonstrating credit interdependence in the BREEAM 2018 assessment methodology (example of credits working to support Mat01 LCA).



The BREEAM methodology also assists the project in addressing some of the identified relevant UN SDGs that are not captured by the RIBA Climate Challenge approach. BREEAM has credits relating to the three core selected items, but also credits that would work to address the other SDGs as relevant to building design and operation. The BRE published a document in November 2018 which clearly demonstrated how the SDGs align with the BREEAM family of schemes, showing how the use of BREEAM as a sustainable development tool can assist in providing successful outcomes.

Fig. 10.6: Examples of BREEAM scheme alignment with the UN SDGs (via BRE UN SDG publication, November 2018).

SUSTAINABLE DEVELOPMENT GOALS		BREEAM's Overarching Contribution to Sustainable Development Goals	Building Standards BREEAM delivered by bre HOME QUALITY MARK	Communities Standard BREEAM delivered by bre	Infrastructure Standard CEEQUAL delivered by bre	Shelter and Settlement Sustainability Tool* QSAND
3 GOOD HEALTH AND WELL-BEING	Ensure healthy lives and promote wellbeing for all at all ages	Encourages the provision of comfortable, healthy and safe internal and external environments for asset users and others within the vicinity				
11 SUSTAINABLE CITIES AND COMMUNITIES	Make cities inclusive, safe, resilient and sustainable	Promotes the development of sustainable communities and encourages access to sustainable transport, delivery of affordable and safe homes, implementation of flood resilience measures, minimisation of air pollution, and access to public and green space				
15 LIFE ON LAND	Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	Encourages sustainable land use, protection and creation of ecological features, and improvement of long term biodiversity for asset sites and surrounding land				
KEY			Significant contribution to meeting the UN goals and targets	Some contribution to meeting the UN goals and targets	Limited or indirect contribution to meeting the UN goals and targets	

BREEAM is also useful as a timeline management device, setting deadline targets for provision of design information in accordance with the RIBA Plan of Works. The latest version of the scheme, BREEAM 2018 New Construction, places heavy emphasis on completion of early actions prior to the conclusion of RIBA 2. This focus on early action and integration of sustainable action and though-processes is synchronised with the independent Sustainability Strategy process for this application, therefore the processes are both complementary and interdependent.

MCC policy supports the use of BREEAM to provide third-party verified assessment of sustainable performance for new developments. MCC Core Strategy Policy DM1 notes that, for commercial developments, sustainable best-practice would include the application of BREEAM standards. The GM Places for Everyone Plan notes the requirement to target Excellent whilst the scheme itself will target Outstanding.

The development will be assessed under the latest and most onerous version of the BREEAM methodology, BREEAM 2018 New Construction (v3). In BREEAM 2018, so many of the key credit criteria cover the development as a whole (for example materials, ecology, transport etc.), that it does not make sense to provide a separate BREEAM assessment for the small retail space, as holistic sustainable design is applied to the development as a whole. Performance parameters will still be set for the shell only retail space, in respect of compliant building fabric performance to facilitate low-carbon operation in the ‘fabric first’ approach.

Table 10.1: Table to show the BREEAM assessment for the office use being undertaken at the Proposed Development, including scope and minimum performance targets.

Assessment	Scheme	Scope	Minimum Target
Office	BREEAM 2018 NC v3	Shell & Core	‘Outstanding’ (≥85%)

As an office-led scheme, the development will seek to achieve a minimum of BREEAM ‘Outstanding’ under the 2018 New Construction scheme, the highest possible rating, only achieved by 1% of new UK buildings. Please refer to the Sweco BREEAM pre-assessment tracker document for the office appended to this report (Appendix B), which demonstrates the credits targeted for the Proposed Development to meet this minimum requirement.

BREEAM will be used as a framework to support and underwrite the development sustainability strategy. In the headline sections which follow, the strategy shows how key BREEAM credits have been selected to support this, and to address some of the MCC Core Strategy 2012-2027 policy requirements in respect of sustainable development. In addition, use of BREEAM as a framework allows this strategy to support aims and objectives of the MCCF and DMZCF and GMPfE; examples of how the BREEAM 2018 credit selection supports this are captured in the individual sections within this report.

The BREEAM assessment also helps to support the themes and targets set out as part of the overall sustainability approach, and in some cases compliance with BREEAM credit sections forms the set

targets. As a third-party verified scheme, this is a robust way of demonstrating that set targets have been met on practical completion.

10.3 Energy and carbon dioxide emissions



Achieve a minimum of 25% emissions reduction against Part L 2006.

The development energy strategy has been described earlier in this document and is not therefore repeated in full within this section. This section intends to summarise the current performance, targets and approach taken to achieving low-energy development, and consequent carbon emissions reduction, at the pre-application stage.

Part 1 Policy E1.5 of the SDP encourages high energy efficiencies within new developments and requires steps towards reduced energy demand to be taken at early design stages. The proposed development should reduce CO₂ emissions by at least 25% on top of the requirements set out by Building Regulations: Approved Document L (2006).

This translates into an approximate 44% improvement of PartL 2013 over PartL 2006. The calculations completed for this statement follow the guidance set by Building Regulations: Approved Document L (2013), as required by Building Control. Thus, all results will be presented in relation to PartL 2013.

Following the MCC Core Strategy Policy EN6 energy hierarchy approach, and the ‘fabric first’ approach coveted by LETI and UKGBC for delivering low-energy buildings, the development has placed major focus at the pre-application stage on ensuring that energy demand is reduced in the first instance. Details of the measures applied at the Proposed Development can be found in Section 5.2 of the energy strategy that precedes this section. Passive design measures employed include the following:

- Optimised façade that responds to each elevation, considering solar exposure throughout the year.
- Review using DSM software of the perimeter solar gains to align with the targets set in BCO guidance and reduce cooling loads.
- Optimised window-to-wall ratios.
- Exposed soffits on office floors to take benefits from thermal mass (subject to structural slab design and heat capacity).
- High-performance building fabric, significantly better than the requirements of Building Regulations Part L 2013.
- Balanced solar control for glass to ensure that solar gains are controlled whilst maintaining good visual light transmittance, views and daylight penetration to reduce lighting loads.

H&W Performance Indicator

CO2 & temperature sensors to adapt fresh air provision to occupancy

H&W Performance Indicator

Optimised external facades, limiting impacts of overheating, creating comfortable internal environment, user-operated spaces.

H&W Performance Indicator

Optimised and balanced solar control for daylighting and views out, exposed soffits allow more high-level light penetration.

The development has also taken significant steps within the proposed building services design to enhance energy efficiency and improve operational energy performance. The key measures employed for this application can be observed in Section 5.3 of the energy strategy. The development is progressing with an all-electric energy supply approach, which allows advantage to be taken of the diminishing grid carbon factors for electricity as per the current SAP 10 factors and the National Grid Future Energy Scenarios, and is a key contributor in the move towards a zero carbon development. A summary of the key energy efficiency measures employed for the development is as follows:

- Heating & cooling will primarily be provided by roof mounted air cooled, four pipe reverse cycle heat pumps. The units will include air to water and water to water heat exchangers to provide simultaneous heating and cooling with the potential to use heat recovery from the water side to maximise the overall heating/cooling efficiency of the building systems.
- Air will be supplied via the façade to on floor AHU which will distribute air from the floor in a displacement system.
- A comprehensive energy monitoring and management system will be in place for the development, including metring to CIBSE TM39 and a user-operable Building Management System (BMS).
- Majority of internal lighting will be high-efficiency LED and will be specified and controlled in accordance with best-practice BREEAM criteria.
- Minimum targets have been set for specification of efficient HVAC equipment (refer to Table 5.3), which are reflected in the energy and carbon models.

H&W Performance Indicator

Displacement ventilation, improved indoor air quality.

H&W Performance Indicator

User-controlled environments, optimised internal comfort characteristics, efficient systems.

H&W Performance Indicator

Good daylighting reducing lighting loads, high-performance and efficient LED lighting suitable for the internal operations.

The combination of the passive design measures and the energy efficiency measures employed at the development as described above, have resulted in the EN6 energy hierarchy Stage 1 carbon emissions reduction of 24% relative to Building regulations Part L 2013, for regulated energy only.

At Stage 2 of the EN6 energy hierarchy, the development achieves a carbon emissions reduction of 20% relative to Building Regulations Part L 2013, for regulated energy only.

The final reduction against Part L of 44% is far in exceedance of the requirements set in EN6 Table 12.2 and the GM PfE requirement and is in fact moving the development towards some of the suggested reductions noted in the key actions of the DMZCF and Objective 1 of the MCCF. This is based on using SAP 10 carbon factors.. MCCF Section 6 Item 2 does note the benefits of a move away from gas-based combustion energy systems, and this development is demonstrating why that is the correct approach. It is very important that this is included here, as this is the more accurate representation of the expected carbon emissions performance for the development.

Beyond this, it is also possible to demonstrate how the application of an all-electric energy supply strategy will assist in facilitating further future reductions in carbon emissions over the development's life, and help drive towards the aims of MCCF Objective 1. By using the National Grid Future Energy Scenarios, focusing on the 'slow progression' scenario as per the requirements for Whole Life Carbon assessments established by RICS (see 'Materials' section), the diminishing carbon factors can be used to show how carbon emissions would change over time given decarbonisation of the grid.

It is also recognised that modelling against Building Regulations Part L does not give a full picture of energy use and carbon emissions, due to the need for control of the process and cross-comparability, which limits model inputs and assumptions. To mitigate this, the development will undertake modelling against the CIBSE TM54 methodology at post-planning stage. CIBSE TM54 is an involved advanced modelling simulation process, which provides a much more accurate representation of regulated and unregulated energy consumption, and is the preferred method for checking compliance of EUI targets. CIBSE TM54 is lauded within the industry as the tool that will assist us in getting closer to understanding the actual energy use of a development at the project design stage, allowing for more appropriate design and specification based on more accurate data.

Figure 10.8 below shows the significant difference in calculated energy consumption comparing Part L-derived results with those from a full CIBSE TM54 advanced energy calculation method.

Figure 10.8: graph to show the significant differences in modelled energy consumption between Building Regulations Part L and CIBSE TM54.

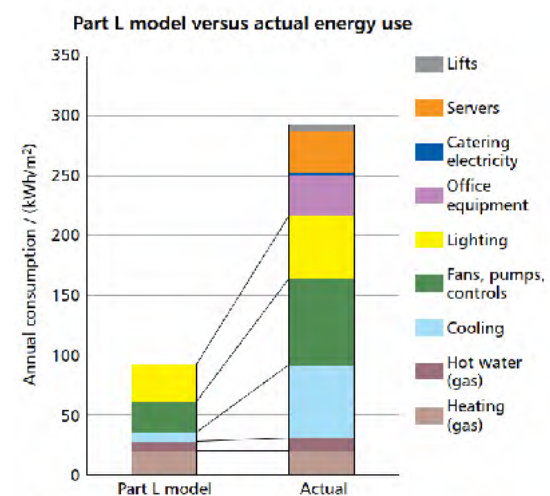


Figure 1 Comparison of A101.2A calculations and operational performance for a case study

The onerous requirements of BREEAM 2018 will also be used as a design tool to drive project energy efficiency and services design performance. Credits have been targeted to facilitate this, including Hea01, Hea04, Ene01, Ene02, Ene03, Ene04, Ene06, Pol01 and Pol02, which support the overall approach to low-energy and low-carbon design.

10.4 Water consumption



Target a 40% reduction in potable water consumption compared to the BREEAM 2018 baseline (equal to 3 no. BREAM Wat01 credits).
Integrate Sustainable Drainage Systems (SuDS) into design.

Managing water resource is one of the core sustainability themes for the Proposed Development. The intent is to use the BREEAM 2018 ‘Water’ credit sections to demonstrate how careful and considered specification of water-consuming components and associated features will positively impact water use.

The SDP requires the environmental standards statement to show how water is being managed in an environmentally effective way. New developments are expected to include SuDS within their designs, as well as use water efficient devices.

MCC Core Strategy 2012-2027 does not have a specific policy that directly requests that development’s provide a strategy that deals with water efficiency, but the requirements would broadly fall into compliance with Policy DM1 and EN8 (in respect of providing resilience to climate change through good management of operational water resource. Similarly, the DMZCF and MCCF

do not have specific policies related to managing operational/potable water, but again the general approach could be seen to comply with the overarching requirements of DMZCF key action 4, and MCCF Objective 2 + Section 6 item 3 in respect to climate resilience and including measures for recycling of resources. GMPfE Policy JP-S 5 Flood Risk and Water Environment outlines the aim to conserve water and maximise water efficiency in new development.

The low-consumption culture begins with the intent to specify water-consuming components and sanitaryware with a high standard of water efficiency. Components will be selected in accordance with the EU Water Efficiency Label, targeting the top two ‘green’ bands of this label to provide performance verification and support the project approach. In addition, sanitaryware will have set performance requirements to help facilitate the first stage of water-use reduction from end users. This is based on the credit performance bands in BREEAM Wat01, which can be used in this instance to help steer good component specification. The minimum standard for BREEAM ‘Outstanding’ in the Wat01 credit section is 2 no. credits. The development will target a minimum of 3 no. Wat01 credits, which largely reflects a 40% reduction in potable water consumption vs, the BREEAM 2018 baseline. This also forms part of the architectural health and wellbeing performance indicators for the Proposed Development, as demonstrated below.

H&W Performance Indicator
Specification of low-consumption sanitaryware and water fittings

Table 10.2 below sets out the proposed minimum performance requirements for sanitaryware for the Proposed Development, in accordance with the WUI intent and the minimum target BREEAM Wat01 credits.

Table 10.2: table to show proposed minimum performance requirements for the sanitaryware components for the Proposed Development.

Water fitting – Non-Domestic Areas	Capacity / flow rate	Units
WC, dual flush (effective)	2.95	litres
Urinals (2 or more)	n/a	Litres/bowl/hour
Wash hand basin taps	4.5	litres/minute
Showers	6	litres/minute
Commercial dishwashers	5	litres/rack
Commercial washing machines	7.5	litres/kg
Kitchen sink taps	5	litres/minute

Referring back to the BREEAM 2018 assessment, engagement and target of credits such as Wat 02, Wat 03 and Wat 04 also assist in support the project water strategy. Sufficient water metering will be provided within the development, covering both the incoming supply and also monitoring water usage of high-consumption systems and building areas. A water leak detection system will be provided, which will monitor leaks throughout the development and synchronise with the BMS to

ensure that leaks are identified and can be mitigated quickly. In addition, sanitary supply shut off devices, such as PIR linked to the lighting systems, will be included to only supply water to spaces (such as WCs and hand basin taps) when it is required. All of these solutions support the low-flow sanitaryware specification requirements

Unregulated water demands (i.e. those associated with irrigation systems) should also be addressed. There is likely to be significant planting to terraces at the development (see ‘Ecology’ section), but it is unclear at the point of submission whether irrigation will be required. Regardless, the project team intend to set performance targets to manage this should it arise, as follows:

- Where possible, and subject to supply distribution and availability, water for irrigation should be provided through recycled water supplies.
- Species selection for planted/landscaped areas should accord with local climatic context and be drought-resistant where this also supports the UGF target for the development.
- Irrigation systems should be sub-surface, drip-fed in design.
- Moisture sensors should be included to ensure that water is not supplied when soils/substrates already hold sufficient moisture.
- Zoning of irrigation should be implemented.
- Controllers and monitoring systems (including weather systems) should be considered to ensure automated supply.

The above approach provides a strong declaration of intent to manage water resource to meet the project sustainability goals. The assessment intends to consider both regulated and unregulated water use, and therefore represents the full picture of water use at the Proposed Development.

