PARCEL R, Kingsmere, Bicester

Preferred Homes Bicester Ltd & Countryside (Bicester) Ltd

ENERGY AND SUSTAINABILITY STATEMENT

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Cudd Bentley Consulting

CONTENTS

RECORD OF REVISIONS.

Date.	Revision.	Description of change.
05/09/2023	1	Issued.
18/09/2023	2	Updated to incorporate comments
18/10/2023	3	Updated to cover comments and site Plan

1 EXECUTIVE SUMMARY

This report considers the energy and sustainability measures identified within the hybrid planning application comprising (i) in FULL, the construction of an 82 no. apartment affordable extra care home (class C2) with associated bistro, open space, landscaping, car/cycle parking, service infrastructure (drainage, highway, lighting), engineering operations, creation of new vehicular access and re-instatement of existing access to footpath, and (ii) in OUTLINE, the construction of a maximum of 14 market residential dwellings (class C3), on land known as Parcel R, Kingsmere, Bicester. This document reviews the requirements at both national and local level, as set out in the National Planning Policy Framework and within the adopted Development Plan which is the CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015.

The recommended sustainability features for the extra care home resulting from a dynamic energy model, will allow for an 3.43% energy saving from a base Part L 2021 compliant build and 29.4% savings from base Part L 2013. A 3.02% reduction in carbon emission over part L2 2021 is anticipated through the incorporation of Air Source Heat Pumps and a 55kWp Photovoltaic (PV) array, which will be located on the roof of the extra care home. The sustainability features used will allow for a 1.14 tonnes reduction in annual CO_2 emissions. The energy and carbon savings are to be achieved through passive design, energy efficient measures incorporating design features such as energy efficient lighting, submetering of relevant areas, upgrading of 'U' values and occupancy sensing in relative areas, as well as the incorporation of PV array and Air Source Heat Pumps.

To reduce the energy demand of the development (both the extra care home and C3 dwellings) as well as help to conserve water resources within the local area, it is anticipated that the fit-out works will provide for sanitary fittings which will be water efficient through measures such as dual flush toilets and low flow taps.

This report includes annualised baseline calculations which predict the likely energy consumption and associated CO_2 emissions for the extra care home. The total baseline energy and carbon, taking into account regulated energy demands are:

- *264,862.78 kWh/annum*
- *37.64 Tonnes CO_2/annum*

After the inclusion of Passive, ASHP and additional PV measures, the total energy consumption and carbon emissions for the extra care home, taking into account regulated energy demands have further reduced to:

- *255,773.98 kWh/annum*
- *36.51 Tonnes CO_2/annum*

The total energy and carbon emissions estimated for the C3 residential dwellings element of the Proposed Development based on the sample model, taking into account regulated energy demands are:

- *15,541 kWh/annum*
- *4.82 Tonnes CO_2/annum*

2 INTRODUCTION

This report considers the energy and sustainability measures identified within the hybrid planning application comprising (i) in FULL, the construction of an 82 no. apartment affordable extra care home (class C2) with associated bistro, open space, landscaping, car/cycle parking, service infrastructure (drainage, highway, lighting), engineering operations, creation of new vehicular access and re-instatement of existing access to footpath, and (ii) in OUTLINE, the construction of a maximum of 14 market residential dwellings (class C3), on land known as Parcel R, Kingsmere, Bicester.

Government policies now require significant energy reductions from proposed buildings. Building a greener future sets a planned trajectory outlined via Part L 2021 of the Building Regulations. These commitments have been the key focus point in addressing policies and strategies to reduce energy use and carbon emissions through energy efficiency and low or zero carbon technologies (LZC).

Whilst targeting compliance with all relevant policies applicable to the development proposals as a whole, and bearing in mind site layout constraints, because of the nature of the hybrid application, the recommended strategy identifies specific energy measures and appropriate technologies for the extra care element of the scheme but can only identify generic principles for the C3 residential element.

Notwithstanding this, it is important to note that the (i) condition 31 of the existing outline planning permission (13/00847/OUT) covering Parcel R, requires that the development achieves a 19% carbon reduction over the 2013 Building Regulations (2013 Part L) and a potable water consumption of 110 litres per person per day in accordance with the higher water efficiency standard required by Part G of the aforementioned Regulations, and (ii) the approved Kingsmere Design Code includes a number of sustainability principles that will need to be borne in mind as part of this Energy and Sustainability Strategy for the Extra Care and C3 dwellings development proposal.

Figure 2.1: Proposed Site Plan

3 DRIVERS OF SUSTAINABILITY

The term Sustainable Development, is defined by the Department for the Environment, Food and Rural Affairs as:

'… making sure people throughout the world can satisfy their basic needs now, while making sure that future generations can also look forward to the same quality of life. It recognises that the "three pillars" – economy, society and environment – are interconnected.'

United Nations Framework Convention on Climate Change

To achieve this objective of sustainable development in any industry, sector strict regulations have been put in place that have filtered down through EU Directives from the European Climate Change Programme, to National UK Acts such as the Climate Change Act 2008, to Local Policy in the form of Core Strategies. However, there are larger drivers behind the concept of sustainable development.

Kyoto Protocol

In 1997, the Kyoto Protocol was adopted as part of the United Nations Framework Convention on Climate Change, to which the UK is a signatory. The key feature of the protocol was the binding targets that were set for industrialised countries to reduce their Green House Gas emissions by 12.5% below 1990 levels by 2008-2012.

Cancun Agreements

Since the initial adoption of the Kyoto Protocol, extensive research has been put forward as to the causes and markers of climate change from the Intergovernmental Panel on Climate Change, which has led to new targets and objectives being made. In 2012, the international community met to discuss new directions for responding to climate change by adopting new agreements. The key objectives of the Cancun Agreements are:

- *Establish clear objectives for reducing human-generated greenhouse gas emissions over time to keep the global average temperature rise below two degrees;*
- *Mobilise the development and transfer of clean technology to boost efforts to address climate change, getting it to the right place at the right time and for the best effect;*
- *Assist the particularly vulnerable people in the world to adapt to the inevitable impacts of climate change;*
- *Protect the world's forests, which are a major repository of carbon;*
- *Establish effective institutions and systems which will ensure these objectives are implemented successfully.*

COP21: Paris Global Climate Agreement

In December 2015, a global climate deal was reached in a summit involving all of the world's nations. The targets of this aimed principally to curb the dangerous levels of climate change and drive an increase low-carbon infrastructure investment. Numerous organisations and corporations also committed to helping create a greener future by making their own pledges through the course of the summit. The key elements of the agreement are:

- *To keep global temperatures "well below" 2.0°C above pre-industrial times and "endeavour to limit" them even more, to 1.5C*
- *To limit the amount of greenhouse gases emitted by human activity to the same levels that trees, soil and oceans can absorb naturally, beginning at some point between 2050 and 2100*
- *To review each country's contribution to cutting emissions every five years so they scale up to the challenge*

- *For rich countries to help poorer nations by providing "climate finance" to adapt to climate change and switch to renewable energy.*

BRE's COP21 Climate Pledge (December 2015)

"We commit to continue to drive best practice and carbon reduction, as we have through the use of BREEAM for the past 25 years. By reaching over 9,000 BREEAM rated buildings we predict emissions savings will be in excess of 900,000 tonnes of CO_2, compared to regulatory minimum performance requirements, by 2020. Saving not only carbon, but bringing wider benefits to both the owner and occupiers."

4 NATIONAL POLICY

National Planning Policy

An effective planning system is required to contribute to achieving sustainable development. The ***National Planning Policy Framework*** (NPPF), 2021, outlines what the government deems as sustainable development in England.

Sustainable development is defined as having the following three overarching objectives which are interdependent and need to be pursued in mutually supportive ways: an economic objective, a social objective, and an environmental objective.

1. Economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
2. Social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
3. Environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

The above objectives can be described as an energy trilemma, this is demonstrated in Figure 4.1 below. Each dimension is dependent on each other and sustainable development proposals should adhere to each role. This energy statement shall ensure the Extra Care Home is one that contributes economically, socially and environmentally in accordance with the NPPF, 2021.

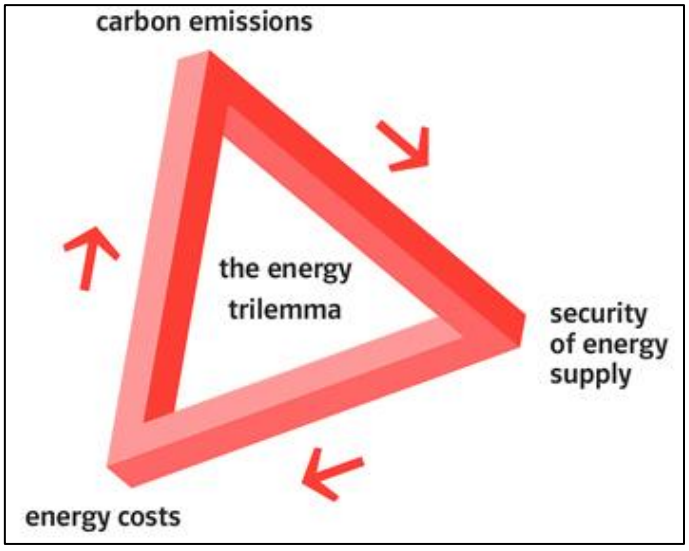

Figure 4.1 The Energy Trilemma

The principles of the NPPF have been followed to provide an energy strategy which reduces energy use and carbon emissions, in line with best practice. This will provide a balanced scheme which focuses on optimal use of non-

renewable resources (energy efficiency measures) whilst providing a renewable energy strategy best suited to the sites and their building uses. Below are some key extracts relevant to the development from Chapter fourteen 'Meeting the Challenge of Climate Change, Flooding & Coastal Change':

Paragraph 153

Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

Paragraph 154

New development should be planned for in ways that:

a. avoid increased vulnerability to the range of impacts arising from climate change. When 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.

Paragraph 155

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 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; and

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

Paragraph 156

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.

