LOVE DESIGN STUDIO

September 2022

Uxbridge Road

Energy and Sustainability Statement

Contents

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Section Zero

0 Executive Summary

Executive Summary

Love Design Studio have prepared this Energy and Sustainability Statement on behalf of Infinite Partners (the applicant) as part of a planning application to the London Borough of Hillingdon (the Local Planning Authority). The scheme is considered an application of Potential Strategic Importance (PSI). It will therefore be referred to the GLA Planning Authority.

The proposal is for the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping. The total proposed site will consist of 435 hotel keys and 23,946m2 gross external area.

Energy Breakdown

The energy strategy follows the energy hierarchy; Use Less Energy (Be Lean), Supply energy efficiently (Be Clean) and use Renewable and low carbon energy (Be Green) as per Policy EM1 of the Hillingdon Local Plan (2012).

The scheme adopts a fabric-first and passive design approach to reduce energy demand for space heating and reduce the demand for active cooling. Key design elements of the proposals comprise of:

- A well-insulated building fabric shell
- Being airtight, reducing draughts and heat-loss.
- Provision for Mechanical ventilation with heat recovery (MVHR)
- Provision for Waste water heat recovery systems (WWHRS)

An all-electric, air source heat-pump system is proposed to deliver the space heating and hot water demand for this scheme. ASHPs offer a highly energy efficient low carbon solution, that future-proofs the dwelling towards achieving net zero carbon in operation in coming years. Low operational costs and carbon emissions, are complemented with improved air quality on-site due to zero combustion on site, benefitting the health & wellbeing of occupants.

Photovoltaic solar panels are the preferred on-site renewable generation technology as electricity is off-set on-site.

Based on the assessment undertaken, the energy strategy set out within this report delivers a new build cumulative CO_2 reduction of **74%** compared to the 2013 baseline. The cumulative CO_2 reduction is broken down by the following:

- 27% at Be Lean
- 0% at Be Clean
- 47% at Be Green

Sustainability

A BREEAM 2018 New Construction Pre-Assessment of the proposed site has been conducted, with the aim to achieve BREEAM 'Very Good'. The following 10 categories were assessed and have been used to demonstrate the scheme's sustainability credentials:

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

This report demonstrates that the building has a current targeted score of 67.3% which equates to a **BREEAM rating of 'Very Good'** with the potential to achieve a score of 85.52%, which equates to a BREEAM rating of 'Excellent'. The score breakdown is illustrated to the right, and the credit breakdown for each category is set out on the following pages.

The current BREEAM targeted score provides a small buffer over the target score of 55% (the threshold for Very Good) should credits be lost through design or cost constraints as the project progresses.

Executive Summary

Energy Strategy

The new development will be fossil-fuel free and will include a site wide hot water distribution network supplied by energy efficient heat pumps.

The new basement heat plant room will have the provision for connecting to a future district heat network, should this be brought forward in the local area (pg.17, fig.9).

For the hotel, it is possible that Domestic Hot Water (DHW) may account for over 50% of the total operational energy demand, so there is a real focus on maximising the DHW efficiency. It is noted that there is the possibility of the future connection to data centres in the local area where they may be looking at cost-effective ways to 'dump their heat'; therefore, the heat plant room allows space for future heat exchangers to exploit this option. The option for including Waste Water Heat Recovery Systems (WWHRS) will be explored at the detailed design stage.

The scheme adopts a fabric-first and passive design approach to reduce energy demand for space heating and active cooling. For when heating and cooling is required the new hotel and adjoining amenity areas will be served by a Variable Refrigerant Flow (VRF) system, effectively allowing for energy to be transferred efficiently across the site where it is required most via the interconnection of BC controllers which intelligently transfers energy around the system, drawing on energy from the outdoor units.

Each hotel room will have a Mechanical Ventilation Heat Recovery (MVHR) unit to provide fresh air efficiently in winter and the option for natural ventilation.

The VRF and MVHR units will have the option to be operated within the bedrooms, but also have the collective capability of being overridden via a centralised smart remote controller to avoid use when the room is unoccupied.

The strategy for the incubator spaces is to consider future functional adaptability to avoid unnecessary demolition works should tenants change. The incubator workspaces will be provided with capped off services from the hot water network but will also have the flexibility to adopt their own HVAC solutions, whether it be; highly efficient split/multi split systems for space heating and cooling, simple direct electric heating panels and/or space for mechanical ventilation (depending on the tenant's future needs and preferences).

The existing hotel block already has a fully functioning, relatively modern (circa. 2015), HVAC system in the form of; a refrigerant pipework network connected to bedroom comfort conditioning units in the ceiling void, providing space heating and cooling; these are connected via rooftop outdoor condensers. An Air Handling Unit (AHU) supplies fresh air to each individual hotel room. DHW to the existing hotel building is currently supplied by a mix of gas boilers and heat pumps.