10.5 Flood Risk, Water Management & Drainage

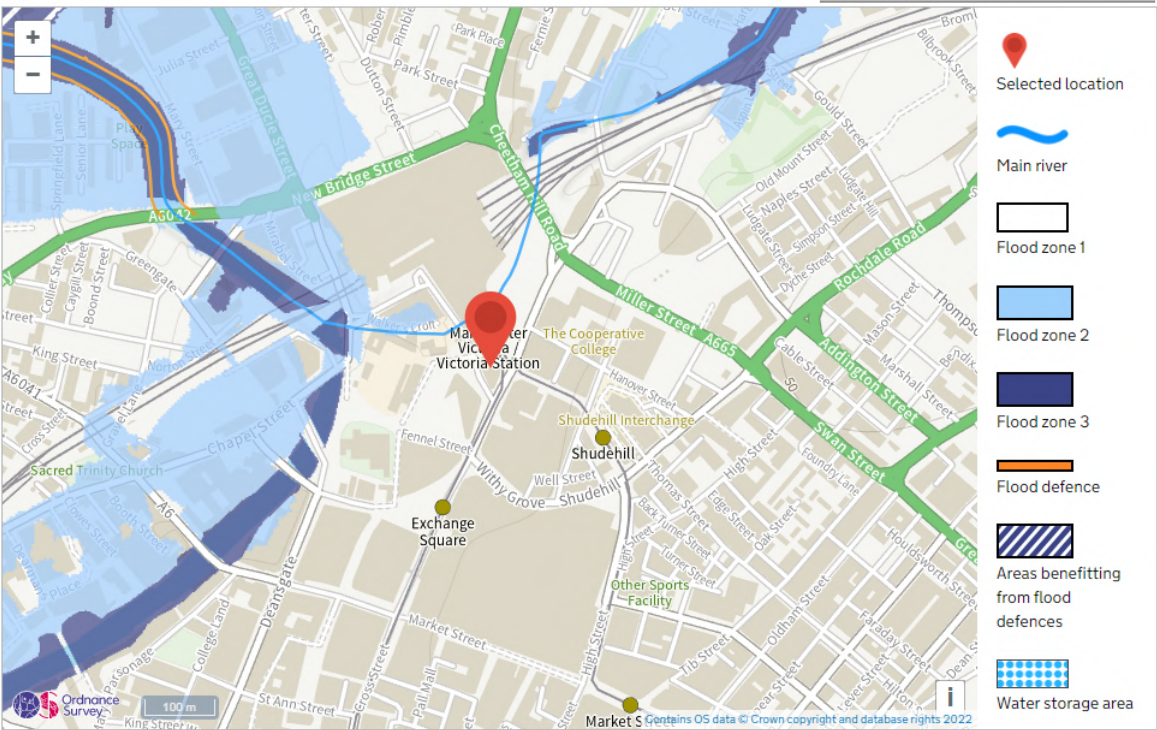
10.5.1 Flood Risk Assessment

Managing flood risk is an important aspect of the sustainability strategy. This issue is particularly relevant to developments seeking to address the impacts of climate change, as an increase in potential for future UK flooding is one of the more likely and better-understood scenarios from the latest UKCP data. The issue also has covers factors such as robust design, occupant safety/means of escape and the potential for significant future economic impacts in a flooding scenario, so it is imperative that the risk is understood and mitigated.

MCC Core Strategy 2012-2027 Policy EN14 and the SDP required a Flood Risk Assessment to be completed in accordance with the Manchester SFRA and PPS25, which is now superseded by the NPPF. However, this is only applicable to sites greater than 0.5ha within Critical Drainage Areas and Canal Hazard Zones, as identified by the SFRA. Flood risk also forms a key consideration for Policies EN8 and DM1, which expect this to be mitigated through building location and design, taking into account the impacts of climate change. Mitigating flood risk and making allowances for climate change impacts are also required as part of the alignment process with MCCF Objectives 2 and 4, related to climate-resilient design. GM PfE Policy JP-S 5 Flood Risk outlines the steps to protect water quality and managing flood risk.

The development is located in Flood Zone 1, defined by the Environment Agency as having a ‘low’ risk of flooding from rivers and sea (less than 1 in 100 annual probability) and medium risk from surface run off.

Fig. 10.10: potential flood extent map to show the location of the Proposed Development (via Environment Agency).



The risk from all sources to site flooding is deemed to be ‘low’, with the development located in Flood Zone 1. Full detail of how specific risk levels were identified and claimed are captured within the FRA. Mitigation of flood risk will also be captured in the BREEAM Wst05 – Adaptability to Climate Change assessment process.

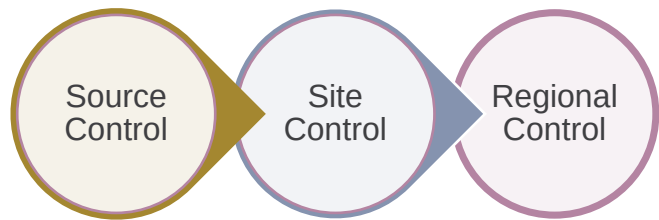
10.5.2 Sustainable Drainage Systems (SuDS) & Project Approach

New development always carries the risk of increasing impermeable areas with new hardstanding materials, therefore exacerbating any localised flood risk from surface water. This is likely to become more urgent in the future under expected climate change scenarios, with more rain expected to fall in Manchester in the future. It is therefore imperative that new development does not exacerbate existing site condition, and includes Sustainable Drainage measures (SuDS) to further reduce risk of overburdening drainage networks and causing surface water flooding. A drainage strategy has been produced for the purposes of this application, which details the strategy to be employed at this development.

MCC Core Strategy 2012-2027 Policy EN14 includes a requirement for minimising surface water runoff, including the implementation of SuDS on site and reducing runoff rates to agreed values. To accord with policies EN8 and DM1, the drainage assessment and calculations for SuDS

storage/discharge volumes should also account for climate change, in accordance with current best-practice at the time of submission. Ensuring that's surface water runoff is managed and calculations for mitigation include allowances for climate change also contribute to MCCF Objective 2. Further to this, the development should explore solutions that benefit more than one sustainability objective, i.e. utilising urban greening for dual benefits of biodiversity and mitigating surface water runoff, as per the intent of MCCF Section 6 item 6.

Fig. 10.11: The SuDS Management Train.



Based on guidance set out in the Manchester City Council ‘Local Flood Risk Management Strategy’, a 50% runoff rate reduction for Brownfield sites should be provided, with an aim of reducing runoff to Greenfield rates up to a 1 in 100-year storm event, including consideration of climate change. Peak runoff rates for brownfield sites should be no greater than the existing runoff rate from the site for all storm events up to the 100-year storm.

It is proposed to drain the surface water generated from the development via a rainwater attenuation system prior to discharge to the existing combined sewer. Surface water is to be controlled by onsite storage and attenuation to mimic / reduce the run-off rate.

The storage of the system will be sized appropriately to accommodate the potential impacts of future climate change, so the system provides SuDS as per EN14, and will be resilient/futureproofed as far as possible, as per the requirements of MCC Policy EN8 and MCCF Objective 2.

10.6 Materials

10.6.1 The Importance of Materials

It is acknowledged that the proportional impact of embodied and operational carbon over a building's life cycle is beginning to change; the focus in the past few decades has been almost solely on tackling operational carbon emissions, with embodied carbon impacts largely dismissed. However, as the industry continues to innovate and drive down operational energy consumption and its consequent emissions, the importance of embodied carbon impacts become more pronounced. For an energy efficient building in 2020, embodied carbon emissions can make up 60-70% of the whole life cycle impacts; therefore, it is not reasonable to claim to have developed a low-carbon development without a strategy to address and reduce the embodied carbon impacts associated with materials.

Such action was already recognised within the existing MCC Core Strategy, specifically Policy EN4, which requires “the use of building materials with low embodied carbon in new development”, supporting consideration of the total carbon footprint of new buildings. Sustainable use of materials was also required as part of policy DM1, and arguably contributes to climate change mitigation (though specification of sustainable materials) policy EN8 as well. Good material choice also provides links with Policies EN19 (waste) and EN20 (minerals), all of which are linked to this intent of this section.

A sustainable and low-carbon materials strategy is also a critical part of the MCCF document, although again a specific method for assessing embodied carbon is not raised. Assessment of the carbon impacts associated with products and materials over the development's life cycle must be seen as an essential component for accurately reporting against Objective 1 of both the MCCF and DMZCF; leaving this to only report on operational carbon emissions is not a robust enough strategy for mitigating the impacts of climate change in Manchester. Emissions must be considered as a whole, covering embodied and operational together, to enable the assessment of synergies and interplay between the two measures to deliver truly

There is significant crossover with the way in which whole life carbon assessment is approached and the “things we buy and throw away” statement in Section 6 item 5 of the MCCF. Both the DMZCF and the MCCF note that carbon associated with products and materials is still an unknown for Manchester and should be quantified where possible. However, when talking about zero carbon new development, the DMZCF notes that, as well as low operational emissions, new buildings will need to have significantly less emissions embodied in their materials and construction phase, and that materials will need to come from a ‘circular economy’, with significant uplift in the reuse/recycling of materials, and a significantly increased use of sustainable materials. The GM PfE Policy JP-S- 7 outlines the role of circular economy and zero waste will play in being a leading green city by 2038.

10.6.2 Sustainable Procurement of Materials

The development team will integrate sustainable procurement activities into the design process. The process has also been underwritten by the requirements of the BREEAM 2018 Mat03 credit section, which provides methodology and credit-based incentive towards sustainable procurement of products and materials.

It is important that sustainable procurement is integrated fully into project delivery from the earliest stages, and this will be set out within a project Sustainable Procurement Plan (SPP), which will be in place at the conclusion of RIBA 2. The SPP will follow the RIBA 2020 Plan of Works, specifically picking out key sustainability goals and aligning this with activities around sustainable procurement. This process also aligns closely with other material and waste considerations of the project; the WLC analysis, requirement for EPD, material efficiency measures, adaptability to climate change, pre-demolition audit and general project waste aspirations are all influenced by the SPP.

The SPP will include advice and measures to influence sustainable procurement of twelve key material groups, including concrete, steelwork and aluminium amongst others. Each material group will have set requirements around six core ‘themes’, in common with the wider approach to sustainability on this project. The input into these themes is informed by the collaborative work and feedback between the design team at pre-planning stage, and includes the following core input items:



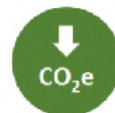
Responsible sourcing certifications

Setting minimum levels of responsible sourcing certification for key materials (FSC, BES 6001 etc.)



Requesting Environmental Product Declarations (EPDs)

As per Section 10.6.4 – where available for particular material groups, EPDs will be requested from suppliers.



Key considerations for the Whole Life Carbon approach

Includes steering information on sustainable procurement to support the successful delivery of project WLC goals.



Setting provisional material sourcing distances

Setting base requirements for sourcing materials locally, subject to the material in question and impacts on other factors



Key considerations for construction

Core considerations for each material group through construction.



Material considerations for a circular economy

Key considerations for the material in respect of how it is likely to impact the circular economy and future reuse/resource efficiency.

The requirement for local sourcing/setting of provisional materials sourcing distances accords with the aims of MCCF Section 6 item 5, specifically “local businesses”. This will be weighed up against the relative embodied carbon impacts (i.e. sourcing a certain product like steel from further away might realise much greater carbon savings than procuring locally), to determine overall sustainability benefit to the project. Where possible/suitable, preference will be given in specifications to local sourcing to stimulate local economy and reduce transport emissions. The process also ensures that the relevant parts of MCC Core Strategy Policy DM1 and EN4, plus DMZCF Section 6 item 4 related to sustainable and high-quality materials specification and procurement are addressed in a methodical way.

The implementation of the above will be monitored through the project procurement phases and into construction, to ensure that the requirements are upheld. It is likely the outputs of the SPP will be used to inform Pre-Qualification Questionnaires (PQQs) for potential material suppliers, to ensure that the aims of the plan are implemented. Regular review of the SPP will also take place throughout the project, in line with project progression against the RIBA Plan of Works. This will ensure that the SPP is able to influence project decision-making, rather than be an early-stages BREEAM item that is then ticked off and forgotten. This is a good example of how BREEAM methodologies are used as a framework approach to drive value in sustainable design.

Some key materials will have mandatory requirements in respect of responsible sourcing. All timber products used within the Proposed Development, be that in temporary works, formwork or in construction itself, will be procured in accordance with the UK Government’s Timber Procurement Policy, and will be required to carry FSC (or equal approved) responsible sourcing certification. The project team understands that failure to comply with this standard will result in the inability to secure any BREEAM rating for the project, and therefore compliance with this standard is essential.

10.7 Waste Management

10.7.1 Construction Waste Management



Engage in circular economy activities.

Target a diversion of 95% of non-hazardous construction and demolition waste from landfill.

Target construction waste of <6.5 tonnes per 100m² GIA.

The SDP requires a waste management strategy to be included within the environmental standards statement. This is to ensure a suitably sized bin storage area and access points for collection crews are taken into consideration at the earliest stages of design.

The circular approach and low-waste culture for the project will also be applied to the construction stage. It is important to note that the successful achievement of low wastage from site activities is not simply limited to how the contractor manages waste during the construction phase; achievement of the low-waste targets is directly linked with designing for low waste in the first place, and making sure that the design facilitates the achievement of the targets from the project contractor. This accords with the first section of the waste hierarchy approach.

Application of this approach has been a core consideration for the development team. The design features which will support low construction waste on site include the following key measures:

- Internal floor to u/s beam heights are in accordance with standard dimensions for plasterboards, reducing needs for offcuts (plasterboards are a high-waste product).
- Metal components will be delivered both with high recycled content and to specified dimensions for the project.
- Precast façade elements will be prefabricated offsite and delivered in accordance with specified dimensions.
- Detailed BIM models will assist with the calculation and procurement of services distribution equipment to exacting requirements based on building-specific information.

Specific waste targets will be set for the project in accordance with the BREEAM 2018 Wst01 requirements, and to support the development intent to achieve the ‘Outstanding’ BREEAM rating. BREEAM Wst01 targets are onerous; that they have not changed or increased since the 2011 version of the schemes speaks volumes about how difficult they are perceived to be. However, in this case the waste approach should be supported by the design measures described above.

In accordance with the requirement to achieve 2 no. credits under the first section of Wst01, the project non-hazardous construction waste target will be as follows:



Achieve ≤6.5 tonnes of construction waste per 100m² GIA.

BREEAM 2018 also sets targets for diversion of resources from landfill (for non-hazardous materials). The general targets set by BREEAM are as follows:

- **Demolition waste:** 80% by volume/90% by tonnage diverted from landfill.
- **Non-demolition waste:** 70% by volume/80% by tonnage diverted from landfill.

Recent Sweco project experience has demonstrated that in almost all cases contractors will exceed these values with respect to diverting their waste from landfill. This suggests that it should be possible to therefore set more onerous targets for them to achieve, which would assist with the delivery of the low-to-zero waste strategy for this development. The project therefore proposes the following targets in respect of diverting waste from landfill:



95% of non-hazardous demolition waste diverted from landfill.



95% of non-hazardous, non-demolition waste diverted from landfill.

The above would be set as minimum targets for the project to achieve. Wherever possible, and subject to project-specific considerations, the contractor would be expected to demonstrate how they can go beyond this requirement and work towards 100% diversion from landfill for non-hazardous products.

The demolition contractor must provide a Resource Management Plan (RMP) or site waste management plan (SWMP) which quantifies their waste and accords with the above project targets. The principal contractor must record site waste throughout construction, and report this via their own RMP/SWMP, to show compliance with the above targets. Both contractors will be informed of the project waste targets and required to formally commit to their achievement.

Reuse and recycling should be prioritised, which helps support the recycling requirements set out in MCCF Section 6 item 5 ("recycle"). The process will allow us to determine which waste materials have actually been recycled, their rates and where this process took place. This provides a level of

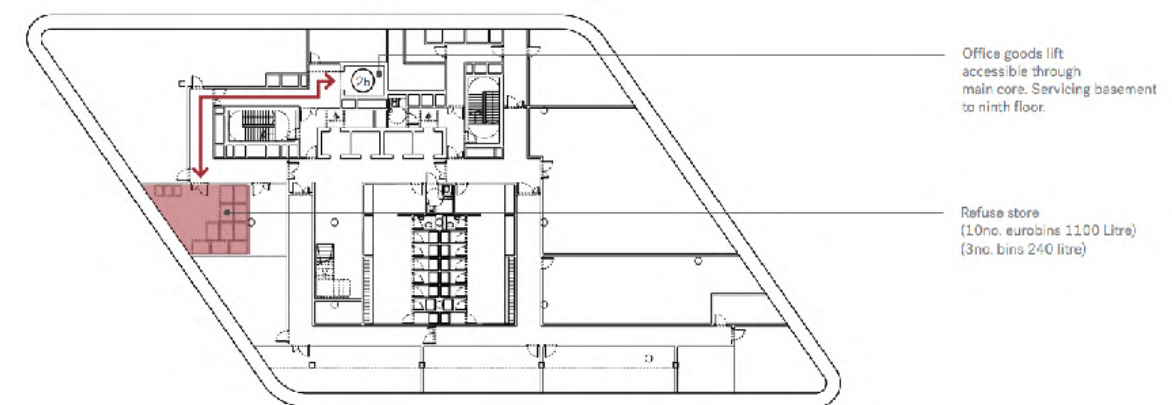
transparency in the process and adds to the circular design approach initiated by the pre-demolition audit.

10.7.2 Operational Waste Management

The final stage of the holistic life-cycle-based waste management strategy for the development, and to instil the low-waste culture, is to ensure that facilities are provided to support sustainable operational waste management practices. This is also supported by the requirements for MCC Core Strategy policies DM1 and EN19, which require such facilities to be provided.

The development has allocated significant space for the storage of waste within the basement level, with 50m² provisioned at the time of application. The location is shown the GA drawing below in Figure 10.16.

Fig. 10.16: GA drawing showing the location of the waste storage area (red) within the basement



The provisioned space will provide storage for general waste as well as segregated recyclable waste streams, as determined by waste management consultant and as appropriate to the development use type. Bins will need to be adequately labelled to assist with the segregation of operational waste, in accordance with the means in which it is collected. Storage will also be provided for organic waste streams given the intent for the retail space at ground level, and collection of this waste will be agreed with a local provider. To facilitate good hygiene and cleanliness, the collection area or bin store will be provided with a water outlet, to ensure that organic waste bins are washed before reuse.