Paragraph 157

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.

Paragraph 158

When determining planning applications for renewable and low carbon development, local planning authorities should:

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.

5 LOCAL POLICY

CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015

Local planning policy and guidance is provided by the Development Plan consisting of the Adopted Cherwell Local Plan 2011-2031 (Part 1), July 2015. The following policies are of particular relevance.

Policy ESD 3: Sustainable Construction

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.

Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day. All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant.

The demonstration of the achievement of this standard should be set out in the Energy Statement. The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

Policy SLE 4: Improved Transport and Connections

All development where reasonable to do so, should facilitate the use of sustainable modes of transport to make the fullest possible use of public transport, walking and cycling. Encouragement will be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. Development which is not suitable for the roads that serve the development and which have a severe traffic impact will not be supported.

Policy ESD 5: Renewable Energy

Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas
- Visual impacts on local landscapes
- The historic environment including designated and non-designated assets and their settings
- The Green Belt, particularly visual impacts on openness
- Aviation activities
- Highways and access issues
- Residential amenity.

Policy ESD 3: Sustainable Construction

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- Minimising both energy demands and energy loss
- Maximising passive solar lighting and natural ventilation
- Maximising resource efficiency
- Incorporating the use of recycled and energy efficient materials
- Incorporating the use of locally sourced building materials

- Reducing waste and pollution and making adequate provision for the recycling of waste
- Making use of sustainable drainage methods
- Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and
- Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.

6 ENERGY USAGE AND CARBON EMISSIONS

Government policies require significant energy reductions from buildings. Building a Greener Future sets a planned trajectory (delivered via Part L of the building regulations 2021) with an aspiration for all non-domestic new buildings to be zero carbon by 2020. The Climate Change Act (Nov 2008) sets the UK targets of; CO_2 reduction of 26% by 2020 and CO_2 reduction of 80% by 2050.

6.1 POLICY REVIEW

National Planning Policy Framework (2021)

Section 14 – Meeting the Challenge of Climate Change, Flooding and Coastal Change

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 suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b. consider identifying suitable areas for renewable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c. identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for collocating potential heat customers and suppliers.

CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015

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Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

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- Visual impacts on local landscapes
- The historic environment including designated and non-designated assets and their settings
- The Green Belt, particularly visual impacts on openness
- Aviation activities
- Highways and access issues
- Residential amenity.

6.2 DEVELOPEMENT SUSTAINABILITY FEATURES

Energy modelling has been undertaken which adopts the following hierarchy for reducing carbon emissions for the development; Be Lean, Be Clean, Be Green.

The total baseline energy and carbon emissions for the Extra care home (built to Part L2 2021), taking into account regulated energy demands are:

- *264,862.78 kWh/annum*
- *37.64 Tonnes CO_2/annum*

The total baseline energy and carbon emissions for the Dwellings (Class 3, built to Part L1 2021), taking into account regulated energy demands are:

- ***15,541.18 kWh/annum***
- ***4.82 Tonnes CO_2/annum***

The primary energy demands of the development will be:

- *Lighting;*
- *General power;*
- *Heating and ventilation;*
- *Hot water supply.*

Unregulated energy use is not covered by existing regulations and includes energy consumed by the occupants through activities and appliances; in this case it would typically be small power usage (appliances, computers etc.). The following unregulated energy use for the development as a whole (extra care and the C3 dwellings) was calculated as:

- ***140,201.89 kWh/annum***
- ***21.23 Tonnes CO_2/annum***

Be Lean

To provide energy and carbon saving further to a base Part L (2021) build; targeting compliance with local and national policies, the following passive design and energy efficiency measures are recommended.

The following 'U' values shall be incorporated within the Extra Care Home, in accordance with Part L2 (2021):

- *External Walls - U = 0.26 W/m².K;*
- *Exposed Floor - U = 0.16 W/m².K;*
- *Exposed Roofs - U = 0.18 W/m².K;*
- *Glazing - U = 0.82 W/m².K;*
- *Entrance Doors - U = 1.3 W/m².K;*
- *Air Permeability - 5 m^3/hr/m^2@ 50 Pa.*

The following 'U' values shall be incorporated within dwellings (Class C3) in accordance with Part L1 (2021) to provide energy and carbon savings:

- *External Walls - U = 0.26 W/m².K;*
- *Exposed Floor - U = 0.16 W/m².K;*
- *Exposed Roofs - U = 0.16 W/m².K;*
- *Glazing - U = 1.6 W/m².K;*
- *Air Permeability - 5 m^3/hr/m^2@ 50 Pa.*

Together with the above passive design measures, the proposed energy strategy includes the following energy efficiency measures throughout the development:

- *The provision of energy efficient lighting (PIR controls and occupancy sensing in relevant areas);*
- *The provision of zonal thermal and lighting controls;*

- *The provision of variable speed pumps and fans;*
- *The enhancement of pipework and ductwork, thermal insulation;*
- *Specific Fan Powers improved beyond Part L requirements.*

Be Clean

It was investigated to establish if there were any existing decentralised energy networks near the proposed site using the Department of Energy and Climate Change CHP database. It has been concluded that there are no suitable existing nearby CHP systems or source of waste heat or power to which a connection may be possible. The Kingsmere development as a whole does not incorporate CHP systems, because it is not considered (I) economically viable to install CHP for just the development of Parcel R, and (ii) there is insufficient space available for such an installation

In order to economically justify installing a CHP unit on any site, a minimum requirement of 4,000 hours running time per year is necessary. Based on the building types being Care Home and dwellings (Class C3), there is a low heating and hot water demand for a continuous period over the year, typically a maximum of circa 2,117 hours is anticipated.

Months	Load per Day (hrs)	Load per week (hrs)	Load per month (hrs)	Load for 6 months (hrs)	
April to Sept	2	14	58.8	352.8	
October to March	10	70	294	1,764.0	
		Total approximate Load for a year		2,116.8	hours
		Minimum required hours		4,000.0	hours

Table 6.1 CHP Analysis

Be Green

Further means of reducing energy and carbon emissions for the development have been explored, through the use of renewable technologies. The following, Table 6.2, reviews the primary options for generation of on-site renewable/ Low or Zero Carbon (LZC) energy and considers their suitability for use on the extra care home and dwellings (Class C3).

Renewable Technology Feasibility Assessment		Viable?
Bio Fuel Boilers 	Bio-fuel boilers are specifically designed to burn solid biomass or liquid bio-fuel in order to heat water, or raise steam. This can then be used for space heating or Domestic Hot Water (DHW) supply. Bio-fuel boilers could potentially provide the annual space heating and DHW demand for the Unit, however they are not recommended for this development for the following reasons:- 1. Biomass boilers generate increased Oxides of Nitrogen (NOx) and particulates (PM10) which would affect air quality. 2. The storage requirements for the biofuel would require a large plant space, with an auxiliary storage facility to allow for a two week period where delivery of fuel might not be available.	No

Renewable Technology Feasibility Assessment		Viable?
3. Land Use: Large volumes of storage is required for fuel at ground level or basement level with sufficient vehicular access for fuel delivered. 4. Noise: Noise levels are generated by the operation of the bio-fuel boiler and associated deliveries of the bio-fuel. The plant room enclosure will have to be attenuated to acceptable levels imposed by planning and Acoustician recommendations.		
Wind Turbines 	Wind turbines convert the kinetic energy in the wind into mechanical energy which is then converted into electricity. Wind turbines can provide electrical power either directly to a load or via a battery system. The use of wind turbines is not recommended for this development for the following reasons:- 1. Wind turbines, of a size necessary to make a contribution to the Unit renewable energy requirements are considered inappropriate on spatial, planning, aesthetic and noise grounds. Noise pollution from commercial wind turbines can be quiet significant within a few hundred metres. 2. The site is not ideal; an ideal site is a hill with a flat, clear exposure. It should be free from strong turbulence and obstructions like large trees, houses or other buildings. As the development is surrounded by industrial buildings, turbulent wind flow will be experienced across the site which is not ideal for wind turbine installations. 3. The financial viability of a small scale installation on the site would be compromised by the operational efficiency of the unit (circa 30%). 4. Wind turbines, can cause electrical interference within a 2km radius. 5. Finally, the main disadvantage is down to the winds unreliability factor. The wind strength is often too low in many areas, where this site is located the wind speed is 4.9 m/s at 10m, as can be seen in the wind map presented in Appendix C, in order for the wind turbines to be feasible, wind speeds of greater than 5.5m/s are required. 6. There would be an adverse visual impact on the site which will be dependent on the height at which the wind turbines are located. 7. Noise levels are generated by the rotating blades; these noise levels will vary dependent on wind velocity and will need to be in acceptable levels imposed by planning and Acoustician recommendations.	No

Renewable Technology Feasibility Assessment		Viable?
Ground Source Heat Pumps 	Space cooling and heating can be provided by circulating water cooled or heated directly by the ground or via subterranean water. Ground water cooling and heating through the use of aquifers makes use of the relatively stable ground/ water temperature which is available at a temperature range of 10 – 14°C. The use of Ground Source Heat Pumps is not recommended for this development for the following reasons:- 1. Cost of boreholes may be prohibitive (subject to site geological conditions). 2. Favourable ground conditions may not exist. 3. Problems can arise with boreholes silting up (open-loop). 4. Changes in local ground conditions could affect water quality and the amount that can be extracted (open-loop). 5. This installation would require Environmental Agency approval. Ground and Hydrology analysis would be required to investigate if favourable conditions exist.	No
Solar Water Heating 	Solar Water Heating systems use radiant energy from the sun to heat water. Systems comprise of a roof mounted heat collector piped to a coil located within a hot water storage cylinder. The use of Solar Panels are not recommended for this development for the following reasons: 1. The roof area of both the extra care and C3 dwellings are more suited to provision of PV panels. 2. Noise levels are generated by pumps at roof level, these are insignificant so should pose no issues	No
Air Source Heat Pumps 	An Air Source Heat Pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15°C and typically draws approximately a quarter to a third of the electricity of a standard resistance heater for the same amount of heating, reducing utility bills. This typical efficiency compares to 70-95% for a fossil-fuel powered boiler. Heat Pumps are proposed for use within the proposed development to provide the heating requirements. The benefits of ASHP are as follows: 1. They are ideally suited to serve the office areas within the development during periods when they may require heating or cooling. The times when cooling is required may differ for different space depending on their use, occupancy period and levels, the operation of individual air source heat pumps would allow individual control and can be efficiently accommodated within the building design; 2. The heat pump unit can be configured to provide internal heat reclaim from dissimilar environmental zones, reducing energy consumption and carbon emissions.	Yes

Renewable Technology Feasibility Assessment		Viable?
	3. Air Source Heat Pumps can be installed on ground mounted, roof mounted or wall mounted frames. When installing Air Source Heat Pumps there are various factors to consider; Heat Pumps should be positioned to provide shelter from high winds which can reduce efficiency by causing defrost problems.	
Noise Noise levels are generated by fans, and compressors causing vibrations. The noise levels are dependent on manufacturer and vary accordingly, these will need to be in acceptable levels imposed by planning and Acousticians recommendations.		
Photovoltaics 	Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases silicon. A **55kWp** photovoltaic array is proposed for the extra care home. They have the following advantages for use on this development: 1. Photovoltaic panels can be situated at roof level, east facing, to provide a source of renewable energy. 2. Panels can be grid connected to sell surplus electricity produced. 3. Low maintenance issues.	**Yes**
Land Use There are no land issues or adverse visual impacts as the photovoltaic panels are roof mounted. Noise There are no noise issues generated by this technology.		

Table 6.2 Renewable Technology Feasibility Assessment

6.3 SUMMARY

By applying the above passive design measures, the savings generated for the Extra Care Home and Dwellings Class C3 are displayed in Table 6.3 – 6.4, and Figures 6.1 – 6.2. The full calculations can be seen in Appendix C.

	Carbon Dioxide Emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	37.64	18.82
After Passive + PV + ASHP Measures	36.51	It is anticipated that a circa 3% saving can be achieved through the use of energy efficient fittings, for example A or A+ appliances. This would reduce the unregulated carbon emissions to 18.25:
Total Cumulative Saving	**1.14 (3.02%)**	**0.57 (3.02%)**

Table 6.3 Carbon Dioxide Emissions for Extra Care Home

	Carbon Dioxide Emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	4.82	2.41
After Passive Savings	4.63	It is anticipated that a circa 3% saving can be achieved through the use of energy efficient fittings. This would reduce the unregulated carbon emissions to 2.33
Total Cumulative Saving	**0.19 (3.94%)**	**0.08 (3.31%)**

Table 6.4 Carbon Dioxide Emissions for Dwellings C3

Extra Care Home PV Requirement
55 kWp system – circa 149 panels – Circa 252 m^2

Table 6.5 Extra Care Home PV Requirement

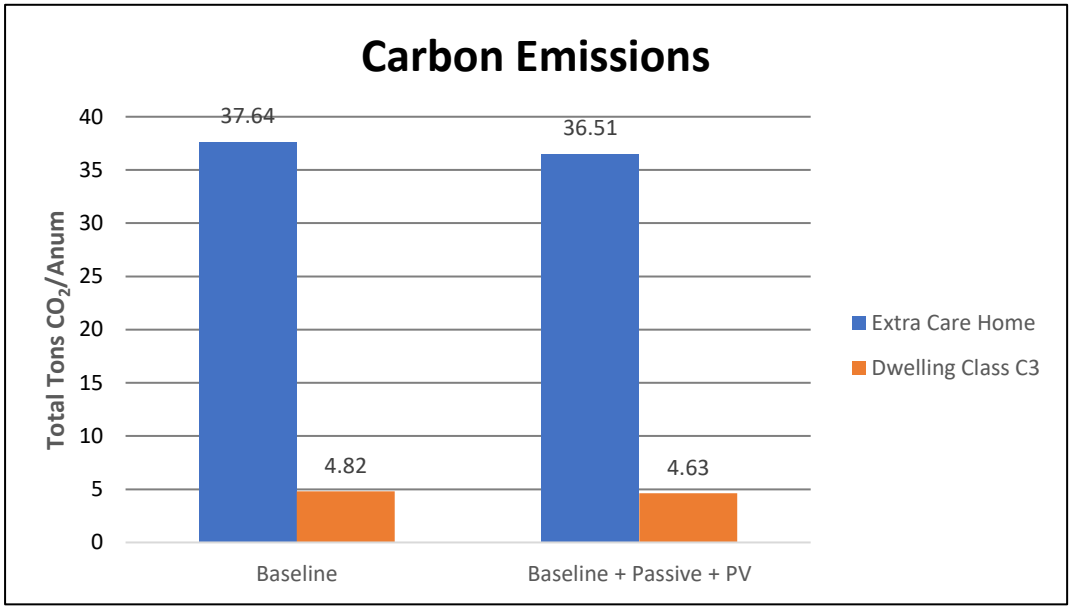

Figure 6.1 Site Carbon Emissions

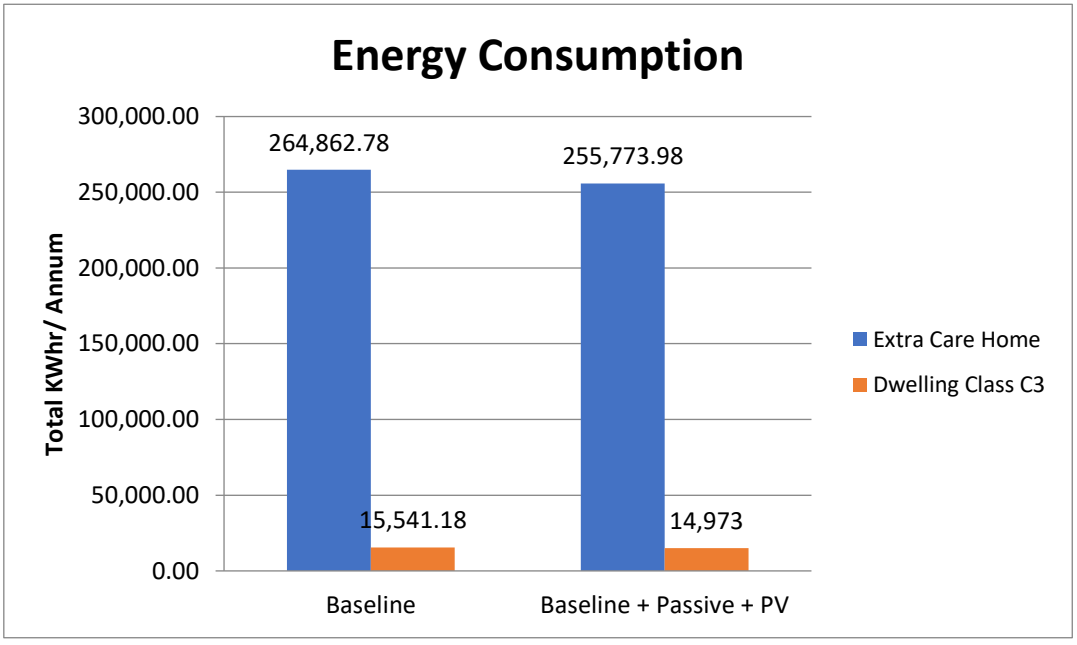

Figure 6.2 Site Energy Consumption

The current energy strategy therefore recommended and to be committed to is for the Extra Care only to include the use of Air Source Heat Pumps and 55 kWp of PV. The C3 dwellings element of the development is simply to maintain the sustainability principles adopted under the 13/00847/OUT and approved Kingsmere Design Code.

The recommended strategy takes into consideration the most appropriate technologies available for the location and proposed development and provides a scheme that is commercially viable whilst being in compliance with national and local policies. Furthermore, bearing in mind the requirement within condition 31 of the outline

permission to achieve a minimum 19% betterment over the 2013 Regulations, the adoption of the aforementioned strategy would achieve:

i. 28.73% Carbon savings over the Part L 2013 for the whole site (Extra Care and C3 dwellings)
ii. 29.6% Carbon savings over the Part L 2013 for the Extra Care only

The energy strategy for the Extra Care Home is shown in table 6.5 below.

Development Energy Strategy	
Heating	Heat Pumps for the Bedroom, Lounge, Kitchen, and communal spaces. Whereas electric panel radiators for the corridors of the development
Hot water (DHW)	Heat Pump for the hot water
Ventilation	Mechanical Extract to Bathrooms and Kitchens, Mechanical supply to all Bedrooms and Lounges all provided by MVHR
Lighting	Energy efficient LED lighting where applicable

Table 6.6 Proposed Energy Strategy for the Extra Care Home

The following energy strategy will be incorporated into the dwellings Class C3 as shown in table 6.6

Development Energy Strategy	
Heating	All electric within Houses
Hot water (DHW)	All electric within Houses
Ventilation	Extract system provided within WC's and Kitchen
Lighting	Energy efficient LED lighting where applicable

Table 6.7 Proposed Energy Strategy for Dwellings Class C3

7 WATER CONSUMPTION

The ever-increasing impacts of climate change are continuously inflating demand for water, as well as increasing a need for awareness towards water usage. The UK is already under a large amount of pressure regarding water resources. To contribute towards mitigating this issue, the proposed development will consider various means of being economical with water consumption.

7.1 POLICY REVIEW

National Planning Policy Framework (2021)

Section 15 - Conserving and enhancing the natural environment

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e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

7.2 DEVELOPMENT SUSTAINABILITY FEATURES

In order to ensure the reduction and management of water consumption within both the Extra Care home and dwellings (Class C3), it is anticipated that various measures shall be undertaken, and specific features installed during the fit out works to minimise the building's portable water consumption.

It is anticipated that improvements in the consumption of portable water will be achieved through the specification of water efficient components within sanitary areas during the fit out works. Such features include the specification of low flow taps as well as dual flush toilets with reduced flush volumes.