All of the above are requirements of the BREEAM Wst03 credit, which is targeted for this project as per the pre-assessment tracker located in Appendix B. The BREEAM Wst03 credit section is mandatory for achieving 'Excellent' or 'Outstanding' ratings, and therefore the sustainable waste management measures stipulated by this section must be met in order to achieve the target score.

Tenants will be expected to provide on-floor facilities to support the segregation of waste stream and uphold the low-waste ethos of the development. localised storage for general and recyclable waste streams will be required.

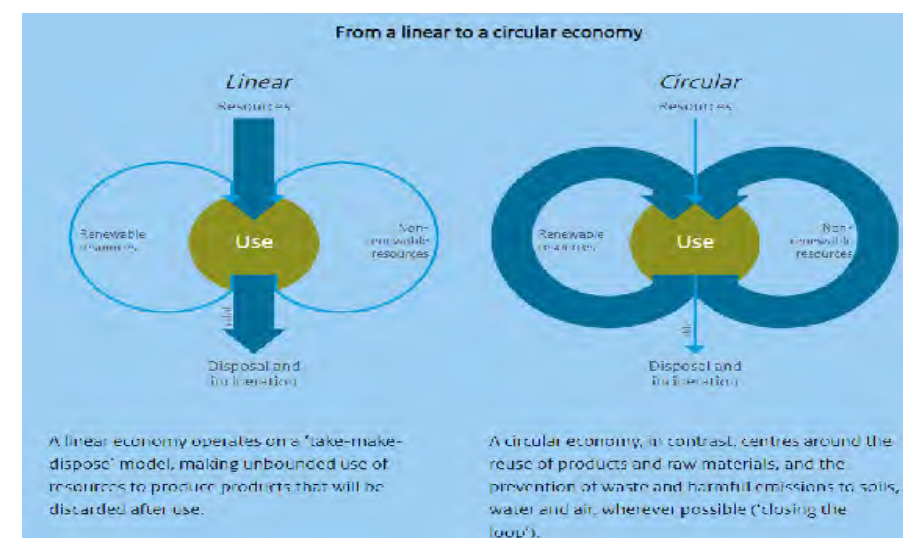
10.8 Circular Design Principles

Principles of circularity and design for future flexibility & reuse have been integrated into the project development. This section is shorter, because the principles of circularity should be enveloped in overall design rather than treated as a separate entity.

The BREEAM 2018 scheme will also be used to support this. Many of the credits in BREEAM support a circular approach to design, construction and operations; many of these key credits have already been demonstrated in this statement. In September 2019, the BRE released a note which demonstrated the alignment of specific credits with the circular economy approach and ow target and achievement of specific credits facilitates material circularity.

The following credit sections were established as being key to this process: Man03, Tra01, Tra02, Mat01, Mat02, Mat03, Mat05, Mat06, Wst01, Wst03, Wst04, Wst05, Wst06, Pol01 and Pol03. The pre-assessment tracker in Appendix B demonstrates that all of these credits are either targeted in full or considered as 'potential' credits at this stage. This is a great example of some of the concepts raised in section 10.2 of this statement, where BREEAM can be released from its tradition conception as a 'tick box sustainability exercise', and used as a framework tool to integrate and realise some of the core concepts of circular design. As is shown by the target credits, the development is embracing this approach.

Fig. 10.17: principles of a circular economy vs. a traditional linear economy.



10.9 Air Quality & Pollution

10.9.1 External Air Quality

As per the energy strategy and section 10.3 of this statement, the development is pursuing and all-electric energy supply strategy. This means that there will be no on-site combustion technology, and therefore zero localised NOx emissions. NOx emissions are a key indicator of air quality, and

are damaging pollutants that adversely impact health and wellbeing. Although it is appreciated that there are still off-site NOx impacts via parts of the grid supply that are not yet fully decarbonised, there will be no additional on-site NOx emissions from this application.

Additionally, as described in the 'materials' section of this report, there has been a focus on the impact of refrigerants. Refrigerants have a disproportionately late impact on the whole life carbon story, because they typically have very high Global Warming Potentials (GWP). The use of heat pumps will likely facilitate the use of low-GWP refrigerants, and the measures required in BREEAM 2018 Pol01 for refrigerant impact and leak detection/mitigation measures will be employed to support this approach. The relevant Pol01 credits are targeted in the BREEAM trackers in Appendix B to demonstrate the completeness of approach. Refrigerants with GWP of <1000 will be prioritised for use on site for means of cooling.

The delivery of good air quality in central Manchester, and ensuring that new development does not exacerbate existing air quality condition, feeds into the overall health and wellbeing strategy for the development, and also accords with some of the key feedback received which helped drive the DMZCF and MCCF. The approach set out within the supporting Air Quality Assessment, which is included as part of this application documentation, also shows how the development approach supports the aims of MCC Core Strategy Policy EN16. GM PfE Policy JP-S-6 Clean Air requires that applications do not negatively impact on air quality and the requirement for construction management plans and the promotion of sustainable transport.

10.9.2 Maintaining Internal Air Quality

When considering air quality performance, it is important to consider mitigation of internal air quality impacts for the building occupants as well as the external air quality concerns raised in the policy documentation. The Proposed Development is designed to ensure that optimal indoor air quality is maintained for the building occupants and uses the best-practice methodologies set out in BREEAM and the IWBI's WELL Building Standard to help establish this.

An indoor air quality plan (IAQP) will be developed at RIBA Stage 3, in accordance with the BREEAM Hea02 methodology and once the ventilation strategy reaches a well-defined stage of design development, to facilitate maintenance of good indoor air quality. The IAQP will define sources of indoor air pollutants, and will establish mitigation and flush-out measures based on the specific ventilation design for the development. The study will also set out a strategy for avoidance of deleterious and high-VOC internal fixings and finishes, and propose a strategy for specification and determination of low-impact materials. This will be further underwritten by the engagement with BREEAM and WELL approaches to this subject, which provide supporting information and set targets for VOC and internal air pollutant compliance.

Architectural H&W Performance Indicator Improved indoor air quality.

The proposed facade design and building services solutions help to facilitate good indoor air quality. The use of displacement ventilation, where air is supplied from the floor, is also closely linked with

maintaining good indoor air quality; the approach was considered favourable in a post-Covid-19 review of optimal indoor air quality solutions for building occupants. Air quality and CO₂ sensors will also be utilised to ensure that indoor air quality is monitored during operation.

10.9.3 Noise Pollution

Refer to separate acoustician report which demonstrates how the scheme will comply with BREEAM Pol 05 and MCC Core Strategy DM1

10.9.4 Light Pollution

MCC Core Strategy Policy DM1 notes that development should give regard to the issues of light pollution within its surrounding context. Measures to reduce light pollution are considered as part of this sustainability statement.

Features from the BREEAM 2018 'Pol04 – reduction of night-time light pollution' credit section in particular will be used as a base method for limiting external light pollution. All external lighting will be designed in accordance with the *Institute of Lighting Professionals (ILP) Guidance note for the reduction of obtrusive light, 2011*, which sets standards to limit external light pollution from developments. The standard allows the development to meet the following key recommendations:

- Limit the average upward light ratio of luminaires to restrict sky glow.
- Limit illuminance at the windows of nearby properties for which light trespass may be an issue.
- Limit intensity of each light source in particularly obtrusive directions beyond the boundaries of the site.

Curfews for the external lighting of the development will also be set to limit external light pollution, in accordance with the operation times. Generally, all external lighting will be switched off automatically, using timeclock controls (or similar), during 23:00 to 07:00. If safety or security lighting is provided external to the development and will be used between the hours noted above, this lighting will be expected to comply with the recommended levels of lighting set out in Table 2 of the ILP guidance notes. External lighting will also be required to support the low-energy ethos of the development, and will need to meet the performance requirements associated with external lighting set out in BREEAM 2018 credits Hea01 and Ene03, specifically achieving a luminous efficacy of >70 lm/W. Considerations of both light spill and energy performance will be made in appreciation of one another.

The external lighting design will also be in appreciation of the findings and recommendations of the ecology report. Lighting will be specified to ensure that it does not disturb or negatively impact specific species identified as local to site in and around the development.

10.10 **Health and Wellbeing**

Facilitating excellence in occupant health and wellbeing (H&W) had a been a critical part of the Proposed Development sustainability approach. The need to ensure good H&W in design and operation is observed in the architectural indicators used throughout this report, which shows how this theme has fed into many of the relevant sustainability section. This was also highlighted as a

key aspect of the proposal during the pre-application stages, as presented by the development team to representatives at MCC.

Delivery of a development which facilitates H&W feeds into many of the MCC Core Strategy policies, including DM1, EN8, EN9 and EN16. Further to this, H&W is a core concept of MCCF Objective 3, the headline area for 'green infrastructure and nature-based solutions' in Section 6. It is also a critical component of DMZCF aim 'improving residents' health and wellbeing and quality of life'. The overall strategy is set up to support the aims of these sections, both for exiting policy and for the new climate change statements.

These features are captured in specific sections of this statement, but can be summarised as follows:

H&W Performance Indicator - Air

Improved air quality, , displacement ventilation, along interaction with outside roof space.

H&W Performance Indicator - Water

Low-consumption water components, application of design standards to enhance low water use, planting selections which are drought-resistant.

H&W Performance Indicator - Fitness

Architectural layouts provide focus to the stairs and encourage their use, provision of amenity spaces for rest and interaction, provision of cyclist facilities and storage with convenient access.

H&W Performance Indicator - Comfort

Amenity space for rest and interaction, services strategy design for optimum thermal comfort, user-controlled environment, increased access to external/green spaces.

H&W Performance Indicator - Mind

Amenity spaces for rest and interaction, increased use of natural materials

H&W Performance Indicator - Light

No suspended ceiling (exposed soffits), increased internal heights, maximising daylight and views, optimised façade performance, lighting to suit space function,

The BREEAM 2018 scheme will also be used to facilitate strong health and wellbeing performance for the scheme. BREEAM has a specific section on health and wellbeing. As far as possible, all of the relevant credits in the health and wellbeing section have been targeted. This includes the following:

- **Hea01 – View Out:** ensuring that building occupants are provided with a compliant ‘view out’, based on a minimum window-to-wall ratio requirement for occupant desk locations.
- **Hea01 – External Lighting:** external lighting will need to meet specific requirements of BS 5480-1:2013.
- **Hea02 – Ventilation:** ventilation to be provided into the development in accordance with the approved standard for ventilation, BS ISO 17772-1:2017.
- **Hea02 – Indoor Air Quality Plan:** as per section 10.9.2.
- **Hea04 – Thermal Comfort:** modelling of the development against CIBSE AM11 for optimal internal thermal comfort at RIBA Stage 3. This will include a model using future weather files to assess maintenance of optimal thermal comfort under a climate change scenario.
- **Hea05 – Acoustics:** refer to section 10.9.4.
- **Hea06 – Security:** security consultation has occurred with GMP prior to the application submission. Recommendations will be incorporated into the design.
- **Hea07 – Safe Access:** provision of safe access in and around the building, ensuring that conflicts between pedestrians, cyclists and deliveries/waste collection are managed appropriately.
- **Hea07 – Outside Space:** provision of outside space including planting and seating, as provided on terrace and at the roof terrace space.

Other parts of this strategy reflect the measures taken to align the development with the requirements of MCCF Section 5.2, including resilience to flood risk and flooding (section 10.5), other climate change risks (see section 10.11 below), as well as increasing the amount and quality of green spaces (section 10.12) to improve physical and mental health. The transport measures employed by the development, including a dedicated cycle store and the concurrent facilities as described in section 10.13, also address the aim to encourage sustainable transport and get Manchester residents moving.

10.11 Adaptation to Climate Change

As with the circular economy section, the measures intended to mitigate impact on climate change can be found throughout this statement, ingrained into each approach, and therefore are not repeated in full here. The process is underwritten by the commitment to engage with and create onerous project targets from the RIBA 2030 Climate Challenge, and use of approved third-party methodologies such as BREEAM, which provide an established reporting basis for benchmarking and cross-comparable results with other UK development. A robust approach should ensure that the measures to mitigate climate change for new developments impact every aspect of sustainability, and it is felt that this statement goes some way to demonstrating how such an approach can be utilised effectively. Impacts of climate change, and our ability to combat this, have been considered and addressed in the following sections of this sustainability statement:

- Choice of project targets and benchmarks.
- Application of the BREEAM scheme methodology & commitment to ‘Outstanding’.
- Approach to passive design and low-energy culture.
- The project energy approach.

- The embodied carbon assessments.
- Material selection and sourcing.
- Approach to sustainable water resource consumption.
- The whole life approach to low waste.
- Flood risk and drainage.
- Health and wellbeing.
- Biodiversity and green infrastructure.
- Air quality.

The MCC Core Strategy Policy EN8 deals specifically with mitigation of the impacts of climate change; all of the four measures required by EN8 have been met by the various sections of this report, as described by the list above. This is further supported by GM PFE Policy JP-S-4 Resilience

It could be argued that the entire MCCF document is a resilience requirement piece for Manchester, as the overall aim is to ensure that “Manchester will play its full part in limiting the impacts of climate change”. Section 5.2 of the MCCF addresses the need for adaptation and resilience specifically. As part of the BREEAM 2018 scheme method, the Wst05 credit will be targeted, which covers an assessment of adaptability for climate change. This allows for a methodological assessment to be undertaken to assess the risks to development from climate-related hazards, based on the latest international and UK climate change research and findings. The assessment will cover temperature variations (heat and cold), flood risk and excessive rainfall, drought, impacts of air quality and extreme future weather events, collating mitigation response measures from the architect, structural engineer and MEP consultants to set out the myriad of ways in which this development will be resilient to potential risks posed by future climate change. The development will also likely achieve the ‘exemplary’ credits in BREEAM 2018 related to the Wst05 section, which is awarded through achievement of minimum scores within other credits in the scheme which BRE feel represent provision of a robust climate change adaptability approach. The target of these credits can be observed in the BREEAM pre-assessment tracker located in Appendix B of this sustainability statement.

10.12 Biodiversity & Green Infrastructure



Target an increase in ecological value compared to pre-development site (based on BREEAM 2018 Ecology Framework)
Encourage and support urban greening of terraces and roof spaces.

The SDP requires the environmental standards statement to demonstrate how the development will contribute to Manchester’s Biodiversity strategy. A full account should be included on how the proposed building will protect existing biodiversity and enhance the ecological value of the site.

Encouraging increased urban greening and inclusion of design measures that increase biodiversity for the development is a measure that has run through many of the previous sections of this report. MCC Core Strategy Policy EN9 supports the use of green roofs, green walls, tree planting and other forms of green infrastructure as a means to combating climate change. Additionally, the merits of a strong urban greening strategy are picked up in the MCCF, particularly Objectives 2 and 3 and Section 6 item 6 (green infrastructure and nature-based solutions). This latter section provides more

detail on what is expected for urban greening in a future Manchester, noting that urban greening has an essential role to play in helping Manchester meet its climate change objectives. The MCCF also recognises that urban greening can have benefits beyond simply increasing biodiversity, stretching into carbon sequestration, air quality, surface water runoff and occupant health and wellbeing benefits. The use of urban greening as a tool to enhance occupant wellbeing is also picked up as a key theme in the DMZCF (see *Aim – improving residents’ health and well-being and quality of life*).

The roof terraces will also include planted features, either trees or terrace planter boxes, which will incorporate a mix of species that respond to the local context. As part of the BREEAM approach, the project ecologist will liaise with MCC and local ecological stakeholders (for example the Manchester Wildlife Trust) to ensure that species selection is appropriate and support the local condition.

The MCCF also suggests that Manchester should look to increase urban green infrastructure by c.10% by 2038, compared to 2018 levels. The development proposes to quantify this using the new BREEAM 2018 Ecology Framework (BEF). The BEF first considers the current ecological condition of the site, and a suitably qualified ecologist performs a site visit and assigns the existing development a score based on the level of planted area compared to hardstanding. The score for the existing development is poor, because the current site does not include any urban greening measures. The ecologist will then calculate the potential score of the new development, given the level and type of planting/urban greening applied to the new development, as noted in this section. The increase in perceived ecological value vs. pre-development site can then be calculated as a percentage improvement. Because the current development was in situ in 2018, this can be seen as a way of demonstrating how the development contributes to the aims of the MCCF.

The BREEAM 2018 ecology section is a robust way of demonstrating how ecology can be integrated into project design and will also include measures for the contractor to comply with to protect flora and fauna during the construction stage. The strong urban greening intent of the project is reflected in the BREEAM ecology credit targets; 100% of the credits between LE02 and LE05 have been targeted for the project, as demonstrated in the BREEAM pre-assessment which is appended to this document.