7.3 SUMMARY

To ensure the sustainability of the development it is anticipated that water efficient fixtures will be incorporated into the design, such as low flow taps and dual flush toilets with reduced effective flush volumes.

To be further sustainable, it is anticipated that pulsed water meters will be installed on the mains water supply, to effectively monitor water consumption. The inclusion of the above sustainability features allows for the development to be deemed sustainable with regard to water consumption.

8 TRANSPORT

Transport produces a large proportion of the country's greenhouse gas emissions, something which government at both national and local level are striving to combat, especially through planning frameworks for new developments. Solutions to transport issues are to be incorporated into the design of the development.

8.1 POLICY REVIEW

National Planning Policy Framework (2021)

Section 9 – Promoting Sustainable Transport

Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

a) the potential impacts of development on transport networks can be addressed;
b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
c) opportunities to promote walking, cycling and public transport use are identified and pursued;

CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015

Policy SLE 4: Improved Transport and Connections

All development where reasonable to do so, should facilitate the use of sustainable modes of transport to make the fullest possible use of public transport, walking and cycling. Encouragement will be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. Development which is not suitable for the roads that serve the development and which have a severe traffic impact will not be supported.

8.2 DEVELOPMENT SUSTAINABILITY FEATURES

The proposed development is located in the west of Bicester, Oxfordshire. The development is located within 5mins walking distance from the nearest bus stop (Ludlow Road) and North Bicester train station is 1.8 miles away from the development as shown in figure 8.1.

The proposed development is in close proximity to the national cycle network route 51 as shown in figure 8.2. The wider Kingsmere phase 2 development has been planned comprehensively to include a hierarchy of roads, streets, bus routes, pedestrian and cycle links which the proposed development at Parcel R will feed into. There is a high level of integration and connectivity throughout Kingsmere.

A key pedestrian cycle link is the greenway immediately adjacent to the site to the north, and pedestrian links are provided from that directly into Parcel R. The extra care home and the C3 dwellings all include suitable safe, secure and accessible cycle storage to enable and encourage cycling.

Travel Plans for both the extra care and the C3 dwellings have been prepared to try and reduce the reliance on the private car and to encourage residents to use sustainable modes of transport.

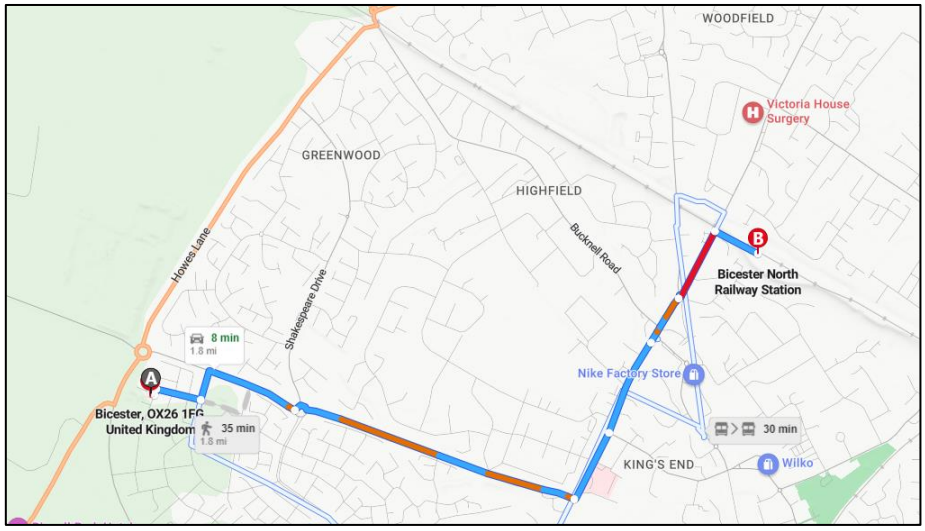

Figure 8.1 Nearest Train Station

Figure 8.2 National Cycle Network

8.3 SUMMARY

The above provisions aim to make the proposed development easier to access for all building users, as well as offering a sustainable means of commuting rather than using a private vehicle.

The site is situated by a 5-minute walk from the nearest bus stop, this allows for a fair provision of public transport.

9 CONSTRUCTION SITE MANAGEMENT

The requirement for new materials needs to be minimised, by re-using existing buildings and materials where possible and providing a Site Waste Management Plan for all construction sites. This responsibility lies with the contractor and needs to be clarified at an early design stage. It is becoming a greater requirement now to construct buildings that are flexible and can be re-used.

9.1 POLICY REVIEW

National Planning Policy Framework (2021)

Local plans should set out strategic priorities for the area; this should include strategic policies to deliver the provision of infrastructure for waste management, water supply and wastewater.

CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015

Policy ESD 3: Sustainable Construction

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- Minimising both energy demands and energy loss
- Maximising passive solar lighting and natural ventilation
- Maximising resource efficiency
- Incorporating the use of recycled and energy efficient materials
- Incorporating the use of locally sourced building materials
- Reducing waste and pollution and making adequate provision for the recycling of waste
- Making use of sustainable drainage methods
- Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and
- Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.

9.2 DEVELOPMENT SUSTAINABILITY FEATURES

In order to comply with national and local policy, it is anticipated that certain measures will be put into place for this development, such as a Site Waste Management Plan which monitors the site energy and water consumption and ensures that that site timber is legally and responsibly sourced in accordance with the UK Government's Timber Procurement Policy. Further to this the Site Waste Management Plan should also monitor the resource efficiency of the development construction works as well as the percentage of non-hazardous materials, excavation and construction, which have been diverted from landfill.

It is expected that the main contractor will also set targets and monitor site consumption data for water consumption, energy consumption as well as fuel from deliveries and collection of waste and materials to and from site. Monitoring of such actions can encourage contractors to become more resource efficient to meet given targets.

Additionally, it is expected the main contractor will comply with best standards as set out in the Considerate Constructors Scheme, achieving a score which is considered as exceeding compliance with the criteria of the scheme.

To ensure the sustainable construction of the development, the project will consider the concept of the waste hierarchy as seen in Figure 9.1 below. The waste hierarchy recognises the need for waste to be considered for a variety of waste streams before being sent to land fill as a last resort. The hierarchy is as follows:

- *Waste minimisation;*
- *Reusing or waste or up cycling;*
- *Recycling of all applicable materials;*
- *Recovery of energy from waste (anaerobic digestion plants);*
- *Waste is sent to landfill.*

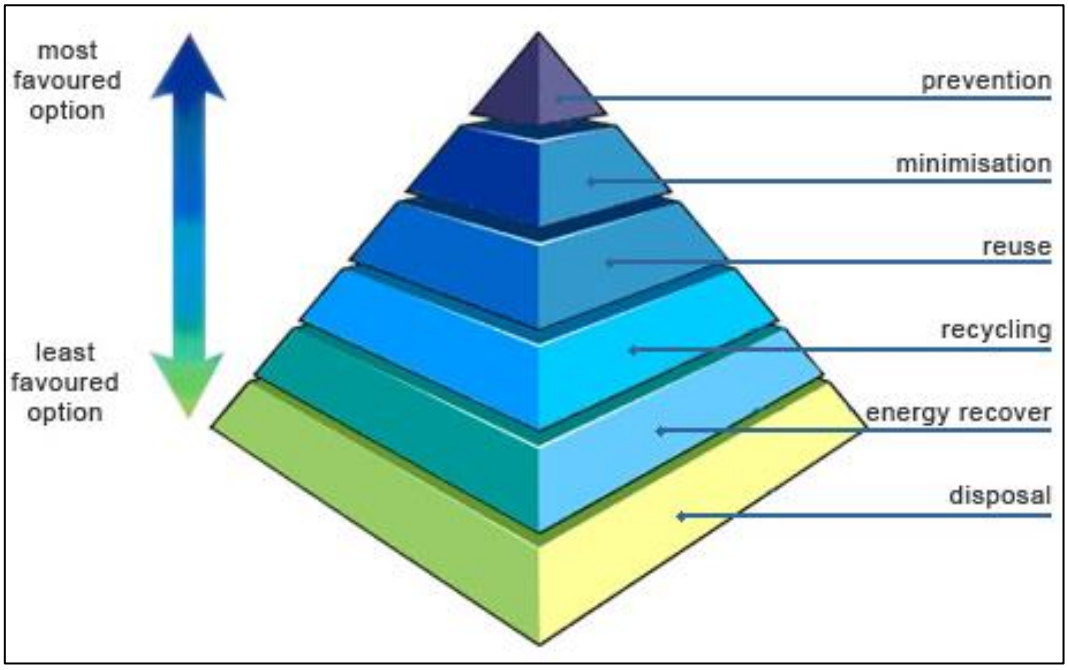

Figure 9.1 Waste Hierarchy Diagram

9.3 SUMMARY

It is anticipated that this development will produce a Site Waste Management Plan, highlighting key refurbishment materials and the correct waste streams for recycling these materials.

The development should adhere to a Considerate Constructors Scheme, achieving a targeted score which exceeds 'compliance' with the criteria of the scheme. As a result of these measures, the development may be deemed sustainable as regards to construction site management.

10 SUSTAINABLE DESIGN

Good urban design is essential in providing a varied and sustainable environment, which can facilitate opportunities for positive contributions within communities. As part of sustainable design for developments, it is essential that suitable design principles are followed to maximise opportunities for energy reduction through design as well as ensuring buildings follow or enhance the character of an area. Developments should also give further consideration to the level of security and comfort that is provided for future building users, including thermal and visual comfort, inclusivity and safe access.

10.1 POLICY REVIEW

National Planning Policy Framework (2021)

Section 12- Achieving Well-Designed Places

The creation of high-quality buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.

CHERWELL LOCAL PLAN REVIEW-ADOPTED JULY 2015

Policy ESD 3: Sustainable Construction

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.

Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement.