To ensure the long-term success of any planting scheme, maintenance and management procedures must be established. A Landscape Habitat Management Plan (LHMP), produced in accordance with BS 42020:2013 Section 11.1 and covering as a minimum the first 5 years after occupation, will be produced for the development. The plan will include the management practices that will need to be undertaken to ensure that the planting strategy is successful and continues to deliver on its promise of improving urban greening and ecological biodiversity in Manchester.

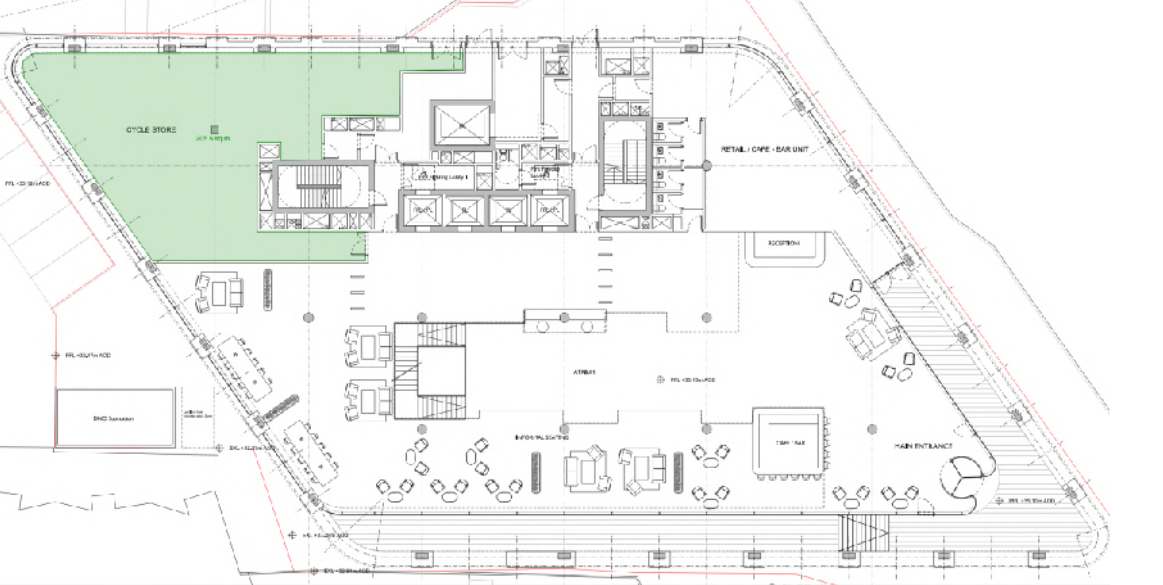
10.13 Sustainable Transport

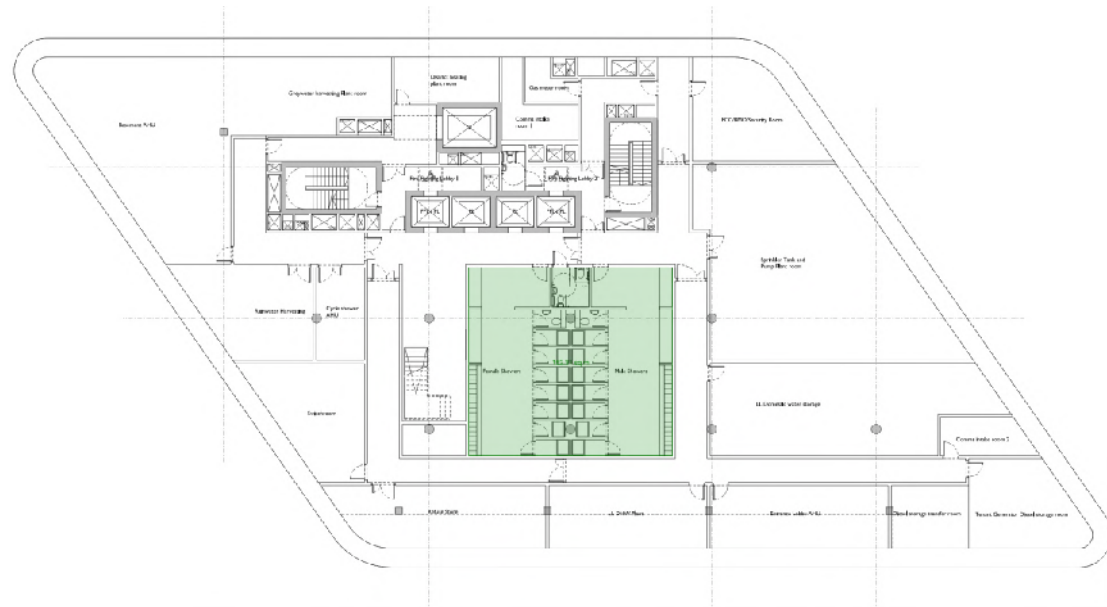
MCC Core Strategy Policy T1 places key focus on delivering development that enhances the opportunities for sustainable transport. Developments should improve choice by developing alternatives to car use, improve access to transport facilities, facilitate low-carbon methods of transport and promote safe and accessible environments for pedestrians and cyclists. MCCF Section 6 item 3 (transport and flying) also places emphasis on the importance of increasing walking and cycling within the city. This is not only good for health and wellbeing but is also for improving local air quality and reducing reliance on private motor vehicles.

The development is located in an area which has excellent links to public transport and is a short walking distance from a number of key bus routes, Manchester Victoria Station and Manchester tram system stations. Additionally, the development is not proposing to include any car parking spaces, which will reduce the reliance of building users on personal method of transport when accessing the building, in accordance with the aims of the MCCF.

Cycle storage facilities are provided at ground level, with 84 long stay cycle parking spaces . The cycle store will be accessible for all building users who wish to cycle to work. Within the basement, facilities have been provided such as showers, lockers and changing space, to ensure that cyclists are encouraged to use the facilities. This is an important aspect of facilitating sustainable transport, and the two measures will work together to encourage greater uptake of cycling to work.

Fig. 10.20: GA drawing showing the location of the cyclist facilities at Basement Level and the cycle store at Ground floor (highlighted in green)





- There will be a firm requirement for engagement with the whole life carbon process, using their supply chain experience to inform and complement low-carbon material deflection and decision-making.
- The waste target set in Section 10.7.2 must be met.
- Site activities must be undertaken in appreciation of the recommendations with respect to ecological protection & enhancement.
- The contractor must engage fully with the commissioning process, and this must be a far more thorough undertaken than is traditional. This item is of high importance to the success of the development energy goals.

10.14 Construction

Although the design has demonstrated that sustainable development is at the very top of the agenda, there is a need for this to be reflected in the construction of the development as well. BREEAM has always been a very useful tool for ensuring that contractors are invested in the delivery of sustainable assists, and the BREEAM scheme will again be used to assist in the management and delivery of the project to practical completion.

The main contractor will have ultimate responsibility of ensuring that the BREEAM target is achieved during the construction stage, and must therefore have a full understanding of the sustainable design intent of the project to meet this. Once appointed, the contractor will be introduced to the project targets, including those associated with the RIBA Climate Challenge, as well as key processes such as the whole life carbon analysis, energy modelling/regulated carbon emissions reduction requirements. The development team will work closely with the construction team to ensure that they are invested in achieving the high levels of holistic sustainability set at the early stages of development.

BREEAM allows us to set key actions for the contractor, based on key requirements of the scheme (as demonstrated in the waste section 10.7.2). The following key actions will be required from the contractor to ensure that they uphold the requirements of the project:

- Operate ISO 14001 certification, covering all of their site operations.
- Produce and implement a Construction Environmental Management Plan (CEMP) for the development.
- Operate a sustainable procurement plan, and engage fully in the requirements of the project as set out re: procurement.
- Sign up to the Considerate Constructors Scheme (CCS), and achieve a score of >40, with at least 7 points scored in each of the 5 sections.
- Set targets (and display on site) in respect of site water and energy consumption, and monitor and report the delivery of key materials to site.

11 Conclusion

This energy and sustainability statement covers the full breadth of holistic energy and sustainability issues, with the intent of not just showing how the development meets and exceeds policy requirement, but goes beyond this to try and address they key aims and objectives of the MCCF and the DMZCF. The project has established its own set of clear and well-defined sustainability goals to realise this, by starting at the highest international level (UN Sustainable Development Goals), and working down towards a set of onerous but achievable targets that are perceived to demonstrate the strong sustainability aspirations of the Proposed Development, and set a precedent for futureproofed sustainable development in Manchester.

The project team have developed a custom set of key targets and approaches that are based around core themes of sustainable development, utilising key industry benchmarking and best-practice to deliver an exemplary, futureproofed sustainable development in Manchester. The core targets are as follows:



Sustainability Certification

Target of BREEAM 2018 New Construction 'Outstanding'
Implement features of the IWBI's WELL Building Standard



Operational Energy & Carbon Emissions

Achieve a minimum of 35% emissions reduction against Part L 2013
Reduce carbon emissions by 10% through passive design alone.



Water Resources

Target a 40% reduction in potable water consumption compared to the BREEAM 2018 baseline (equal to 3 no. BREAM Wat01 credits).
Integrate Sustainable Drainage Systems (SuDS) into design.



Waste Management

Engage in circular economy activities.
Target a diversion of 95% of non-hazardous construction and demolition waste from landfill.
Target construction waste of <6.5 tonnes per 100m² GIA.



Ecology & Urban Greening

Target an increase in ecological value compared to pre-development site (based on BREEAM 2018 Ecology Framework)
Encourage and support urban greening of terraces and roof spaces.

Additionally, the development had significantly exceeded the minimum performance requirements of MCC Core Strategy Policy EN6 in respect of regulated emissions reductions against Part L 2013 of the Building Regulations, following the set energy hierarchy and achieving a total **44%** reduction, which far exceeds the Greater Manchester Places for Everyone Joint Development plan's target of at least **20%** against Part L 2013.

These figures is also without taking into account the future decarbonisation of the National Grid, which, assisted by the development's all-electric energy supply strategy, will push the development towards zero carbon in the future.

The development is also engaging with the BREEAM 2018 scheme methodology, targeting the highest possible rating of 'Outstanding', which will sit the development in the top 1% of UK buildings with respect to verified holistic sustainable design, construction and operation. BREEAM has been used as a framework throughout this document to show how the credits are key criteria are both aligned with MCC Policy and the aims of the MCCF and DMZCF documents, and also support the project-specific targets and approach to sustainable development.

Appendix A – Part L2A - BRUKL Reports

Reg. Office Address:
Sweco UK Limited
Grove House
Mansion Gate Drive
Leeds, LS7 4DN
+44 113 262 0000

Reg. No.: 2888385
Reg. Office: Leeds

www.sweco.co.uk

Sweco UK Limited
1 Bath Road

Maidenhead, SL6 4AQ
+44 1628 623 423

Roaa Babiker
Senior Sustainability Engineer
+44 1628 598 335

Roaa.babiker@sweco.co.uk

Project name

New Victoria (Green Record)

As designed

Date: Mon May 23 14:48:07 2022

Administrative information

Building Details

Address: New Victoria, Manchester,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: Kartik Amrania

Telephone number: 01628 842 102

Address: 1 Bath Rd, Maidenhead, SL6 4AQ

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

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.4
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.4
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.9
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	020000E7:Surf[0]
Floor	0.25	0.12	0.12	0000000F:Surf[0]
Roof	0.25	0.12	0.12	02000113:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.2	1.2	0M000023:Surf[0]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]

U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- 05. Plant Systems (Nat Vent & Elec Heat)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- 02. WC Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	0.76
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					YES

3- 10. Stairwells Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- 06. L8 Roof Plant (Mech Vent)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	1.5	-
Standard value	N/A	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

5- 08. Reception Systems Perimeter

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	0	1.6	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types ≤12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

6- 07. Reception Systems Internal

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	0	1.6	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types ≤12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

7- 14. Store Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

8- 04. Basement Plant Systems (Mech Vent)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	-	0.2	1.54	0.76
Standard value	2.5*	N/A	N/A	1.5^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

9- 00. Office Systems Internal

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	0	1.54	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

10- 01. Office Systems Perimeter

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	0	1.54	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

11- 03. Retail Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	0	1.6	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

12- 09. Cycle Store Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.43	4.43	-	1.54	0.76
Standard value	2.5*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
0M_Meeting_Room4		-	-	-	-	-	-	-	0.2	-	-	N/A
08_Office_Perimeter_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
08_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I		
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
04_Perimeter_Office_NE2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NE1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_SW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NE2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_Perimeter_SW1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Retail_Perimeter_SE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Retail_Perimeter_NE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Retail_Internal	-	-	-	-	-	-	-	-	0.3	-	-	N/A
00_Retail_NE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Retail_SE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0_Reception_Perimeter_SW1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Retail_Internal	-	-	-	-	-	-	-	-	0.3	-	-	N/A
00_Retail_WC	-	-	-	-	-	-	-	-	0.3	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
07_Office_Plant	-	100	-	-	192
07_Superloos_1	-	-	100	-	103
07_Core_Lobby_3	-	-	100	-	85
07_Core_Lobby_1	-	-	100	-	103
07_Stairwell_1	-	-	100	-	59
07_Core_Lobby2	-	-	100	-	60
07_WC_Lobby	-	-	100	-	101
07_Superloo2_2	-	-	100	-	52
07_Disabled_WC	-	-	100	-	37
07_Stairwell_2	-	-	100	-	57
08_Superloos_1	-	-	100	-	103
08_Core_Lobby_1	-	-	100	-	103
08_Stairwell_1	-	-	100	-	59
08_Core_Lobby2	-	-	100	-	60

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
08_WC_Lobby	-	-	100	-	101
08_Superloo2_2	-	-	100	-	52
08_Disabled_WC	-	-	100	-	37
08_Stairwell_2	-	-	100	-	57
08_Core_Lobby_3	-	-	100	-	85
08_Plant_A	-	100	-	-	375
08_Plant_B	-	100	-	-	249
08_Plant_Corridor	-	-	100	-	45
08_Plant_C	-	100	-	-	258
09_Core_Lobby_1	-	-	100	-	100
09_Stairwell_1	-	-	100	-	56
09_Core_Lobby2	-	-	100	-	60
09_Superloo2_2	-	-	100	-	51
09_Disabled_WC	-	-	100	-	36
09_Stairwell_2	-	-	100	-	57
09_Core_Lobby_3	-	-	100	-	81
09_WC_Lobby	-	-	100	-	91
09_Superloos_1	-	-	100	-	84
09_Amenity_Corridor	-	-	100	-	159
09_Plant_A	-	100	-	-	79
09_Plant_B	-	100	-	-	1159
09_Plant_C	-	100	-	-	75
10_Stairwell_1	-	-	100	-	47
10_Stairwell_2	-	-	100	-	44
10_Corridor_2	-	-	100	-	24
10_Corridor_1	-	-	100	-	23
0M_Plant_Room	-	100	-	-	192
0M_Superloos_1	-	-	100	-	103
0M_Core_Lobby_3	-	-	100	-	85
0M_Core_Lobby_1	-	-	100	-	103
0M_Stairwell_1	-	-	100	-	59
0M_Core_Lobby2	-	-	100	-	60
0M_WC_Lobby	-	-	100	-	101
0M_Superloo2_2	-	-	100	-	52
0M_Disabled_WC	-	-	100	-	37
0M_Stairwell_2	-	-	100	-	57
0M_Meeting_Room4	-	-	67	35	234
0M_Meeting_Room3	-	-	72	35	161
0M_Meeting_Room2	-	-	72	35	161
0M_Meeting_Room1	-	-	67	35	229
00_Stairwell_1	-	-	100	-	61
00_Core_Lobby2	-	-	100	-	63
00_Disabled_WC	-	-	100	-	39

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
00_Stairwell_2	-	100	-	-	58
00_CorridorE	-	100	-	-	24
00_CorridorD	-	100	-	-	94
00_Corridor_C	-	100	-	-	56
00_Store	-	100	-	-	22
00_Disabled_WC_Lobby	-	100	-	-	39
00_CorridorA	-	100	-	-	37
00_CorridorB	-	100	-	-	57
00_CorridorF	-	100	-	-	25
00_DNO	100	-	-	-	90
0B_Basement_AHU_&_Grey_Water	100	-	-	-	535
0B_DH_Plant	100	-	-	-	105
0B_FCC	100	-	-	-	176
0B_Refuse_Store	100	-	-	-	210
0B_DHW_Plant	100	-	-	-	169
0B_Entrance_AHU	100	-	-	-	187
0B_Switchroom	100	-	-	-	171
0B_CorridorD	100	-	-	-	181
0B_Shower_AHU	100	-	-	-	102
0B_Rainwater_Harvesting	100	-	-	-	170
0B_CW_Storage	100	-	-	-	349
0B_Sprinkler_Tank	100	-	-	-	511
0B_StairwellA	-	100	-	-	76
0B_Plant	100	-	-	-	72
0B_Comms_Intake1	100	-	-	-	114
0B_Gas_Meter	100	-	-	-	72
0B_CorridorC	100	-	-	-	97
0B_StairwellB	-	100	-	-	75
0B_CorridorG	100	-	-	-	120
0B_Disabled_WC	-	100	-	-	52
0B_CorridorF	100	-	-	-	200
0B_Comms_Intake2	100	-	-	-	87
0B_Diesel_Store	100	-	-	-	220
0B_CorridorE	100	-	-	-	164
0B_CorridorA	100	-	-	-	293
0B_Stair	-	100	-	-	225
0B_CorridorB	100	-	-	-	548
0B_Female_Lockers	-	100	-	-	107
0B_Disabled_Shower	-	100	-	-	30
0B_Male_Lockers	-	100	-	-	108
0B_Male_Showers	-	100	-	-	64
0B_Female_Showers	-	100	-	-	64
08_Office_Internal	120	-	-	-	1440