The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

10.2 DEVELOPMENT SUSTAINABILITY FEATURES

The Extra Care Home and dwellings (Class C3) shall include a variety of features which are regarded as having a good sustainable design. It is anticipated that any external lighting specified will be designed to reduce unnecessary light pollution during night time hours. This can be achieved through the use of time switches or daylight sensors which switch off lighting between 2300hrs and 0700hrs as well as cut off luminaires which reduce light spill.

To ensure the risk of potential overheating is minimised building modelling of the unit has confirmed that no occupied space is at risk from excessive solar gains; this being achieved through use of glazing with a low shading coefficient. Additionally, to ensure that overheating will not occur during summer months and the building is suitably insulated as well as allowing for adaptation due to the effects of climate change, it is anticipated that the development will use building fabrics with efficient 'U' values which complies with the minimum requirements of Part L2 (2021), as seen within Table 10.1. Further to this the energy efficiency measures discussed within Section

6.0 will be incorporated into the design of the development. It is anticipated that such measures will lower the building's energy requirements making its operation feasible and practical for years to come.

Element	Part L2 Requirement	U Value Specified
Wall	0.26	0.26
Roof	0.18	0.18
Floor	0.18	0.16
Glazing	1.6	0.82

Table 10.1 U Values For the Extra Care Home

To provide a fully sustainable development it is also anticipated that the materials used for the following main elements of the development shall be rated under the Green Guide to Specification targeting ratings between A+ and D:

- *External walls;*
- *Ground floor;*
- *Roof;*
- *Windows.*

To provide a development which remains sustainable during its operation phase, it is anticipated that space will be provided for the provision of waste storage facilities with additional space of recyclable waste streams. This is to enable building users to sort waste before collection and minimise the quantity of waste that may end up at landfill.

10.3 SUMMARY

In order to comply with national and local policies, the development shall strive to provide both to building users and the local community a building of sustainable design.

Measures should be taken to ensure the thermal comfort of future building users, through efforts such as ensuring no occupied areas will result in excessive solar gains and in turn over heating.

External lighting except safety and security lighting should be designed to be switched off automatically through the use of timers of day light sensors as well as the specification of cut off luminaires to reduce any potential light spill on to neighbouring properties as covered in the lighting assessment.

The above design features allow for the proposed development to be of sustainable design.

Appendix A – CHP Search

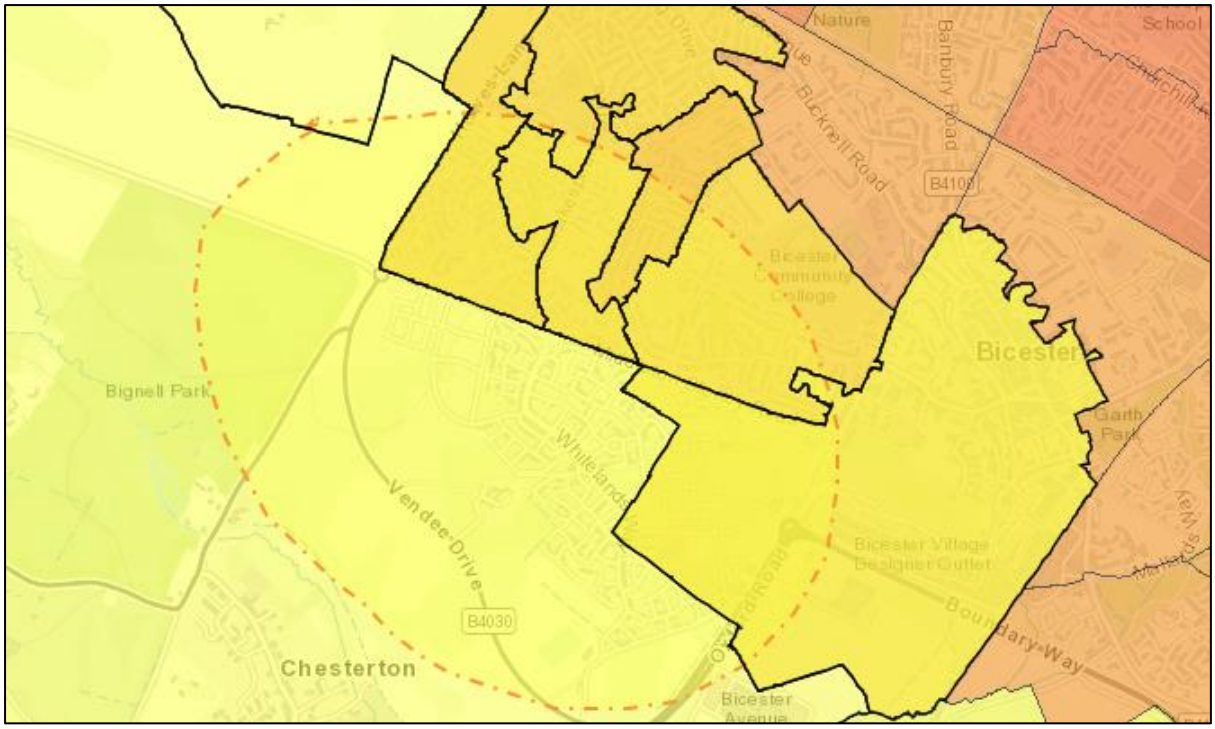

Figure A.1: CHP availability Search Area

Sector Name	Share	Total MWh
Communications and Transport	0.58%	411 MWh
Commercial Offices	0.47%	332 MWh
Domestic	92.81%	65,155 MWh
Education	1.21%	851 MWh
Government Buildings	1.22%	859 MWh
Hotels	0.43%	301 MWh
Large Industrial	0%	0 MWh
Health	0.11%	81 MWh
Other	0.09%	63 MWh
Small Industrial	1.5%	1,056 MWh
Prisons	0%	0 MWh
Retail	1.14%	803 MWh
Sport and Leisure	0.1%	70 MWh
Warehouses	0.31%	221 MWh
District Heating	0%	0 MWh
Total heat load in Area		**70,203 MWh**

Figure A.2: CHP Heat Load Distribution

Appendix B – Wind Map

Chart C.1 Wind Velocity Chart for Parcel R, Kingsmere

Appendix C – Energy Calculations

1. Extra Care Home Results

Baseline

Baseline											
Total Area [m2]	Heating [KWh/m2]	Cooling [KWh/m2]	Auxliary [KWh/m2]	Lighting [KWh/m2]	Hot Water [KWh/m2]	Total [KWh/m2]	Total KWh/Annum	kgCO2/m²/ Annum	kgCO2/ Annum	Total Tonns CO2/Annum	Energy By PV [KWh/m2]
7,574.00	4.55	0.00	10.78	9.77	14.40	39.50	264,862.78	4.97	37,642.78	37.64	4.53

Baseline + Passive + PV + ASHP

Baseline + Passive + ASHP + PV											
Total Area [m2]	Heating [KWh/m2]	Cooling [KWh/m2]	Auxliary [KWh/m2]	Lighting [KWh/m2]	Hot Water [KWh/m2]	Total [KWh/m2]	Total KWh/Annum	kgCO2/m²/ Annum	kgCO2/ Annum	Total Tonns CO2/Annum	Energy By PV [KWh/m2]
7,574.00	4.55	0.00	10.78	9.77	14.40	39.50	255,773.98	4.82	36,506.68	36.51	5.73

Savings

Energy Savings Passive + ASHP + PV (kWh/annum)	*Carbon Savings Passive + ASHP + PV (Tonn CO2/Annum)*	*%Energy Savings Passive + ASHP + PV (kWh/annum)*	*%Carbon Savings Passive + ASHP + PV (Tonn CO2/Annum)*
9,088.80	**1.14**	**3.43**	**3.02**

2. Dwellings Class C3 Results

Baseline:

kWh/annum Baseline											
Quantity	Total Area m²	DER	TER	Heating	Cooling	Auxillary	Lighting	Hot Water	Total Kwh/Annum	Carbon kg Co2 / Annum	Tonnes
9	864	3.71	12.41	1657.44		89.44	199.51	2962.45	4908.84	3207.86	3.21
2	144	4.59	13.95	3166.94		89.44	244.83	3108.86	6610.06	660.44	0.66
2	320	2.97	9.00	1028.99		89.44	162.40	2741.45	4022.27	951.81	0.95
13	1328								15,541.18	4,820.11	4.82

Passive Savings:

Quantity	Total Area m²	DER	TER	Heating	Cooling	Auxillary	Lighting	Hot Water	Total Kwh/Annum	Carbon kg Co2 / Annum	Tonnes
9	864	3.57	11.93	1593.69		86	191.84	2848.51	4720.04	3084.48	3.08
2	144	4.41	13.41	3045.13		86	235.41	2989.29	6355.83	635.04	0.64
2	320	2.86	8.65	989.41		86	156.15	2636.01	3867.57	915.20	0.92
13	1328								14,943.44	4,634.72	4.63

Appendix D – Sample BRUKL Report for the Extra Care Home

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Extra Care Home

As designed

Date: Fri Sep 15 15:54:00 2023

Administrative information

Building Details

Address: Extra Care Home, Bicester,

Certifier details

Name:

Telephone number: 01344 628821

Address: Cudd Bentley, Ashurst Manor, Sunninghill, SL5 7DD

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.d.0

Interface to calculation engine: Energy Simulator

Interface to calculation engine version: 10.10.0.199

BRUKL compliance module version: v6.1.d.0

Foundation area [m^2]: 1703

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

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	4.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	4.82	
Target primary energy rate (TPER), kWh/m^2.annum	53.51	
Building primary energy rate (BPER), kWh/m^2.annum	51.6	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.26	0.26	Wall 1
Floors	0.18	0.16	0.18	Internal Ceiling 1
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.18	0.18	Exposed Roof 1
Windows** and roof windows	1.6	0.82	0.82	Window 1
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.3	1.3	Door 1 (Personnel Door)
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m^2K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m^2K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m^2K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

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

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

Building services

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

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

1- Bed

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- Lobby

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

3- Office

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- Lounge

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

5- Corridors

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Default DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2.8	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Zone-level mechanical ventilation, exhaust, and terminal units