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
08_Office_Perimeter_SW	124	-	-	-	1071
08_Perimeter_Office_SE	126	-	-	-	765
07_Perimeter_Office_NE1	142	-	-	-	199
07_Perimeter_Office_NW	125	-	-	-	944
07_Perimeter_Office_SW	124	-	-	-	1177
07_Perimeter_Office_NE2	144	-	-	-	137
07_Perimeter_Office_SE	125	-	-	-	907
07_Office_Internal	119	-	-	-	2730
06_Office_Plant	100	-	-	-	192
06_Superloos_1	-	100	-	-	103
06_Core_Lobby_3	-	100	-	-	85
06_Core_Lobby_1	-	100	-	-	103
06_Stairwell_1	-	100	-	-	59
06_Core_Lobby2	-	100	-	-	60
06_WC_Lobby	-	100	-	-	101
06_Superloo2_2	-	100	-	-	52
06_Disabled_WC	-	100	-	-	37
06_Stairwell_2	-	100	-	-	57
06_Perimeter_Office_NE1	142	-	-	-	199
06_Perimeter_Office_NW	125	-	-	-	944
06_Perimeter_Office_SW	124	-	-	-	1177
06_Perimeter_Office_NE2	144	-	-	-	137
06_Perimeter_Office_SE	125	-	-	-	907
06_Office_Internal	119	-	-	-	2730
05_Office_Plant	100	-	-	-	192
05_Superloos_1	-	100	-	-	103
05_Core_Lobby_3	-	100	-	-	85
05_Core_Lobby_1	-	100	-	-	103
05_Stairwell_1	-	100	-	-	59
05_Core_Lobby2	-	100	-	-	60
05_WC_Lobby	-	100	-	-	101
05_Superloo2_2	-	100	-	-	52
05_Disabled_WC	-	100	-	-	37
05_Stairwell_2	-	100	-	-	57
05_Perimeter_Office_NE1	142	-	-	-	199
05_Perimeter_Office_NW	125	-	-	-	944
05_Perimeter_Office_SW	124	-	-	-	1177
05_Perimeter_Office_NE2	144	-	-	-	137
05_Perimeter_Office_SE	125	-	-	-	907
05_Office_Internal	119	-	-	-	2730
03_Office_Plant	100	-	-	-	192
03_Superloos_1	-	100	-	-	103
03_Core_Lobby_3	-	100	-	-	85

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
03_Core_Lobby_1	-	100	-	-	103
03_Stairwell_1	-	100	-	-	59
03_Core_Lobby2	-	100	-	-	60
03_WC_Lobby	-	100	-	-	101
03_Superloo2_2	-	100	-	-	52
03_Disabled_WC	-	100	-	-	37
03_Stairwell_2	-	100	-	-	57
03_Perimeter_Office_NE1	142	-	-	-	199
03_Perimeter_Office_NW	125	-	-	-	944
03_Perimeter_Office_SW	124	-	-	-	1177
03_Perimeter_Office_NE2	144	-	-	-	137
03_Perimeter_Office_SE	125	-	-	-	907
03_Office_Internal	119	-	-	-	2730
02_Office_Plant	100	-	-	-	192
02_Superloos_1	-	100	-	-	103
02_Core_Lobby_3	-	100	-	-	85
02_Core_Lobby_1	-	100	-	-	103
02_Stairwell_1	-	100	-	-	59
02_Core_Lobby2	-	100	-	-	60
02_WC_Lobby	-	100	-	-	101
02_Superloo2_2	-	100	-	-	52
02_Disabled_WC	-	100	-	-	37
02_Stairwell_2	-	100	-	-	57
02_Perimeter_Office_NE1	142	-	-	-	199
02_Perimeter_Office_NW	125	-	-	-	944
02_Perimeter_Office_SW	124	-	-	-	1177
02_Perimeter_Office_NE2	144	-	-	-	137
02_Perimeter_Office_SE	125	-	-	-	907
02_Office_Internal	119	-	-	-	2730
04_Office_Plant	100	-	-	-	192
04_Superloos_1	-	100	-	-	103
04_Core_Lobby_3	-	100	-	-	85
04_Core_Lobby_1	-	100	-	-	103
04_Stairwell_1	-	100	-	-	59
04_Core_Lobby2	-	100	-	-	60
04_WC_Lobby	-	100	-	-	101
04_Superloo2_2	-	100	-	-	52
04_Disabled_WC	-	100	-	-	37
04_Stairwell_2	-	100	-	-	57
04_Perimeter_Office_NE1	142	-	-	-	199
04_Perimeter_Office_NW	125	-	-	-	944
04_Perimeter_Office_SW	124	-	-	-	1177
04_Perimeter_Office_NE2	144	-	-	-	137

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
04_Perimeter_Office_SE	125	-	-	-	907
04_Office_Internal	119	-	-	-	2730
01_Office_Plant	100	-	-	-	192
01_Superloos_1	-	100	-	-	103
01_Core_Lobby_3	-	100	-	-	85
01_Core_Lobby_1	-	100	-	-	103
01_Stairwell_1	-	100	-	-	59
01_Core_Lobby2	-	100	-	-	60
01_WC_Lobby	-	100	-	-	101
01_Superloo2_2	-	100	-	-	52
01_Disabled_WC	-	100	-	-	37
01_Stairwell_2	-	100	-	-	57
01_Perimeter_Office_NE1	142	-	-	-	199
01_Perimeter_Office_NW	125	-	-	-	944
01_Perimeter_Office_SW	124	-	-	-	1177
01_Perimeter_Office_NE2	144	-	-	-	137
01_Perimeter_Office_SE	125	-	-	-	907
01_Office_Internal	119	-	-	-	2730
0M_Lounge_Perimeter_NE	-	69	35	-	251
0M_Lounge_Perimeter_NW	-	60	35	-	691
0M_Lounge_Perimeter_NE	-	82	35	-	161
0M_Reception_Perimeter_NW	-	60	35	-	740
0M_Reception_Perimeter_SW1	-	64	35	-	898
0M_Retail_Perimeter_SE	-	31	35	-	472
0M_Retail_Perimeter_NE	-	32	35	-	319
0M_Retail_Internal	-	34	35	-	248
00_Cycle_Store_NE	-	100	-	-	251
00_Cycle_Store_NW	-	100	-	-	210
00_Cycle_Store_Internal	-	100	-	-	137
00_Retail_NE	-	32	35	-	359
0M_Reception_SW2	-	170	35	-	5
0M_Reception_SE	-	170	35	-	7
0M_Reception_Double_Height	-	170	35	-	28
0M_Entrance_Internal_Mezzanine	-	95	35	-	102
0M_Entrance_Internal_Mezzanine	-	60	35	-	1194
00_Cafe	-	113	-	-	235
00_Reception_SW2	-	67	35	-	317
00_Reception_SW2	-	63	35	-	510
00_Reception_Double_Height	-	60	35	-	1524
00_Reception_Perimeter_NW	-	61	35	-	712
00_Retail_SE	-	32	35	-	393
0_Reception_Perimeter_SW1	-	59	35	-	1220
00_Entrance_Internal	-	61	35	-	1423

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
00_Retail_Internal	-	60	47	35	106
00_Retail_WC	-	60	37	35	181

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?
0M_Meeting_Room4	NO (-24.2%)	NO
0M_Meeting_Room3	N/A	N/A
0M_Meeting_Room2	N/A	N/A
0M_Meeting_Room1	N/A	N/A
08_Office_Internal	N/A	N/A
08_Office_Perimeter_SW	NO (-15.8%)	NO
08_Perimeter_Office_SE	NO (-16.5%)	NO
07_Perimeter_Office_NE1	NO (-49.4%)	NO
07_Perimeter_Office_NW	NO (-46.7%)	NO
07_Perimeter_Office_SW	NO (-41.2%)	NO
07_Perimeter_Office_NE2	NO (-49.9%)	NO
07_Perimeter_Office_SE	NO (-40.3%)	NO
07_Office_Internal	N/A	N/A
06_Perimeter_Office_NE1	NO (-49.4%)	NO
06_Perimeter_Office_NW	NO (-46.6%)	NO
06_Perimeter_Office_SW	NO (-41.7%)	NO
06_Perimeter_Office_NE2	NO (-50%)	NO
06_Perimeter_Office_SE	NO (-40.3%)	NO
06_Office_Internal	N/A	N/A
05_Perimeter_Office_NE1	NO (-49.4%)	NO
05_Perimeter_Office_NW	NO (-46.6%)	NO
05_Perimeter_Office_SW	NO (-42.1%)	NO
05_Perimeter_Office_NE2	NO (-50%)	NO
05_Perimeter_Office_SE	NO (-40.3%)	NO
05_Office_Internal	N/A	N/A
03_Perimeter_Office_NE1	NO (-49.4%)	NO
03_Perimeter_Office_NW	NO (-46.6%)	NO
03_Perimeter_Office_SW	NO (-43.3%)	NO
03_Perimeter_Office_NE2	NO (-50.4%)	NO
03_Perimeter_Office_SE	NO (-42.8%)	NO
03_Office_Internal	N/A	N/A
02_Perimeter_Office_NE1	NO (-49.8%)	NO
02_Perimeter_Office_NW	NO (-46.7%)	NO
02_Perimeter_Office_SW	NO (-43.9%)	NO
02_Perimeter_Office_NE2	NO (-55.2%)	NO
02_Perimeter_Office_SE	NO (-49.6%)	NO
02_Office_Internal	NO (-100%)	NO
04_Perimeter_Office_NE1	NO (-49.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Perimeter_Office_NW	NO (-46.6%)	NO
04_Perimeter_Office_SW	NO (-42.7%)	NO
04_Perimeter_Office_NE2	NO (-50%)	NO
04_Perimeter_Office_SE	NO (-40.3%)	NO
04_Office_Internal	N/A	N/A
01_Perimeter_Office_NE1	NO (-50.2%)	NO
01_Perimeter_Office_NW	NO (-56.9%)	NO
01_Perimeter_Office_SW	NO (-47.3%)	NO
01_Perimeter_Office_NE2	NO (-60.6%)	NO
01_Perimeter_Office_SE	NO (-57.6%)	NO
01_Office_Internal	N/A	N/A
0M_Lounge_Perimeter_NE	NO (-19%)	NO
0M_Lounge_Perimeter_NW	YES (+8.7%)	NO
0M_Lounge_Perimeter_NE	N/A	N/A
0M_Reception_Perimeter_NW	NO (-56.1%)	NO
0M_Reception_Perimeter_SW1	NO (-30.3%)	NO
0M_Retail_Perimeter_SE	NO (-31.3%)	NO
0M_Retail_Perimeter_NE	NO (-27.8%)	NO
0M_Retail_Internal	N/A	N/A
00_Cycle_Store_NE	NO (-52.1%)	NO
00_Cycle_Store_NW	YES (+21%)	NO
00_Cycle_Store_Internal	N/A	N/A
00_Retail_NE	NO (-28.7%)	NO
0M_Reception_SW2	NO (-30.8%)	NO
0M_Reception_SE	NO (-47.8%)	NO
0M_Reception_Double_Height	NO (-99.7%)	NO
0M_Entrance_Internal_Mezzanine	NO (-100%)	NO
0M_Entrance_Internal_Mezzanine	NO (-100%)	NO
00_Cafe	YES (+38.9%)	NO
00_Reception_SW2	YES (+35.8%)	NO
00_Reception_SW2	YES (+5.2%)	NO
00_Reception_Double_Height	NO (-100%)	NO
00_Reception_Perimeter_NW	NO (-35.9%)	NO
00_Retail_SE	NO (-16.3%)	NO
0_Reception_Perimeter_SW1	YES (+24.7%)	NO
00_Entrance_Internal	NO (-100%)	NO
00_Retail_Internal	N/A	N/A
00_Retail_WC	N/A	N/A

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	15494.8	15494.8
External area [m ²]	11736.1	11736.1
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	5350.77	5920.6
Average U-value [W/m ² K]	0.46	0.5
Alpha value* [%]	9.88	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
2	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
98	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.07	1.57
Cooling	5.94	7.97
Auxiliary	7.07	10.08
Lighting	10.03	20.08
Hot water	7.56	8.37
Equipment*	61.04	61.04
TOTAL**	31.67	48.08

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

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0.2	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	91.2	117.94
Primary energy* [kWh/m ²]	94.78	134.43
Total emissions [kg/m ²]	15.9	23.4

* 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] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] Heat pump (electric): air source, [HFT] Elec										
Actual	0.5	115.5	0	7.8	6.6	3.08	4.11	3.43	4.43	
Notional	0.4	164.6	0	12.1	10.4	2.56	3.79	----	----	
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	13	0	3.8	0	2.4	0.94	0	1	0	
Notional	50.9	0	16.4	0	2.1	0.86	0	----	----	
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	59.5	160.1	5.2	12.6	49.4	3.17	3.54	3.43	4.43	
Notional	17.7	236.5	1.9	17.3	36.4	2.56	3.79	----	----	
[ST] Central heating using air distribution, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	0	0	0	0	0.8	3.81	0	3.43	0	
Notional	0.1	0	0	0	0.6	2.56	0	----	----	
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	0	0	0	0	0	0.94	0	1	0	
Notional	0	0	0	0	0	0.86	0	----	----	
[ST] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] Heat pump (electric): air source, [HFT] Elec										
Actual	0.1	211.5	0	14.3	7.3	3.08	4.11	3.43	4.43	
Notional	0	212.7	0	15.6	11.4	2.56	3.79	----	----	
[ST] Constant volume system (fixed fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	0	0	0	0	0	3.98	2.53	3.43	4.43	
Notional	0	0	0	0	0	2.56	3.79	----	----	
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	12.3	0	3.6	0	1	0.94	0	1	0	
Notional	20.6	0	6.6	0	1	0.86	0	----	----	
[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	0	0	0	0	0	1.11	0	1	0	
Notional	0	0	0	0	0	0.86	0	----	----	
[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	3.4	0	1.1	0	0	0.84	0	1	0	
Notional	15.1	0	4.9	0	0	0.86	0	----	----	
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	28.7	147.8	2.5	11.6	12.6	3.17	3.54	3.43	4.43	
Notional	7.5	140.5	0.8	10.3	14.9	2.56	3.79	----	----	
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	19.7	99.1	1.7	7.7	10.4	3.15	3.56	3.43	4.43	
Notional	17.4	140.2	1.9	10.3	16.5	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 Features

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

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.18	020000E7:Surf[0]
Floor	0.2	0.12	0000000F:Surf[0]
Roof	0.15	0.12	02000113:Surf[0]
Windows, roof windows, and rooflights	1.5	1.2	0M000023:Surf[1]
Personnel doors	1.5	-	No Personnel doors in building
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	3

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



Project name

New Victoria (Lean Record)

As designed

Date: Mon May 23 15:00:05 2022

Administrative information

Building Details

Address: New Victoria, Manchester,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: Kartik Amrania

Telephone number: 01628 842 102

Address: 1 Bath Rd, Maidenhead, SL6 4AQ

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

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	16.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	020000E7:Surf[0]
Floor	0.25	0.12	0.12	0000000F:Surf[0]
Roof	0.25	0.12	0.12	02000113:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.2	1.2	0M000023:Surf[0]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]

U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- 05. Plant Systems (Nat Vent & Elec Heat)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- 02. WC Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	0.2	0	0.76
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- 10. Stairwells Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

4- 06. L8 Roof Plant (Mech Vent)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	1.5	-
Standard value	0.91	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

5- 08. Reception Systems Perimeter

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	0	1.6	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

6- 07. Reception Systems Internal

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	0	1.6	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

7- 14. Store Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

8- 04. Basement Plant Systems (Mech Vent)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	0.2	1.54	0.76
Standard value	0.91	N/A	N/A	1.5^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

9- 00. Office Systems Internal

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	0	1.54	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

10- 01. Office Systems Perimeter

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	0	1.54	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

11- 03. Retail Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	0	1.6	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