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

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
FF.A1.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A1.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A10.(2)	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A10.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A11.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A12.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A13.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A14.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A15.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A16.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A17.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A18.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A19.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A2.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A2.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A20.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A21.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A22.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A22.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A23.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A24.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A25.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A25.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A3.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A4.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A5.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A6.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A6.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A6.WCS	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A7.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
FF.A8.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A8.B(2)	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A9.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A1.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A10.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A11.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A12.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A12.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A13.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A14.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A15.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A16.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A16.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A2.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A3.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A4.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A5.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A6.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A7.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A8.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A9.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.CANTEEN	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.GUEST.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.STOR3	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.WCS2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A1.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A1.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A11.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A12.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A13.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A14.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A15.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A16.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A17.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A18.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A19.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A2.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A2.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A20.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A21.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A22.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A22.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A23.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
SF.A24.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A25.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A25.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A3.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A4.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A5.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A6.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A6.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A6.WCS	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A7.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A9.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A1.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A1.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A10.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A11.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A12.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A13.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A14.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A15.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A16.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A2.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A2.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A3.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A4.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A5.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A6.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A6.B2	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A7.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A8.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A9.B	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A1.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A10.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A11.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A12.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A13.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A14.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A15.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A16.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A17.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A18.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A19.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A2.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A20.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
FF.A21.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A22.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A23.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A24.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A25.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A3.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A4.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A5.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A7.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A8.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A9.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.CHANGIN	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.WCS1	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A1.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A10.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A11.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A12.(6)	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A13.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A14.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A15.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A16.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A2.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A3.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A4.WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A5.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A6.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A7.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A8.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.A9.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.GUES.WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.STOR	-	-	0.5	-	-	-	-	-	-	-	N/A
GF.WCS1	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A1.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A10.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A11.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A12.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A13.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A14.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A15.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A16.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A17.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A18.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A19.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
SF.A2.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A20.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A21.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A22.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A23.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A24.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A25.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A3.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A4.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A5.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A7.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A8.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.A9.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.WCS1	-	-	0.5	-	-	-	-	-	-	-	N/A
SF.WCS2	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A1.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A10.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A11.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A12.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A13.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A14.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A15.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A16.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A2.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A3.WC	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A4.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A5.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A6.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A7.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A8.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.A9.WCS	-	-	0.5	-	-	-	-	-	-	-	N/A
TF.WCS1	-	-	0.5	-	-	-	-	-	-	-	N/A
FF.A1.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A10.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A11.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A12.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A13.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A14.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A15.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A16.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A17.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A18.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A19.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
FF.A2.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A20.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A21.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A22.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A23.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A24.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A25.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A3.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A4.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A5.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A6.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A7.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A8.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.A9.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
FF.STAFF	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A1.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A10.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A11.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A12.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A13.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A14.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A15.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A16.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A2.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A3.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A4.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A5.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A6.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A7.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A8.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
GF.A9.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A1.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A10.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A11.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A12.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A13.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A14.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A15.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A16.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A17.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A18.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A19.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A2.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