12- 09. Cycle Store Systems

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.43	-	1.54	0.76
Standard value	0.91*	2.55	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
0M_Meeting_Room4		-	-	-	-	-	-	-	0.2	-	-	N/A
08_Office_Perimeter_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
08_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
07_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
06_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
05_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
03_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_NE2		-	-	-	-	-	-	-	0.2	-	-	N/A
02_Perimeter_Office_SE		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_NE1		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_NW		-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_SW		-	-	-	-	-	-	-	0.2	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I		
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
04_Perimeter_Office_NE2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
04_Perimeter_Office_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NE1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_SW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_NE2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
01_Perimeter_Office_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Lounge_Perimeter_NE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_Perimeter_SW1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Retail_Perimeter_SE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Retail_Perimeter_NE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Retail_Internal	-	-	-	-	-	-	-	-	0.3	-	-	N/A
00_Retail_NE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0M_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
0M_Reception_SE	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_SW2	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Reception_Perimeter_NW	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Retail_SE	-	-	-	-	-	-	-	-	0.3	-	-	N/A
0_Reception_Perimeter_SW1	-	-	-	-	-	-	-	-	0.2	-	-	N/A
00_Retail_Internal	-	-	-	-	-	-	-	-	0.3	-	-	N/A
00_Retail_WC	-	-	-	-	-	-	-	-	0.3	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
07_Office_Plant	-	100	-	-	192
07_Superloos_1	-	-	100	-	103
07_Core_Lobby_3	-	-	100	-	85
07_Core_Lobby_1	-	-	100	-	103
07_Stairwell_1	-	-	100	-	59
07_Core_Lobby2	-	-	100	-	60
07_WC_Lobby	-	-	100	-	101
07_Superloo2_2	-	-	100	-	52
07_Disabled_WC	-	-	100	-	37
07_Stairwell_2	-	-	100	-	57
08_Superloos_1	-	-	100	-	103
08_Core_Lobby_1	-	-	100	-	103
08_Stairwell_1	-	-	100	-	59
08_Core_Lobby2	-	-	100	-	60

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
08_WC_Lobby	-	-	100	-	101
08_Superloo2_2	-	-	100	-	52
08_Disabled_WC	-	-	100	-	37
08_Stairwell_2	-	-	100	-	57
08_Core_Lobby_3	-	-	100	-	85
08_Plant_A	-	100	-	-	375
08_Plant_B	-	100	-	-	249
08_Plant_Corridor	-	-	100	-	45
08_Plant_C	-	100	-	-	258
09_Core_Lobby_1	-	-	100	-	100
09_Stairwell_1	-	-	100	-	56
09_Core_Lobby2	-	-	100	-	60
09_Superloo2_2	-	-	100	-	51
09_Disabled_WC	-	-	100	-	36
09_Stairwell_2	-	-	100	-	57
09_Core_Lobby_3	-	-	100	-	81
09_WC_Lobby	-	-	100	-	91
09_Superloos_1	-	-	100	-	84
09_Amenity_Corridor	-	-	100	-	159
09_Plant_A	-	100	-	-	79
09_Plant_B	-	100	-	-	1159
09_Plant_C	-	100	-	-	75
10_Stairwell_1	-	-	100	-	47
10_Stairwell_2	-	-	100	-	44
10_Corridor_2	-	-	100	-	24
10_Corridor_1	-	-	100	-	23
0M_Plant_Room	-	100	-	-	192
0M_Superloos_1	-	-	100	-	103
0M_Core_Lobby_3	-	-	100	-	85
0M_Core_Lobby_1	-	-	100	-	103
0M_Stairwell_1	-	-	100	-	59
0M_Core_Lobby2	-	-	100	-	60
0M_WC_Lobby	-	-	100	-	101
0M_Superloo2_2	-	-	100	-	52
0M_Disabled_WC	-	-	100	-	37
0M_Stairwell_2	-	-	100	-	57
0M_Meeting_Room4	-	-	67	35	234
0M_Meeting_Room3	-	-	72	35	161
0M_Meeting_Room2	-	-	72	35	161
0M_Meeting_Room1	-	-	67	35	229
00_Stairwell_1	-	-	100	-	61
00_Core_Lobby2	-	-	100	-	63
00_Disabled_WC	-	-	100	-	39

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
00_Stairwell_2	-	100	-	-	58
00_CorridorE	-	100	-	-	24
00_CorridorD	-	100	-	-	94
00_Corridor_C	-	100	-	-	56
00_Store	-	100	-	-	22
00_Disabled_WC_Lobby	-	100	-	-	39
00_CorridorA	-	100	-	-	37
00_CorridorB	-	100	-	-	57
00_CorridorF	-	100	-	-	25
00_DNO	100	-	-	-	90
0B_Basement_AHU_&_Grey_Water	100	-	-	-	535
0B_DH_Plant	100	-	-	-	105
0B_FCC	100	-	-	-	176
0B_Refuse_Store	100	-	-	-	210
0B_DHW_Plant	100	-	-	-	169
0B_Entrance_AHU	100	-	-	-	187
0B_Switchroom	100	-	-	-	171
0B_CorridorD	100	-	-	-	181
0B_Shower_AHU	100	-	-	-	102
0B_Rainwater_Harvesting	100	-	-	-	170
0B_CW_Storage	100	-	-	-	349
0B_Sprinkler_Tank	100	-	-	-	511
0B_StairwellA	-	100	-	-	76
0B_Plant	100	-	-	-	72
0B_Comms_Intake1	100	-	-	-	114
0B_Gas_Meter	100	-	-	-	72
0B_CorridorC	100	-	-	-	97
0B_StairwellB	-	100	-	-	75
0B_CorridorG	100	-	-	-	120
0B_Disabled_WC	-	100	-	-	52
0B_CorridorF	100	-	-	-	200
0B_Comms_Intake2	100	-	-	-	87
0B_Diesel_Store	100	-	-	-	220
0B_CorridorE	100	-	-	-	164
0B_CorridorA	100	-	-	-	293
0B_Stair	-	100	-	-	225
0B_CorridorB	100	-	-	-	548
0B_Female_Lockers	-	100	-	-	107
0B_Disabled_Shower	-	100	-	-	30
0B_Male_Lockers	-	100	-	-	108
0B_Male_Showers	-	100	-	-	64
0B_Female_Showers	-	100	-	-	64
08_Office_Internal	120	-	-	-	1440

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
08_Office_Perimeter_SW	124	-	-	-	1071
08_Perimeter_Office_SE	126	-	-	-	765
07_Perimeter_Office_NE1	142	-	-	-	199
07_Perimeter_Office_NW	125	-	-	-	944
07_Perimeter_Office_SW	124	-	-	-	1177
07_Perimeter_Office_NE2	144	-	-	-	137
07_Perimeter_Office_SE	125	-	-	-	907
07_Office_Internal	119	-	-	-	2730
06_Office_Plant	100	-	-	-	192
06_Superloos_1	-	100	-	-	103
06_Core_Lobby_3	-	100	-	-	85
06_Core_Lobby_1	-	100	-	-	103
06_Stairwell_1	-	100	-	-	59
06_Core_Lobby2	-	100	-	-	60
06_WC_Lobby	-	100	-	-	101
06_Superloo2_2	-	100	-	-	52
06_Disabled_WC	-	100	-	-	37
06_Stairwell_2	-	100	-	-	57
06_Perimeter_Office_NE1	142	-	-	-	199
06_Perimeter_Office_NW	125	-	-	-	944
06_Perimeter_Office_SW	124	-	-	-	1177
06_Perimeter_Office_NE2	144	-	-	-	137
06_Perimeter_Office_SE	125	-	-	-	907
06_Office_Internal	119	-	-	-	2730
05_Office_Plant	100	-	-	-	192
05_Superloos_1	-	100	-	-	103
05_Core_Lobby_3	-	100	-	-	85
05_Core_Lobby_1	-	100	-	-	103
05_Stairwell_1	-	100	-	-	59
05_Core_Lobby2	-	100	-	-	60
05_WC_Lobby	-	100	-	-	101
05_Superloo2_2	-	100	-	-	52
05_Disabled_WC	-	100	-	-	37
05_Stairwell_2	-	100	-	-	57
05_Perimeter_Office_NE1	142	-	-	-	199
05_Perimeter_Office_NW	125	-	-	-	944
05_Perimeter_Office_SW	124	-	-	-	1177
05_Perimeter_Office_NE2	144	-	-	-	137
05_Perimeter_Office_SE	125	-	-	-	907
05_Office_Internal	119	-	-	-	2730
03_Office_Plant	100	-	-	-	192
03_Superloos_1	-	100	-	-	103
03_Core_Lobby_3	-	100	-	-	85

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
03_Core_Lobby_1	-	100	-	-	103
03_Stairwell_1	-	100	-	-	59
03_Core_Lobby2	-	100	-	-	60
03_WC_Lobby	-	100	-	-	101
03_Superloo2_2	-	100	-	-	52
03_Disabled_WC	-	100	-	-	37
03_Stairwell_2	-	100	-	-	57
03_Perimeter_Office_NE1	142	-	-	-	199
03_Perimeter_Office_NW	125	-	-	-	944
03_Perimeter_Office_SW	124	-	-	-	1177
03_Perimeter_Office_NE2	144	-	-	-	137
03_Perimeter_Office_SE	125	-	-	-	907
03_Office_Internal	119	-	-	-	2730
02_Office_Plant	100	-	-	-	192
02_Superloos_1	-	100	-	-	103
02_Core_Lobby_3	-	100	-	-	85
02_Core_Lobby_1	-	100	-	-	103
02_Stairwell_1	-	100	-	-	59
02_Core_Lobby2	-	100	-	-	60
02_WC_Lobby	-	100	-	-	101
02_Superloo2_2	-	100	-	-	52
02_Disabled_WC	-	100	-	-	37
02_Stairwell_2	-	100	-	-	57
02_Perimeter_Office_NE1	142	-	-	-	199
02_Perimeter_Office_NW	125	-	-	-	944
02_Perimeter_Office_SW	124	-	-	-	1177
02_Perimeter_Office_NE2	144	-	-	-	137
02_Perimeter_Office_SE	125	-	-	-	907
02_Office_Internal	119	-	-	-	2730
04_Office_Plant	100	-	-	-	192
04_Superloos_1	-	100	-	-	103
04_Core_Lobby_3	-	100	-	-	85
04_Core_Lobby_1	-	100	-	-	103
04_Stairwell_1	-	100	-	-	59
04_Core_Lobby2	-	100	-	-	60
04_WC_Lobby	-	100	-	-	101
04_Superloo2_2	-	100	-	-	52
04_Disabled_WC	-	100	-	-	37
04_Stairwell_2	-	100	-	-	57
04_Perimeter_Office_NE1	142	-	-	-	199
04_Perimeter_Office_NW	125	-	-	-	944
04_Perimeter_Office_SW	124	-	-	-	1177
04_Perimeter_Office_NE2	144	-	-	-	137

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
04_Perimeter_Office_SE	125	-	-	-	907
04_Office_Internal	119	-	-	-	2730
01_Office_Plant	100	-	-	-	192
01_Superloos_1	-	100	-	-	103
01_Core_Lobby_3	-	100	-	-	85
01_Core_Lobby_1	-	100	-	-	103
01_Stairwell_1	-	100	-	-	59
01_Core_Lobby2	-	100	-	-	60
01_WC_Lobby	-	100	-	-	101
01_Superloo2_2	-	100	-	-	52
01_Disabled_WC	-	100	-	-	37
01_Stairwell_2	-	100	-	-	57
01_Perimeter_Office_NE1	142	-	-	-	199
01_Perimeter_Office_NW	125	-	-	-	944
01_Perimeter_Office_SW	124	-	-	-	1177
01_Perimeter_Office_NE2	144	-	-	-	137
01_Perimeter_Office_SE	125	-	-	-	907
01_Office_Internal	119	-	-	-	2730
0M_Lounge_Perimeter_NE	-	69	35	-	251
0M_Lounge_Perimeter_NW	-	60	35	-	691
0M_Lounge_Perimeter_NE	-	82	35	-	161
0M_Reception_Perimeter_NW	-	60	35	-	740
0M_Reception_Perimeter_SW1	-	64	35	-	898
0M_Retail_Perimeter_SE	-	31	35	-	472
0M_Retail_Perimeter_NE	-	32	35	-	319
0M_Retail_Internal	-	34	35	-	248
00_Cycle_Store_NE	-	100	-	-	251
00_Cycle_Store_NW	-	100	-	-	210
00_Cycle_Store_Internal	-	100	-	-	137
00_Retail_NE	-	32	35	-	359
0M_Reception_SW2	-	170	35	-	5
0M_Reception_SE	-	170	35	-	7
0M_Reception_Double_Height	-	170	35	-	28
0M_Entrance_Internal_Mezzanine	-	95	35	-	102
0M_Entrance_Internal_Mezzanine	-	60	35	-	1194
00_Cafe	-	113	-	-	235
00_Reception_SW2	-	67	35	-	317
00_Reception_SW2	-	63	35	-	510
00_Reception_Double_Height	-	60	35	-	1524
00_Reception_Perimeter_NW	-	61	35	-	712
00_Retail_SE	-	32	35	-	393
0_Reception_Perimeter_SW1	-	59	35	-	1220
00_Entrance_Internal	-	61	35	-	1423

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
00_Retail_Internal	-	60	47	35	106
00_Retail_WC	-	60	37	35	181

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?
0M_Meeting_Room4	NO (-24.2%)	NO
0M_Meeting_Room3	N/A	N/A
0M_Meeting_Room2	N/A	N/A
0M_Meeting_Room1	N/A	N/A
08_Office_Internal	N/A	N/A
08_Office_Perimeter_SW	NO (-15.8%)	NO
08_Perimeter_Office_SE	NO (-16.5%)	NO
07_Perimeter_Office_NE1	NO (-49.4%)	NO
07_Perimeter_Office_NW	NO (-46.7%)	NO
07_Perimeter_Office_SW	NO (-41.2%)	NO
07_Perimeter_Office_NE2	NO (-49.9%)	NO
07_Perimeter_Office_SE	NO (-40.3%)	NO
07_Office_Internal	N/A	N/A
06_Perimeter_Office_NE1	NO (-49.4%)	NO
06_Perimeter_Office_NW	NO (-46.6%)	NO
06_Perimeter_Office_SW	NO (-41.7%)	NO
06_Perimeter_Office_NE2	NO (-50%)	NO
06_Perimeter_Office_SE	NO (-40.3%)	NO
06_Office_Internal	N/A	N/A
05_Perimeter_Office_NE1	NO (-49.4%)	NO
05_Perimeter_Office_NW	NO (-46.6%)	NO
05_Perimeter_Office_SW	NO (-42.1%)	NO
05_Perimeter_Office_NE2	NO (-50%)	NO
05_Perimeter_Office_SE	NO (-40.3%)	NO
05_Office_Internal	N/A	N/A
03_Perimeter_Office_NE1	NO (-49.4%)	NO
03_Perimeter_Office_NW	NO (-46.6%)	NO
03_Perimeter_Office_SW	NO (-43.3%)	NO
03_Perimeter_Office_NE2	NO (-50.4%)	NO
03_Perimeter_Office_SE	NO (-42.8%)	NO
03_Office_Internal	N/A	N/A
02_Perimeter_Office_NE1	NO (-49.8%)	NO
02_Perimeter_Office_NW	NO (-46.7%)	NO
02_Perimeter_Office_SW	NO (-43.9%)	NO
02_Perimeter_Office_NE2	NO (-55.2%)	NO
02_Perimeter_Office_SE	NO (-49.6%)	NO
02_Office_Internal	NO (-100%)	NO
04_Perimeter_Office_NE1	NO (-49.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Perimeter_Office_NW	NO (-46.6%)	NO
04_Perimeter_Office_SW	NO (-42.7%)	NO
04_Perimeter_Office_NE2	NO (-50%)	NO
04_Perimeter_Office_SE	NO (-40.3%)	NO
04_Office_Internal	N/A	N/A
01_Perimeter_Office_NE1	NO (-50.2%)	NO
01_Perimeter_Office_NW	NO (-56.9%)	NO
01_Perimeter_Office_SW	NO (-47.3%)	NO
01_Perimeter_Office_NE2	NO (-60.6%)	NO
01_Perimeter_Office_SE	NO (-57.6%)	NO
01_Office_Internal	N/A	N/A
0M_Lounge_Perimeter_NE	NO (-19%)	NO
0M_Lounge_Perimeter_NW	YES (+8.7%)	NO
0M_Lounge_Perimeter_NE	N/A	N/A
0M_Reception_Perimeter_NW	NO (-56.1%)	NO
0M_Reception_Perimeter_SW1	NO (-30.3%)	NO
0M_Retail_Perimeter_SE	NO (-31.3%)	NO
0M_Retail_Perimeter_NE	NO (-27.8%)	NO
0M_Retail_Internal	N/A	N/A
00_Cycle_Store_NE	NO (-52.1%)	NO
00_Cycle_Store_NW	YES (+21%)	NO
00_Cycle_Store_Internal	N/A	N/A
00_Retail_NE	NO (-28.7%)	NO
0M_Reception_SW2	NO (-30.8%)	NO
0M_Reception_SE	NO (-47.8%)	NO
0M_Reception_Double_Height	NO (-99.7%)	NO
0M_Entrance_Internal_Mezzanine	NO (-100%)	NO
0M_Entrance_Internal_Mezzanine	NO (-100%)	NO
00_Cafe	YES (+38.9%)	NO
00_Reception_SW2	YES (+35.8%)	NO
00_Reception_SW2	YES (+5.2%)	NO
00_Reception_Double_Height	NO (-100%)	NO
00_Reception_Perimeter_NW	NO (-35.9%)	NO
00_Retail_SE	NO (-16.3%)	NO
0_Reception_Perimeter_SW1	YES (+24.7%)	NO
00_Entrance_Internal	NO (-100%)	NO
00_Retail_Internal	N/A	N/A
00_Retail_WC	N/A	N/A

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	15494.8	15494.8
External area [m ²]	11736.1	11736.1
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	5350.77	5920.6
Average U-value [W/m ² K]	0.46	0.5
Alpha value* [%]	9.88	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
2	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
98	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.27	2.95
Cooling	5.94	7.97
Auxiliary	7.07	10.08
Lighting	10.03	20.08
Hot water	17.86	16.68
Equipment*	61.04	61.04
TOTAL**	44.18	57.77

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

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

Energy Production by Technology [kWh/m²]

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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	91.2	117.94
Primary energy* [kWh/m ²]	94.76	138.12
Total emissions [kg/m ²]	16.2	23.5

* 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] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Elec										
	Actual	0.5	115.5	0.2	7.8	6.6	0.82	4.11	0.91	4.43
	Notional	0.4	164.6	0.1	12.1	10.4	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13	0	4.2	0	2.4	0.85	0	0.91	0
	Notional	50.9	0	16.4	0	2.1	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	59.5	160.1	19.7	12.6	49.4	0.84	3.54	0.91	4.43
	Notional	17.7	236.5	5.7	17.3	36.4	0.86	3.79	----	----
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	0.8	1.01	0	0.91	0
	Notional	0.1	0	0	0	0.6	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	0	0.85	0	0.91	0
	Notional	0	0	0	0	0	0.86	0	----	----
[ST] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Elec										
	Actual	0.1	211.5	0	14.3	7.3	0.82	4.11	0.91	4.43
	Notional	0	212.7	0	15.6	11.4	0.86	3.79	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	0	1.06	2.53	0.91	4.43
	Notional	0	0	0	0	0	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	12.3	0	4	0	1	0.85	0	0.91	0
	Notional	20.6	0	6.6	0	1	0.86	0	----	----
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	0	1.01	0	0.91	0
	Notional	0	0	0	0	0	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	3.4	0	1.1	0	2	0.85	0	0.91	0
	Notional	15.1	0	4.9	0	1	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	28.7	147.8	9.5	11.6	12.6	0.84	3.54	0.91	4.43
	Notional	7.5	140.5	2.4	10.3	14.9	0.86	3.79	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	19.7	99.1	6.5	7.7	10.4	0.84	3.56	0.91	4.43
	Notional	17.4	140.2	5.6	10.3	16.5	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

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

Key Features

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

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.18	020000E7:Surf[0]
Floor	0.2	0.12	0000000F:Surf[0]
Roof	0.15	0.12	02000113:Surf[0]
Windows, roof windows, and rooflights	1.5	1.2	0M000023:Surf[1]
Personnel doors	1.5	-	No Personnel doors in building
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	3

Appendix B – BREEAM Pre-assessment

Reg. Office Address:
Sweco UK Limited
Grove House
Mansion Gate Drive
Leeds, LS7 4DN
+44 113 262 0000

Reg. No.: 2888385
Reg. Office: Leeds

www.sweco.co.uk

Sweco UK Limited
1 Bath Road

Maidenhead, SL6 4AQ
+44 1628 623 423

Roaa Babiker
Senior Sustainability Engineer
+44 1628 598 335

Roaa.babiker@sweco.co.uk

BREEAM 2018 NC (Non-Domestic)
Design & Procurement Assessment
New Victoria Office

65205124
22/03/2022
Revision3



[illegible]

BREEM 2018 NC (Non-Domestic) - Design & Procurement Assessment
65205124
22/03/2022
Revision3

Sweco

1 Bath Road
Maidenhead
Berkshire
SL6 4AQ

+44 (0)1628 623 423
building.services@sweco.co.uk
sweco.co.uk/buildingservices

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BREEAM NC 2018 Credit Review

22/03/2022

Rev.3

Project Name

New Victoria Office

Building Type

Office

Project Type

Shell and Core

Targeted BREEAM rating %

84.21

Excellent

Potential BREEAM rating %

93.45

Outstanding

Achieved scoring %

0.00

Unclassified

	Credit awarded
	Credit not targeted
	Potential additional credit
	Further information required

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
MANAGEMENT		0.61%									
Man 01	Project brief and design	Project Delivery Planning	1	1		0		Client*PM*	2		Design team meetings, scope of work & formal agreements on performance targets with project team members (pre-requisite)
		Stakeholder Consultation (Interested Parties)	1	1		0		Client*PM*	2		All relevant third parties (planning consultation with local authority, local residents and any input from end user) been consulted.
		BREEAM AP (Concept Design)	1	1		0		BREEAM AP*	2		BREEAM AP is appointed prior to RIBA Stage 2 and BREEAM target formally agreed with design team.
		BREEAM AP (Developed Design)	1	1		0		BREEAM AP*	3		BREEAM AP is appointed and monitor progress against target throughout the project up to PC Stage.
Man 02	Life cycle cost and service life planning	Elemental Life Cycle Cost (LCC)	2	2		0		LCC Specialist*	2		G&T to complete (RIBA 2): An Elemental LCC analysis is required to be carried out at RIBA Stage 2 for 20, 30, 50 or 60 years LCC analysis
		Component Level LCC options appraisal	1	1		0		LCC Specialist*	4		Additional Appointment Required (RIBA 4): A Component LCC analysis at RIBA Stage 4 including Envelope, e.g. cladding, window, roof. Services, Finishes, e.g. floors or ceilings. External spaces, e.g. landscaping.
		Capital Cost Reporting	1	1		0		Client*QS*	4		Report a capital cost in £/m2 for BRE purpose only.
Man 03	Responsible construction practices	Legally harvested and traded timber					Yes/No?	Contractor*			This is a minimum requirement for achieving any BREEAM rating.
		Environmental Management	1	1		0		Contractor*	4		Contractor operates EMS: certificate of ISO 14001 /EMAS and implement best practice pollution prevention policies and procedures on site in accordance with Working at construction and demolition sites: PPG6, Pollution Prevention Guidelines.
		BREEAM AP (Site)	1	1		0		Contractor*	4		A Site Sustainability Manager / BREEAM AP should be appointed to monitor targets during the RIBA Stages 5 & 6.
		Responsible Construction Management (Minimum Standard: 1 credit for Excellent, 2 for Outstanding)	2	2		0	Yes/No?	Contractor*	4		Minimum Standard: E-1; O-2. The principal contractor evaluates the risks (on site and off site), plans and implements actions to minimise the identified risks i.e. Considerate Constructors Scheme, Fleet Operator Recognition Scheme.
		Monitoring of Construction Site Impacts - Utility Consumption	1	1		0		Contractor*	4		Site-based energy and water usage to be monitored. Display figures on site.
		Monitoring of Construction Site Impacts - Transport of Construction Materials & Waste	1	1		0		Contractor*	4		Vehicle monitoring of materials deliveries from point of supply and vehicle monitoring of waste to establish carbon figures.
Man 04	Commissioning & Handover	Commissioning - Testing Schedule & Responsibilities (Minimum Standard: 1 credit for Very Good / Excellent / Outstanding)	1	1		0	Yes/No?	Contractor*Specialist*	4		Minimum Standard: VG/E/O - 1. Third party commissioning manager to be appointed. Testing schedule and responsibilities to be provided.
		Commissioning - design and preparation	1	1		0		Contractor*Specialist*	4		Appointment of an appropriate project team member, provided they are not involved in the general installation works provide commissioning management.
		Testing & Inspecting Building Fabric	1	1		0		Contractor*	4		Thermographic survey as well as an airtightness test and inspection required.
		Building User Guide (BUG)					Yes/No?	Contractor*			Minimum Standard: E/O - 1. Commissioning manager required to return to site at summers/winter months after occupation at least for 1 year. Carry out recommissioning if required.
		Handover	1	1		0		Contractor*	4		Third party appointment to undertake evaluation, provide feedback and report with lessons learned to the client and building occupiers.
Man		TOTAL:	18	18	0	0					
		% of total score:	11.00%	11.00%	0.00%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
HEALTH & WELLBEING 0.73%											
Hea 01	Visual comfort	Daylighting	2	0		0		Architect*Specialist*	3		Additional Appointment Required (RIBA 3): Daylighting study to be carried out and achieve average daylight factor of 2% over 80% (100% room dependant) of the floor plate and a uniformity ratio of at least 0.3.
		View Out	1	1		0		Architect*	3		95% of the floor area in 95% of spaces for each relevant building area is within 8 m of an external wall. The window or opening must be ≥ 20% of the surrounding wall area. Or compliance is sought via BS 8206: part 2.
		External Lighting Levels	1	1		0		M&E Consultant*Lighting Specialist*	4		Internal lighting in all relevant areas of the building is designed to provide illuminance (lux) levels and colouring rendering index in accordance with the SLL Code for Lighting 2012 and areas with PC CIBSE LG7. Internal lighting is zoned to allow for occupant control.
Hea 02	Indoor air quality	Indoor Air Quality Plan (IAQP)					Yes	Specialist*	3		Report Completed - Contractor to confirm recommendations (RIBA 3): IAQP to be developed to facilitate good practice. Contractor to ensure recommendations from the IAQP are followed - letter to be issued once appointed
		Ventilation	1	1		0		M&E Consultant*	4		Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation: BS ISO 17772-1:2017 (Requirement is min. of 14 l/second/person) or, for naturally ventilated buildings, CIBSE AM10.
Hea 04	Thermal comfort	Thermal modelling	1	1		0		Energy Consultant*	3		Carry out dynamic thermal modelling using CIBSE AM11 compliant software.
		Design for future thermal comfort	1	1		0		Energy Consultant*	3		The building shall be designed to be adaptable for a projected climate change scenario. PMV and PPD to be reported.
Hea 05	Acoustic performance	Acoustic performance standards	1	1		0		Acoustician*	3		Additional Appointment Required: Appointment of suitably qualified acoustician to undertake calculation & testing requirements. The contractor to confirm that they will remediate any non-conformation.
Hea 06	Safety & Security	Security of Site & Building	1	1		0		Security Specialist*	2		SBD Appointment - Deloitte (RIBA 2): A suitably qualified security specialist (SQSS) is required to conduct an evidence-based Security Needs Assessment at RIBA Stage 2. Recommendations of the SNA to be implemented by the project team at RIBA 4.
Hea 07	Safe and healthy surroundings	Safe Access	1	1		0		Architect*	4		Dedicated and safe cycle paths are provided from the site entrance to any cycle storage, and connect to off-site cycle paths where applicable. Suitable lighting also required.
		Outside Space	1	1		0		Architect*	4		There is an outside space providing building users with an external amenity area.
Hea		TOTAL:	11	9	0	0					
		% of total score:	8.00%	6.55%	0.00%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
ENERGY		0.64%									
Ene 01	Reduction of Emissions	Energy Performance Commissioning - implementation (Minimum Standard: 4 credits for Excellent / 6 credits for Outstanding)	9	6		0	Yes/No?	Energy Consultant*	4		Minimum Standard: E-4; O-6 Credits achieved through IES Modelling Tool and reduction in regulated CO ₂ emissions.
		Energy Modelling and Reporting (Minimum Standard: 4 credits for Outstanding)	4	4		0	Yes/No?	Energy Consultant*	4		Minimum Standard: O-4 Additional Appointment Required: Undertake additional energy modelling during the design and post-construction stage to generate predicted operational energy consumption figures.
Ene 02	Energy Monitoring	Sub-Metering of End-use Categories	1	1		0	Yes/No?	M&E Consultant*Contractor*	4		Minimum Standard: VG/E/O-1. Energy metering systems of at least 90% of the estimated annual energy consumption of each fuel is assigned to the end-use categories.
		Sub-Metering of High Energy Load & Tenancy Areas	1	1		0		M&E Consultant*Contractor*	4		Sub-metering on a floor by floor basis and tenancy areas.
Ene 03	External Lighting	External Lighting	1	1		0		M&E Consultant*Specialist*	4		Average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt. Automatic control to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.
Ene 04	Low Carbon Design	Passive Design Analysis	1	1		0		Energy Consultant*	2		Stage 2 requirement Thermal modelling to be achieved first. Implement passive design measures to reduce the total heating, cooling, mechanical ventilation, lighting loads and energy consumption in line with the passive design analysis findings.
		Free Cooling	1	0		0		M&E Consultant*	4		Façade type (unitised curtain wall) not conducive of openable windows. Mechanically cooled office floorplates, therefore credits not available.
		Low Zero Carbon Feasibility Study	1	1		0		Energy Consultant*	2		Stage 2 requirement LZC Study to establish the most appropriate low or zero carbon energy sources and report the reduction on regulated CO ₂ emissions.
Ene 06	Energy Efficient Transportation Systems	Energy Consumption	1	1		0		Lift Specialist*	4		Lift analysis to determine transportation demand and usage patterns in compliance with BS EN ISO 25745 Part 2 and 3.
		Energy Efficient Features - Lifts	1	1		0		Lift Specialist*	4		Energy-efficient features offering the greatest potential energy savings will be part of the system i.e. a standby condition for off-peak periods.
		Energy Efficient Features - Escalators or moving walks	1	1		0		M&E Consultant*	4		Energy-efficient features offering the greatest potential energy savings will be part of the system
Ene		TOTAL:	22	18	0	0					
		% of total score:	14.00%	11.45%	0.00%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
TRANSPORT			0.96%								
Tra 01	Transport assessment and travel plan	Travel plan	2	2		0	AI >= 40	Transport Consultant*	2		SCP Travel Plan to be commissioned for the development clearly considering the impact onto the surrounding infrastructure etc. due to the site specific travel survey / assessment having been developed. To assess availability of transport links, frequency and amenities in proximity to the site.
Tra 02	Sustainable transport measures	1. The existing AI calculated in Tra 01	10	10		0	1	Transport Consultant*			Early indications show Victoria Office will have a high PTAL index rating,and therefore the points associated with item (1) can be achieved. 1 point. Item (7) Install compliant cycle storage spaces to meet the minimum levels set out in Table 7.5 - 1 point. Item (8) as above but for the changing facilities, lockers and showers. 1 point. Item (9) - BY1 has many existing accessible amenities close by. Very likely this credit will be achieved 1 point. Conversation needs to be had on item (6) - this process may already be underway as part of the planning and access/setting out process so might not be additional work. 2 potential points by itself There is a potential for achieving 6 Points - 10 credits in this scheme.
		2. Demonstrate an increase over the existing Accessibility Index.					Transport Measures?	Transport Consultant*			
		3. Provide a public transport information system in a publicly accessible area, to allow building users access to up-to-date information on the available public transport and transport infrastructure.					Transport Measures?	Transport Consultant*			
		4. Provide electric recharging stations of a minimum of 3kw for at least 10% of the total car parking capacity for the development.					Transport Measures?	Transport Consultant*			
		5. Set up a car sharing group or facility to facilitate and encourage building users to car share. Raise awareness of the sharing scheme.					Transport Measures?	Transport Consultant*			
		6. During preparation of the brief, the design team consults with the local authority (LA) on the state of the local cycling network and public accessible pedestrian routes, to focus on whichever the LA deems most relevant to the project, and how to improve it.					11-12	Transport Consultant*			
		7. Install compliant cycle storage spaces to meet the minimum levels set out in Table 7.5					13	Transport Consultant*			
		8. Provide at least two compliant cyclists' facilities for the building users, (including pupils where appropriate to the building type) – Showers; – Changing facilities; – Lockers; – Drying spaces.					14-15	Transport Consultant*			
		9. At least three existing accessible amenities are present, see Table 7.6.					16	Transport Consultant*			
		Tra					TOTAL:	12	12		
		% of total score:	11.50%	11.50%	0.00%	0.00%					
WATER			0.78%								
Wat 01	Water Consumption	Water Consumption	5	3	1	0	Yes/No?	M&E Consultant* Architect*Contractor*	4		Minimum Standard: E-1 Water fittings to have restricted flow rates to achieve targeted credits. Greywater or rainwater system can contribute and increase these credits.
Wat 02	Water Monitoring	Water Monitoring	1	1		0	Yes/No?	M&E Consultant*	4		Minimum Standard: E-1 Any water-consuming plant or building areas consuming 10% or more of the building's total water demand. Water flow meters pulsed & BMS connected.
Wat 03	Water Leak Detection	Leak Detection System	1	1		0		M&E Consultant*	4		To detect any major leaks within the buildings a leak detection via BMS with audible alarm.
		Flow Control Devices	1	1		0		M&E Consultant*	4		Sanitary supply shut-off valves specified to each toilet area.
Wat 04	Water efficient equipment	Water efficient equipment	1	1		0		M&E Consultant*	4		Mitigate 'unregulated water usage' to reduce water demand.
Wat		TOTAL:	9	7	1	0					
		% of total score:	7.00%	5.44%	0.78%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
MATERIALS			1.25%								
Mat 01	Environmental impacts from construction products - Building life cycle assessment (LCA)	Superstructure - Concept Design	6	4	1	0	Yes/No?	LCA Specialist* [input from whole design team]	RMA		To carry out building Life Cycle Assessment (LCA) <u>before planning submission</u> . Demonstrate how the LCA options appraisal has affected the design.
		Superstructure - Technical Design						LCA Specialist* [input from whole design team]	4		
		Substructure and hard landscaping options appraisal during Concept Design	1	1		0		LCA Specialist* [input from whole design team]	RMA		The LCA options appraisal summary document includes substructure and hard landscaping.
Mat 02	Environmental Product Declarations (EPD)	Specification of products with a recognised environmental product declaration (EPD)	1	0		0		Architect* LCA Specialist*	4		To specify products with recognised EPD, then use Mat 01/02 submission tool.
Mat 03	Responsible Sourcing of construction products	Pre-requisite: Timber procurement details					Yes/No?	ALL TEAM*	4		Minimum Standard: Responsible sourcing of timber. All timber to be FSC/PEFC certified etc.
		Enabling Sustainable Procurement	1	1		0		Client*	2		Stage 2 requirement Sustainable Procurement Plan to be in place before RIBA Stage 2.
		Measuring Responsible Sourcing	3	1	1	0		Architect*Contractor*	4		Material specified from manufacturers who can provide EMS Certification (ISO 14001 etc.)
Mat 05	Designing for Durability & Resilience	Designing for Durability & Resilience	1	1		0		Architect*	4		Protecting vulnerable parts of the building from damage and exposed parts of the building from material degradation.
Mat 06	Material Efficiency	Preparation and Brief	1	1		0	Yes/No?	Design Team*	1		Set targets and report on opportunities and methods to optimise the use of materials. These must be done for each RIBA stage.
		Concept Design					Yes/No?		2		
		Developed Design					Yes/No?		3		
		Technical Design					Yes/No?		4		
		Construction					Yes/No?		5		
Mat		TOTAL:	14	9	2	0					
		% of total score:	17.50%	11.25%	2.50%	0.00%					
WASTE			0.64%								
Wst 01	Construction Waste Management	Pre-demolition audit	1	1		0		Demolition Contractor*	2		Minimum Standard: O-1, Stage 2 requirement Pre Demolition audit at Concept Design stage by a competent person
		Construction Resource Efficiency	3	2		0	Yes/No?	Contractor*	4		RMP to be prepared covering the targets of non-hazardous waste arising from site construction . Contractor to limit waste to less than 6.5tonnes per 100m2 gross internal area. NOTE: 2 credits dependent on contractor commitment.
		Diversion of Resources from Landfill	1	1		0		Contractor*	4		Contractor to limit waste to landfill. 90% (tonnes) of demolition and 80% non-demolition waste to be diverted from landfill.
Wst 03	Operational Waste	Operational Waste	1	1		0	Yes/No?	Architect*Client*	4		Minimum Standard: E-1 Based on NIA 1000 sqm - 2 sqm space for recycling bins is required. Additional sqm when catering is provided. Minimum of 30 litres of 3 internal bins (no individual container smaller than7litres) to be provided for multi-residential buildings.
Wst 04	Speculative Finishes (Offices only)	Speculative Floor and Ceiling Finishes	1	1		0		Architect*	4		To install floor and ceiling finishes selected by the known occupant or if occupant not known in show area only.
Wst 05	Adaptation to Climate Change	Resilience of structure, fabric, building services and renewables installation	1	1		0		Design Team*Specialist*	2 & 4		Stage 2 requirement Conduct a climate change adaptation strategy of new & existing fabric and it's durability to deal with extremes in weather condition. Develop recommendations/ solutions at RIBA Stage 2. Provide an update at RIBA Stage 4.
Wst 06	Design for disassembly and adaptability	Design for disassembly and functional adaptability - recommendations	1	1		0		Design Team*	2		Stage 2 requirement Conduct study by the end of RIBA Stage 2 and develop recommendations prior to RIBA Stage 2. (i.e. alternative building uses, functions, major plant replacement, ventilation strategy to adapt to future building occupant needs, adaptability to changes of in-use etc.
		Disassembly and functional adaptability – implementation	1	1		0		Design Team*	4		Provide an update during RIBA Stage 4, how the recommendations have been implemented - horizontally or vertically expandability, refurbishment potential, local plant and service distribution routes etc.
Wst		TOTAL:	11	9	0	0					
		% of total score:	7.00%	5.73%	0.00%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
LAND USE & ECOLOGY 1.15%											
LE 01	Site Selection	Previously Occupied Land	1	1		0		Architect*	4		75% of new development footprint is built on the previously occupied land.
		Contaminated Land	1	0	1	0		Specialist*	4		Specialist's land contamination report and summary details of the implementation plan of the remediation strategy to be developed.
LE 02	Identifying and understanding the risks and opportunities for the project	Prerequisite - Assessment route selection					Route 2	Client*Contractor*			Prerequisite: The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.
		Survey and evaluation	1	1		0		Rachel Hacking Ecologist*	1		Route 2 - Suitably qualified ecologist (SQE) appointed to carry out survey and evaluation of the site
		Determining the ecological outcomes of the site	1	1		0		Ecologist*Design Team*	2		Route 1 & 2 - Determining ecological outcomes, recommendations and data collected from the survey and evaluation are shared with appropriate team members to influence decisions made for activities during site preparation, design and construction works.
LE 03	Managing negative impacts on ecology	Prerequisite - identifying the risks & opportunities for the project					No	Ecologist*Design Team*			
		Planning, liaison, implementation and data	1	1		0		Design Team*Contractor*	2		Route 1& 2 - Roles and responsibilities to be assigned. Plan and implement site preparation and construction work early; collaborate and implement solutions and measures with stakeholders.
		Managing negative impacts on ecology	2	1	1	0		Rachel Hacking Ecologist*	4		Route 2 - SQE to provide recommendation on avoidance of negative impact of the site preparation and construction works according to the hierarchy and no net impact has resulted (1 or 2 credits)
LE 04	Change and enhancement of ecological value	Prerequisite - identifying the risks & opportunities for the project					Yes/No?	Client*Contractor*			LE 03 has been achieved. Prerequisite: Roles and responsibilities to be assigned. Site preparation and construction works have been planned. The client or contractor confirms compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site.
		Liaison, implementation and data collation	1	1		0		Design Team*	4		Route 2 - Project team liaise with stakeholders and implement solutions on site or off site within the zone of influence.
		Enhancement of ecology	3	2	1	0		Rachel Hacking Ecologist*Architect*	4		Route 2 - SQE to provide calculations of the change in ecological value (up to 3 credits)
LE 05	Long Term ecology management and maintenance	Prerequisite - Roles & Responsibilities, implementation, statutory obligations					Yes/No?	Client*Contractor*	4		
		Planning, liaison, data, monitoring and review management and maintenance	1	1		0		Design Team*	4		Route 2 - Project team liaise with stakeholders to monitor and review implementation effectiveness and maintenance solutions.
		Landscape and ecology management plan (or similar) development	1	1		0		Rachel Hacking Ecologist*Architect*	4		Route 2 - Landscape and ecology management plan, or similar, is developed in accordance with BS 42020:2013 covering as a minimum the first five years after project completion.
LE		TOTAL:	13	10	3	0					
		% of total score:	15.00%	11.54%	3.46%	0.00%					