SF.A20.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A21.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A22.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A23.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A24.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A25.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A3.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A4.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A5.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A6.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A7.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A8.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.A9.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
SF.DAYROOM	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A1.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A10.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A11.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A12.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A13.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A14.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A15.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A16.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A2.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A3.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A4.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A5.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A6.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A7.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A8.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.A9.L	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.DAY	-	-	-	-	0.9	-	-	-	-	0.8	N/A
TF.MEET	-	-	-	-	0.9	-	-	-	-	0.8	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
FF.A1.B	164	-	-
FF.A1.B2	142	-	-
FF.A10.(2)	133	-	-
FF.A10.B	133	-	-
FF.A11.B	140	-	-
FF.A12.B	140	-	-
FF.A13.B	139	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
FF.A14.B	140	-	-
FF.A15.B	140	-	-
FF.A16.B	138	-	-
FF.A17.B	138	-	-
FF.A18.B	138	-	-
FF.A19.B	140	-	-
FF.A2.B	142	-	-
FF.A2.B2	164	-	-
FF.A20.B	139	-	-
FF.A21.B	140	-	-
FF.A22.B	141	-	-
FF.A22.B2	164	-	-
FF.A23.B	140	-	-
FF.A24.B	140	-	-
FF.A25.B	164	-	-
FF.A25.B2	141	-	-
FF.A3.B	140	-	-
FF.A4.B	140	-	-
FF.A5.B	140	-	-
FF.A6.B	142	-	-
FF.A6.B2	164	-	-
FF.A6.WCS	195	-	-
FF.A7.B	140	-	-
FF.A8.B	140	-	-
FF.A8.B(2)	140	-	-
FF.A9.B	140	-	-
GF.A1.B	140	-	-
GF.A10.B	140	-	-
GF.A11.B	140	-	-
GF.A12.B	141	-	-
GF.A12.B2	163	-	-
GF.A13.B	140	-	-
GF.A14.B	140	-	-
GF.A15.B	139	-	-
GF.A16.B	141	-	-
GF.A16.B2	164	-	-
GF.A2.B	141	-	-
GF.A3.B	140	-	-
GF.A4.B	140	-	-
GF.A5.B	141	-	-
GF.A6.B	140	-	-
GF.A7.B	133	-	-
GF.A8.B	137	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
GF.A9.B	138	-	-
GF.CANTEEN	104	-	-
GF.GUEST.B	139	-	-
GF.STOR3	176	-	-
GF.WCS2	239	-	-
SF.A1.B	164	-	-
SF.A1.B2	142	-	-
SF.A11.B	140	-	-
SF.A12.B	140	-	-
SF.A13.B	139	-	-
SF.A14.B	140	-	-
SF.A15.B	140	-	-
SF.A16.B	138	-	-
SF.A17.B	138	-	-
SF.A18.B	138	-	-
SF.A19.B	140	-	-
SF.A2.B	142	-	-
SF.A2.B2	164	-	-
SF.A20.B	139	-	-
SF.A21.B	140	-	-
SF.A22.B	141	-	-
SF.A22.B2	164	-	-
SF.A23.B	140	-	-
SF.A24.B	140	-	-
SF.A25.B	141	-	-
SF.A25.B2	164	-	-
SF.A3.B	140	-	-
SF.A4.B	140	-	-
SF.A5.B	140	-	-
SF.A6.B	164	-	-
SF.A6.B2	142	-	-
SF.A6.WCS	195	-	-
SF.A7.B	140	-	-
SF.A9.B	140	-	-
TF.A1.B	142	-	-
TF.A1.B2	164	-	-
TF.A10.B	133	-	-
TF.A11.B	140	-	-
TF.A12.B	140	-	-
TF.A13.B	139	-	-
TF.A14.B	140	-	-
TF.A15.B	140	-	-
TF.A16.B	138	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
TF.A2.B	141	-	-
TF.A2.B2	164	-	-
TF.A3.B	140	-	-
TF.A4.B	140	-	-
TF.A5.B	140	-	-
TF.A6.B	142	-	-
TF.A6.B2	164	-	-
TF.A7.B	140	-	-
TF.A8.B	141	-	-
TF.A9.B	140	-	-
FF.A1.LOBB	168	-	-
FF.A10.LOB	169	-	-
FF.A11.LOB	169	-	-
FF.A12.LOB	168	-	-
FF.A13.LOB	168	-	-
FF.A14.LOB	169	-	-
FF.A15.LOB	168	-	-
FF.A16.LOB	168	-	-
FF.A17.LOB	168	-	-
FF.A18.LOB	168	-	-
FF.A19.LOB	168	-	-
FF.A2.LOBB	168	-	-
FF.A20.LOB	168	-	-
FF.A21.LOB	168	-	-
FF.A22.LOB	172	-	-
FF.A23.LOB	169	-	-
FF.A24.LOB	168	-	-
FF.A25.LOB	168	-	-
FF.A3.LOBB	169	-	-
FF.A4.LOBB	168	-	-
FF.A5.LOBB	168	-	-
FF.A6.LOBB	165	-	-
FF.A7.LOBB	168	-	-
FF.A8.LOBB	168	-	-
FF.A9.LOBB	168	-	-
GF.A1.LOB	168	-	-
GF.A10.LOB	168	-	-
GF.A11.LOB	168	-	-
GF.A12.LOB	183	-	-
GF.A13.LOB	168	-	-
GF.A14.LOB	168	-	-
GF.A15.LOB	168	-	-
GF.A16.LOB	169	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
GF.A2.LOB	168	-	-
GF.A3.LOB	168	-	-
GF.A4.LOB	168	-	-
GF.A5.LOB	169	-	-
GF.A6.LOB	169	-	-
GF.A7.LOB	168	-	-
GF.A8.LOB	168	-	-
GF.A9.LOB	168	-	-
SF.A1.LOBB	168	-	-
SF.A10.LOB	169	-	-
SF.A11.LOB	169	-	-
SF.A12.LOB	168	-	-
SF.A13.LOB	168	-	-
SF.A14.LOB	169	-	-
SF.A15.LOB	168	-	-
SF.A16.LOB	168	-	-
SF.A17.LOB	168	-	-
SF.A18.LOB	168	-	-
SF.A19.LOB	168	-	-
SF.A2.LOB	168	-	-
SF.A20.LOB	168	-	-
SF.A21.LOB	168	-	-
SF.A22.LOB	172	-	-
SF.A23.LOB	169	-	-
SF.A24.LOB	168	-	-
SF.A25.LOB	168	-	-
SF.A3.LOB	169	-	-
SF.A4.LOBB	168	-	-
SF.A5.LOBB	168	-	-
SF.A6.LOB	165	-	-
SF.A7.LOBB	168	-	-
SF.A8.LOBB	168	-	-
SF.A9.LOBB	168	-	-
TF.A1.LOB	169	-	-
TF.A10.LOB	168	-	-
TF.A11.LOB	168	-	-
TF.A12.LOB	168	-	-
TF.A13.LOB	168	-	-
TF.A14.LOB	169	-	-
TF.A15.LOB	168	-	-
TF.A16.LOB	168	-	-
TF.A2.LOB	169	-	-
TF.A3.LOB	168	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
TF.A4.LOB	169	-	-
TF.A5.LOB	168	-	-
TF.A6.LOB	168	-	-
TF.A7.LOB	168	-	-
TF.A8.LOB	168	-	-
TF.A9.LOB	168	-	-
GF.OFF1	129	-	-
GF.OFF2	132	-	-
GF.RECEP	154	15	9
FF.A1.WCS	162	-	-
FF.A10.WCS	172	-	-
FF.A11.WCS	172	-	-
FF.A12.WCS	172	-	-
FF.A13.WCS	171	-	-
FF.A14.WCS	172	-	-
FF.A15.WCS	172	-	-
FF.A16.WCS	169	-	-
FF.A17.WCS	172	-	-
FF.A18.WCS	172	-	-
FF.A19.WCS	172	-	-
FF.A2.WCS	162	-	-
FF.A20.WCS	172	-	-
FF.A21.WCS	172	-	-
FF.A22.WCS	162	-	-
FF.A23.WCS	172	-	-
FF.A24.WCS	171	-	-
FF.A25.WCS	162	-	-
FF.A3.WCS	172	-	-
FF.A4.WCS	171	-	-
FF.A5.WCS	172	-	-
FF.A7.WCS	171	-	-
FF.A8.WCS	172	-	-
FF.A9.WCS	172	-	-
FF.CHANGIN	107	-	-
FF.WCS1	194	-	-
GF.A1.WCS	172	-	-
GF.A10.WCS	172	-	-
GF.A11.WCS	172	-	-
GF.A12.(6)	162	-	-
GF.A13.WCS	172	-	-
GF.A14.WCS	171	-	-
GF.A15.WCS	171	-	-
GF.A16.WCS	162	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
GF.A2.WCS	172	-	-
GF.A3.WCS	172	-	-
GF.A4.WC	172	-	-
GF.A5.WCS	172	-	-
GF.A6.WCS	171	-	-
GF.A7.WCS	172	-	-
GF.A8.WCS	171	-	-
GF.A9.WCS	172	-	-
GF.GUES.WC	187	-	-
GF.STOR	105	-	-
GF.WCS1	194	-	-
SF.A1.WCS	162	-	-
SF.A10.WCS	172	-	-
SF.A11.WCS	172	-	-
SF.A12.WCS	172	-	-
SF.A13.WCS	171	-	-
SF.A14.WCS	172	-	-
SF.A15.WCS	172	-	-
SF.A16.WCS	169	-	-
SF.A17.WCS	172	-	-
SF.A18.WCS	172	-	-
SF.A19.WCS	172	-	-
SF.A2.WCS	162	-	-
SF.A20.WCS	172	-	-
SF.A21.WCS	172	-	-
SF.A22.WCS	162	-	-
SF.A23.WCS	172	-	-
SF.A24.WCS	171	-	-
SF.A25.WCS	162	-	-
SF.A3.WCS	172	-	-
SF.A4.WCS	171	-	-
SF.A5.WCS	172	-	-
SF.A7.WCS	171	-	-
SF.A8.WCS	172	-	-
SF.A9.WCS	172	-	-
SF.WCS1	194	-	-
SF.WCS2	107	-	-
TF.A1.WCS	162	-	-
TF.A10.WCS	172	-	-
TF.A11.WCS	172	-	-
TF.A12.WCS	172	-	-
TF.A13.WCS	172	-	-
TF.A14.WCS	172	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
TF.A15.WCS	172	-	-
TF.A16.WCS	169	-	-
TF.A2.WCS	162	-	-
TF.A3.WC	171	-	-
TF.A4.WCS	172	-	-
TF.A5.WCS	172	-	-
TF.A6.WCS	162	-	-
TF.A7.WCS	172	-	-
TF.A8.WCS	172	-	-
TF.A9.WCS	172	-	-
TF.WCS1	194	-	-
FF.STOR1	160	-	-
GF.BIN	109	-	-
GF.PLANT1	95	-	-
GF.STOR2	217	-	-
SF.STOR1	160	-	-
TF.STOR1	124	-	-
FF.A1.L	125	-	-
FF.A10.L	130	-	-
FF.A11.L	130	-	-
FF.A12.L	130	-	-
FF.A13.L	130	-	-
FF.A14.L	130	-	-
FF.A15.L	127	-	-
FF.A16.L	130	-	-
FF.A17.L	130	-	-
FF.A18.L	130	-	-
FF.A19.L	130	-	-
FF.A2.L	128	-	-
FF.A20.L	130	-	-
FF.A21.L	130	-	-
FF.A22.L	127	-	-
FF.A23.L	130	-	-
FF.A24.L	126	-	-
FF.A25.L	124	-	-
FF.A3.L	130	-	-
FF.A4.L	130	-	-
FF.A5.L	130	-	-
FF.A6.L	128	-	-
FF.A7.L	130	-	-
FF.A8.L	130	-	-
FF.A9.L	130	-	-
FF.STAFF	119	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
GF.A1.L	129	-	-
GF.A10.L	130	-	-
GF.A11.L	130	-	-
GF.A12.L	125	-	-
GF.A13.L	130	-	-
GF.A14.L	130	-	-
GF.A15.L	127	-	-
GF.A16.L	124	-	-
GF.A2.L	130	-	-
GF.A3.L	130	-	-
GF.A4.L	125	-	-
GF.A5.L	130	-	-
GF.A6.L	130	-	-
GF.A7.L	130	-	-
GF.A8.L	130	-	-
GF.A9.L	130	-	-
SF.A1.L	125	-	-
SF.A10.L	130	-	-
SF.A11.L	130	-	-
SF.A12.L	130	-	-
SF.A13.L	130	-	-
SF.A14.L	130	-	-
SF.A15.L	127	-	-
SF.A16.L	130	-	-
SF.A17.L	130	-	-
SF.A18.L	130	-	-
SF.A19.L	130	-	-
SF.A2.L	128	-	-
SF.A20.L	130	-	-
SF.A21.L	130	-	-
SF.A22.L	127	-	-
SF.A23.L	130	-	-
SF.A24.L	126	-	-
SF.A25.L	124	-	-
SF.A3.L	130	-	-
SF.A4.L	130	-	-
SF.A5.L	130	-	-
SF.A6.L	128	-	-
SF.A7.L	130	-	-
SF.A8.L	130	-	-
SF.A9.L	130	-	-
SF.DAYROOM	119	-	-
TF.A1.L	125	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
TF.A10.L	130	-	-
TF.A11.L	130	-	-
TF.A12.L	130	-	-
TF.A13.L	130	-	-
TF.A14.L	130	-	-
TF.A15.L	127	-	-
TF.A16.L	130	-	-
TF.A2.L	128	-	-
TF.A3.L	130	-	-
TF.A4.L	130	-	-
TF.A5.L	130	-	-
TF.A6.L	128	-	-
TF.A7.L	130	-	-
TF.A8.L	130	-	-
TF.A9.L	130	-	-
TF.DAY	131	-	-
TF.MEET	119	-	-
FF.CORR1	125	-	-
FF.CORR2	141	-	-
FF.CORR3	145	-	-
FF.CORR4	152	-	-
FF.CORR5	142	-	-
FF.LIFTS	153	-	-
FF.STAIR1	136	-	-
FF.STAIRS	145	-	-
FF.STAIRS2	146	-	-
GF.COMM	112	-	-
GF.COMM2	112	-	-
GF.COMM3	112	-	-
GF.CORR1	137	-	-
GF.CORR2	143	-	-
GF.CORR4	156	-	-
GF.CORR5	143	-	-
GF.ENTRANC	121	-	-
GF.KITCHEN	114	-	-
GF.LAUN	121	-	-
GF.LIFT	153	-	-
GF.STAIR1	145	-	-
GF.STAIR2	136	-	-
GF.STAIR3	145	-	-
SF.CORR1	145	-	-
SF.CORR2	125	-	-
SF.CORR3	141	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
SF.CORR4	152	-	-
SF.CORR5	142	-	-
SF.LIFT	153	-	-
SF.STAIR3	146	-	-
SF.STAIRS1	145	-	-
SF.STAIRS2	136	-	-
TF.CORR1	141	-	-
TF.CORR2	145	-	-
TF.CORR3	125	-	-
TF.LIFTS	151	-	-
TF.STAIRS1	145	-	-
TF.STAIRS2	136	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF.A1.B	NO (-69.6%)	NO
FF.A1.B2	NO (-51.1%)	NO
FF.A10.(2)	NO (-68.9%)	NO
FF.A10.B	NO (-68.9%)	NO
FF.A11.B	NO (-57.1%)	NO
FF.A12.B	NO (-55.1%)	NO
FF.A13.B	NO (-68.2%)	NO
FF.A14.B	NO (-55.1%)	NO
FF.A15.B	NO (-66.6%)	NO
FF.A16.B	NO (-81.1%)	NO
FF.A17.B	NO (-88.8%)	NO
FF.A18.B	NO (-79.8%)	NO
FF.A19.B	NO (-70.6%)	NO
FF.A2.B	NO (-53.4%)	NO
FF.A2.B2	NO (-69.7%)	NO
FF.A20.B	NO (-62.6%)	NO
FF.A21.B	NO (-70.5%)	NO
FF.A22.B	NO (-66.2%)	NO
FF.A22.B2	NO (-68.7%)	NO
FF.A23.B	NO (-70.6%)	NO
FF.A24.B	NO (-68.3%)	NO
FF.A25.B	NO (-78.4%)	NO
FF.A25.B2	NO (-69.5%)	NO
FF.A3.B	NO (-55%)	NO
FF.A4.B	NO (-55%)	NO
FF.A5.B	NO (-55.1%)	NO
FF.A6.B	NO (-51.3%)	NO
FF.A6.B2	NO (-69.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF.A7.B	NO (-55.1%)	NO
FF.A8.B	NO (-55%)	NO
FF.A8.B(2)	NO (-55%)	NO
FF.A9.B	NO (-56.9%)	NO
GF.A1.B	NO (-63.2%)	NO
GF.A10.B	NO (-57.2%)	NO
GF.A11.B	NO (-69.3%)	NO
GF.A12.B	NO (-72%)	NO
GF.A12.B2	NO (-69.1%)	NO
GF.A13.B	NO (-70.5%)	NO
GF.A14.B	NO (-70.5%)	NO
GF.A15.B	NO (-67.8%)	NO
GF.A16.B	NO (-68.1%)	NO
GF.A16.B2	NO (-75.1%)	NO
GF.A2.B	NO (-54.7%)	NO
GF.A3.B	NO (-66.1%)	NO
GF.A4.B	NO (-70.3%)	NO
GF.A5.B	NO (-55.1%)	NO
GF.A6.B	NO (-53.1%)	NO
GF.A7.B	NO (-68.9%)	NO
GF.A8.B	NO (-82.1%)	NO
GF.A9.B	NO (-85.1%)	NO
GF.CANTEEN	NO (-70.7%)	NO
GF.GUEST.B	NO (-78.3%)	NO
SF.A1.B	NO (-69.6%)	NO
SF.A1.B2	NO (-51.1%)	NO
SF.A11.B	NO (-57.1%)	NO
SF.A12.B	NO (-55.1%)	NO
SF.A13.B	NO (-68.2%)	NO
SF.A14.B	NO (-55.1%)	NO
SF.A15.B	NO (-66.6%)	NO
SF.A16.B	NO (-81.1%)	NO
SF.A17.B	NO (-88.8%)	NO
SF.A18.B	NO (-79.8%)	NO
SF.A19.B	NO (-70.6%)	NO
SF.A2.B	NO (-53.4%)	NO
SF.A2.B2	NO (-69.7%)	NO
SF.A20.B	NO (-62.6%)	NO
SF.A21.B	NO (-70.5%)	NO
SF.A22.B	NO (-66.2%)	NO
SF.A22.B2	NO (-68.7%)	NO
SF.A23.B	NO (-70.6%)	NO
SF.A24.B	NO (-68.3%)	NO
SF.A25.B	NO (-69.5%)	NO
SF.A25.B2	NO (-78.4%)	NO
SF.A3.B	NO (-55%)	NO
SF.A4.B	NO (-55%)	NO
SF.A5.B	NO (-55.1%)	NO
SF.A6.B	NO (-69.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
SF.A6.B2	NO (-51.3%)	NO
SF.A7.B	NO (-55.1%)	NO
SF.A9.B	NO (-56.9%)	NO
TF.A1.B	NO (-51.1%)	NO
TF.A1.B2	NO (-67.1%)	NO
TF.A10.B	NO (-70.2%)	NO
TF.A11.B	NO (-55.1%)	NO
TF.A12.B	NO (-57.2%)	NO
TF.A13.B	NO (-66.8%)	NO
TF.A14.B	NO (-55.1%)	NO
TF.A15.B	NO (-72.4%)	NO
TF.A16.B	NO (-81.1%)	NO
TF.A2.B	NO (-53.7%)	NO
TF.A2.B2	NO (-67.2%)	NO
TF.A3.B	NO (-57.2%)	NO
TF.A4.B	NO (-57.1%)	NO
TF.A5.B	NO (-55%)	NO
TF.A6.B	NO (-53.5%)	NO
TF.A6.B2	NO (-69.8%)	NO
TF.A7.B	NO (-56.8%)	NO
TF.A8.B	NO (-54.6%)	NO
TF.A9.B	NO (-55.1%)	NO
GF.OFF1	N/A	N/A
GF.OFF2	NO (-22.3%)	NO
GF.RECEP	N/A	N/A
TF.A4.WCS	N/A	N/A
FF.A1.L	NO (-70.3%)	NO
FF.A10.L	NO (-13.8%)	NO
FF.A11.L	NO (-12%)	NO
FF.A12.L	NO (-16.9%)	NO
FF.A13.L	NO (-13.6%)	NO
FF.A14.L	NO (-8.9%)	NO
FF.A15.L	NO (-69.5%)	NO
FF.A16.L	NO (-10.6%)	NO
FF.A17.L	NO (-44.3%)	NO
FF.A18.L	NO (-16%)	NO
FF.A19.L	NO (-44.3%)	NO
FF.A2.L	NO (-10.7%)	NO
FF.A20.L	NO (-19.2%)	NO
FF.A21.L	NO (-42.3%)	NO
FF.A22.L	NO (-21.5%)	NO
FF.A23.L	NO (-42.1%)	NO
FF.A24.L	NO (-69.9%)	NO
FF.A25.L	NO (-86%)	NO
FF.A3.L	NO (-12%)	NO
FF.A4.L	NO (-14.9%)	NO
FF.A5.L	NO (-13.6%)	NO
FF.A6.L	NO (-10.2%)	NO
FF.A7.L	NO (-16.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF.A8.L	NO (-13.6%)	NO
FF.A9.L	NO (-5.7%)	NO
FF.STAFF	NO (-74.6%)	NO
GF.A1.L	NO (-80.6%)	NO
GF.A10.L	NO (-79%)	NO
GF.A11.L	NO (-85.6%)	NO
GF.A12.L	NO (-84.9%)	NO
GF.A13.L	NO (-85.5%)	NO
GF.A14.L	NO (-86.6%)	NO
GF.A15.L	NO (-92.5%)	NO
GF.A16.L	NO (-97.4%)	NO
GF.A2.L	NO (-78%)	NO
GF.A3.L	NO (-81.1%)	NO
GF.A5.L	NO (-76.5%)	NO
GF.A6.L	NO (-78%)	NO
GF.A7.L	NO (-76.5%)	NO
GF.A8.L	NO (-79.1%)	NO
GF.A9.L	NO (-85.6%)	NO
SF.A1.L	NO (-70.3%)	NO
SF.A10.L	NO (-16.9%)	NO
SF.A11.L	NO (-10.4%)	NO
SF.A12.L	NO (-16.9%)	NO
SF.A13.L	NO (-13.6%)	NO
SF.A14.L	NO (-13.6%)	NO
SF.A15.L	NO (-70%)	NO
SF.A16.L	NO (-13.8%)	NO
SF.A17.L	NO (-44.3%)	NO
SF.A18.L	NO (-16%)	NO
SF.A19.L	NO (-44.3%)	NO
SF.A2.L	NO (-10.7%)	NO
SF.A20.L	NO (-19.2%)	NO
SF.A21.L	NO (-40.2%)	NO
SF.A22.L	NO (-18.2%)	NO
SF.A23.L	NO (-44.2%)	NO
SF.A24.L	NO (-71%)	NO
SF.A25.L	NO (-86%)	NO
SF.A3.L	NO (-12%)	NO
SF.A4.L	NO (-13.4%)	NO
SF.A5.L	NO (-12%)	NO
SF.A6.L	NO (-15.5%)	NO
SF.A7.L	NO (-10.4%)	NO
SF.A8.L	NO (-15.1%)	NO
SF.A9.L	NO (-2.6%)	NO
SF.DAYROOM	NO (-74.6%)	NO
TF.A1.L	NO (-70.6%)	NO
TF.A10.L	NO (-12.2%)	NO
TF.A11.L	NO (-13.4%)	NO
TF.A12.L	NO (-12.2%)	NO
TF.A13.L	NO (-11.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
TF.A14.L	NO (-16.7%)	NO
TF.A15.L	NO (-69.5%)	NO
TF.A16.L	NO (-12%)	NO
TF.A2.L	NO (-4.9%)	NO
TF.A3.L	NO (-13.8%)	NO
TF.A4.L	NO (-13.4%)	NO
TF.A5.L	NO (-13.4%)	NO
TF.A6.L	NO (-9%)	NO
TF.A7.L	NO (-13.4%)	NO
TF.A8.L	NO (-13.4%)	NO
TF.A9.L	NO (-13.4%)	NO
TF.DAY	N/A	N/A
TF.MEET	NO (-74.7%)	NO
GF.COMM	NO (-64.1%)	NO
GF.COMM2	N/A	N/A
GF.COMM3	N/A	N/A