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	Mandatory Elements	Responsibilities	Deadline / RIBA Stage	Status	Comments / Actions
POLLUTION			0.75%								
Pol 01	Impact of Refrigerants	Pre-Requisite: systems with electric compressors					Yes/No?	M&E Consultant*	4		Prerequisite: All systems with electric compressors comply with the requirements of BS EN 378:2016 (parts 2 and 3). Refrigeration systems containing ammonia comply with the Institute of Refrigeration Ammonia Refrigeration Systems code of practice.
		Impact of Refrigerants	2	1	1	0		M&E Consultant*	4		1 credit - Refrigerant's Direct Effect Life Cycle CO ₂ equivalent emissions (DELCO ₂ e) of ≤ 1000 kgCO ₂ e/kW cooling/heating capacity. 2 credits - ≤ 100 kgCO ₂ e/kW
		Leak Detection	1	1		0		M&E Consultant*	4		All systems are hermetically sealed or only use environmentally benign refrigerants or a permanent automated refrigerant leak detection system is required.
Pol 02	Local air quality	Local air quality	2	2		0		M&E Consultant*	4		Emissions from all installed combustion plant that provide space heating and domestic hot water do not exceed the levels as set in BREEAM manual i.e. gas boilers NOx = 24mg/kWh.
Pol 03	Flood and surface water management	Flood Resilience	2	2		0		Flood Risk Consultant*	4		AJP FRA Site specific Flood Risk Assessment prepared by specialist to confirm that if the site is a low, medium or high probability of flooding.
		Surface Water Run Off	2	1	1	0		Flood Risk Consultant*	4		Prerequisite - Surface water run-off design solutions must be bespoke. Specialist hydrologist to provide calculation and confirm the proposed attenuation measures, i.e. SUDs.- Brownfield site - volume credit targeted
		Minimising Watercourse Pollution	1	0		0		Flood Risk Consultant*	4		Appropriate consultant to confirm there is no discharge from the developed site for rainfall up to 5 mm and the pollution prevention systems are in line with the SUDs requirements.
Pol 04	Reduction of Night Time Light Pollution	Reduction of Night Time Light Pollution	1	1		0		M&E Consultant*Lighting Specialist*	4		External lighting design is in line with ILP guidance of obtrusive light and can be automatically switched off. Illuminated advertisements are designed in compliance with ILP PLG05 The Brightness of Illuminated Advertisements.
Pol 05	Reduction of Noise Pollution	Reduction of Noise Pollution	1	1		0		Acoustician*	4		A BS 4142:2014 compliant noise impact assessment to be carried out by Acoustician.
Pol		TOTAL:	12	9	2	0					
		% of total score:	9.00%	6.75%	1.50%	0.00%					
INNOVATION			1.00%								
Inn 01	Man 03	Responsible construction practices	1	1		0		Contractor*			Contractor commitment to exemplary credit
Inn 05	Ene 01	Reduction of Energy Use & Carbon Emissions	5	2		0		Energy Consultant*			Energy assessor appointed for POE exercise to report on actual as-built energy consumption vs. targets set via Ene01 criteria 4. Can only be achieved if the 4 credits for the Ene01 Prediction of Operational Energy exercise are achieved.
Inn 11	Wst 05	Responding to Climate Change	1	0	1	0		BREEAM Assessor*			Not Targeted..
Inn		TOTAL:	10	3	1	0					
		% of total score:	10.00%	3.00%	1.00%	0.00%					
Final BREEAM Score		Overall Credits	132	104	9	0					
		Final BREEAM score:	110.00%	84.21%	9.24%	0.00%					

Appendix C – PV Arrangement

Reg. Office Address:
Sweco UK Limited
Grove House
Mansion Gate Drive
Leeds, LS7 4DN
+44 113 262 0000

Reg. No.: 2888385
Reg. Office: Leeds

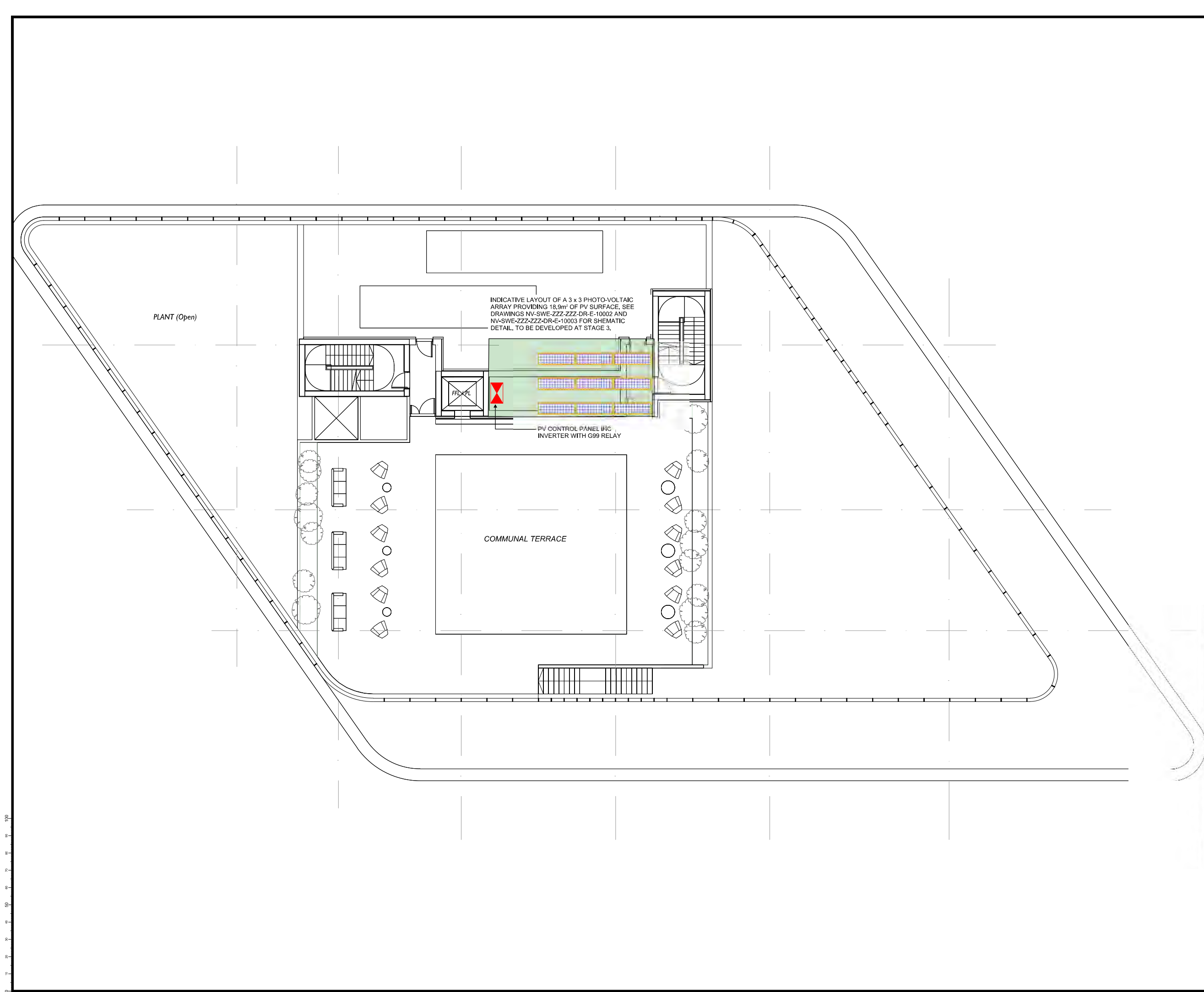
www.sweco.co.uk

Sweco UK Limited
1 Bath Road

Maidenhead, SL6 4AQ
+44 1628 623 423

Roaa Babiker
Senior Sustainability Engineer
+44 1628 598 335

Roaa.babiker@sweco.co.uk



NOTES

- DO NOT SCALE FROM THIS DRAWING MANUALLY OR ELECTRONICALLY.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT PROJECT INFORMATION.
- ALL DATUM LEVELS ARE IN METRES AND DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

LEGEND:

- MONOCRYSTALLINE PHOTO-VOLTAIC PANEL MOUNTED ON A UNISTRUT A-FRAME STRUCTURE AT 38° AZIMUTH AND 59° DUE SOUTH
- ACCESS AND MAINTENANCE ZONE

P01	10.05.2022	INITIAL SKETCH SUBMISSION	MSM	MSM	JB
Rev	Date	Amendment Details	Dr'n	Chk'	App'

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Sweco
4th Floor,
Abbey House
33 Booth Street,
Manchester
M2 3LW
Tel: +44 (0)161 927 4810
Web: www.sweco.co.uk



Client:
**MORGAN CAPITAL,
PARTNERS LLP**

Project Title:
**NEW VICTORIA,
MANCHESTER**

Drawing Title:
**ELECTRICAL SERVICES
ROOF LEVEL
PHOTOVOLTAIC ARRANGEMENT**

Purpose Of Issue:
PRELIMINARY

Status: **S0** Status Description: **Initial Status or WIP**

Designed MSM	Drawn MSM	Checked MSM	Approved JB
Sheet Size A1	Scale 1:100	SWECO Ref 65205124	Revision P01

Drawing Number:
NV-SWE-ZZZ-ZZZ-DR-E-10004