Regulation 25A: Consideration of high efficiency 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
Floor area [m^2]	7574	7574
External area [m^2]	10726.5	10726.5
Weather	SWI	SWI
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	2925.34	3459.83
Average U-value [W/m^2K]	0.27	0.32
Alpha value* [%]	25.19	16.91

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
100	**Residential Institutions: Hospitals and Care Homes**
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	4.55	3.93
Cooling	0	0
Auxiliary	10.78	8.62
Lighting	9.77	11.44
Hot water	14.4	14.89
Equipment*	70.82	70.82
TOTAL**	**39.49**	**38.88**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	5.73	2.79
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*5.73*	*2.79*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	335.32	295.05
Primary energy [kWh/m^2]	51.6	53.51
Total emissions [kg/m^2]	4.82	4.97

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	36.7	87.8	3.3	0	10.4	3.12	0	3.5	0
	Notional	41.3	81.4	4.3	0	6.1	2.64	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	62.7	82.9	21.8	0	0	0.8	0	1	0
	Notional	50	89.3	10.4	0	0	1.34	0	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	81.4	406.2	7.2	0	3.1	3.12	0	3.5	0
	Notional	84.9	386	8.9	0	1.5	2.64	0	----	----
[ST] No Heating or Cooling										
	Actual	146.9	71.5	0	0	43.6	0	0	0	0
	Notional	117.7	97.4	0	0	52.3	0	0	----	----
[ST] No Heating or Cooling										
	Actual	48.8	789.3	0	0	0	0	0	0	0
	Notional	44.1	786.7	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	8.2	567.2	0.7	0	12	3.12	0	3.5	0
	Notional	6.9	463	0.7	0	6.8	2.64	0	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	77.9	192.9	6.9	0	2.5	3.12	0	3.5	0
	Notional	68.8	188.2	7.2	0	1.2	2.64	0	----	----

Key to terms

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