All the rooftop units will look to be repositioned to the higher part of the roof rather than fully replaced. The decision for repositioning is to align with the aims of the scheme to avoid the unnecessary increase of embodied carbon emissions (building services can often account for >30% of total embodied emissions in refurbishments). If deemed technically feasible, the boilers will either be replaced with heat pumps or the option for connecting to the site wide DHW network.

The basement currently has space available for water recovery systems in the form of a rainwater harvesting tank room and a grey water tank room. The financial and technical feasibility of adopting these technologies and their preferred uses (irrigation versus communal toilet flushing uses) will be considered at the detailed design stage.

The scheme looks to meet Net-Zero Carbon for Operational Energy, in reference to the London Plan energy hierarchy (Policy SI 2). An SBEM model was used to calculate the space heating, hot water, lighting, cooling, fans and pumps energy, improvements from low carbon technologies, and therefore the on-site operational energy consumption.

Following the new Part L 2021 Building Regulations that came into effect in June 2022, the GLA Energy Assessment Guidance (June 2022) states that major non-domestic developments must meet a 35 per cent on-site carbon reduction beyond Part L 2021. However, as the software is currently in an interim period between Part L 2013 and Part L 2021 that is yet to be tried and tested, the GLA have stated the following:

"However, as the accompanying Part L 2021 software is not yet available, planning applicants should continue to use the 2020 guidance, spreadsheet and the Part L 2013 methodology until the software has been approved by government and is fully functional."

Therefore, this energy assessment has proceeded using the 2013 methodology by running SBEM calculations against Part L 2013 carbon factors and notional baselines. The outputs were then used in the GLA Carbon Emissions Reporting Spreadsheet 2020 which uses Part L 2013 as a baseline.

Furthermore, this energy assessment has split the results into new build, existing building, and site-wide summaries. This is due to the existing building retaining its energy system and undergoing minimal refurbishment to avoid unnecessary embodied carbon emissions.

The new build targets a >15% CO_2 reduction at the 'Be Lean' Stage as per the Adopted London Plan 2021 targets. The scheme also significantly exceeds the 35% CO_2 reduction on-site target compared to Part L 2013 baselines to make an allowance for the new Part L 2021 Building Regulations. Where space on the roof is available photovoltaic solar panels are provided. The scheme may offset the remaining emissions through a carbon offset payment.

Section One

1 Introduction

Introduction

Scope

This Energy and Sustainability Statement has been prepared on behalf of Infinite Partners (the applicant) as part of a planning application to the London Borough of Hillingdon (the Local Planning Authority).

Regarding energy, operational carbon emissions have been calculated for the proposed development, including regulated and unregulated energy use. The assessment has been carried out in compliance with methodology contained in the 'GLA Energy Assessment Guidance (June 2022)' In compliance with the GLA guidance, the completed Energy assessment is contained in the appendices and should be read in conjunction with this report.

Regarding sustainability, a BREEAM Pre-Assessment of the proposed site has been conducted, with the aim to achieve BREEAM 'Very Good'. The following 10 categories were assessed and have been used to demonstrate the scheme's sustainability credentials: Management, Health and Wellbeing, Energy, Transport, Water, Materials, Waste, Land Use and Ecology, Pollution, and Innovation.

Site Overview

Scheme

Illustrated to the right is the proposed 1.40 acres site area for 27 Uxbridge Road. The site is bounded by Uxbridge Road to the north and Springfield Road to the west. The sites surrounding the proposal is a mixture of light industrial, residential and open spaces.

The site lies within the jurisdiction of the London Borough of Hillingdon. The scheme is considered an application of Potential Strategic Importance (PSI). It will therefore be referred to the GLA Planning Authority.

Within the site currently stands a 60's 13 storey hotel, including plant, comprising 170 keys, meeting rooms, and gym.

The proposal scheme entails the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping.

The proposed development will consist of 265 additional hotel keys and a total gross external area of 23,946m2.

Existing Hotel Building

The existing hotel block already has a fully functioning, relatively modern (circa. 2015), HVAC system in the form of; a refrigerant pipework network connected to bedroom comfort conditioning units in the ceiling void, providing space heating and cooling; these are connected via rooftop outdoor condensers. An Air Handling Unit (AHU) supplies fresh air to each individual hotel room. DHW to the existing hotel building is currently supplied by a mix of gas boilers and heat pumps.

All the rooftop units will look to be repositioned to the higher part of the roof rather than fully replaced. The decision for repositioning is to align with the aims of the scheme to avoid the unnecessary increase of embodied carbon emissions (building services can often account for >30% of total embodied emissions in refurbishments). If deemed technically feasible, the boilers will either be replaced with heat pumps or the option for connecting to the site wide DHW network.

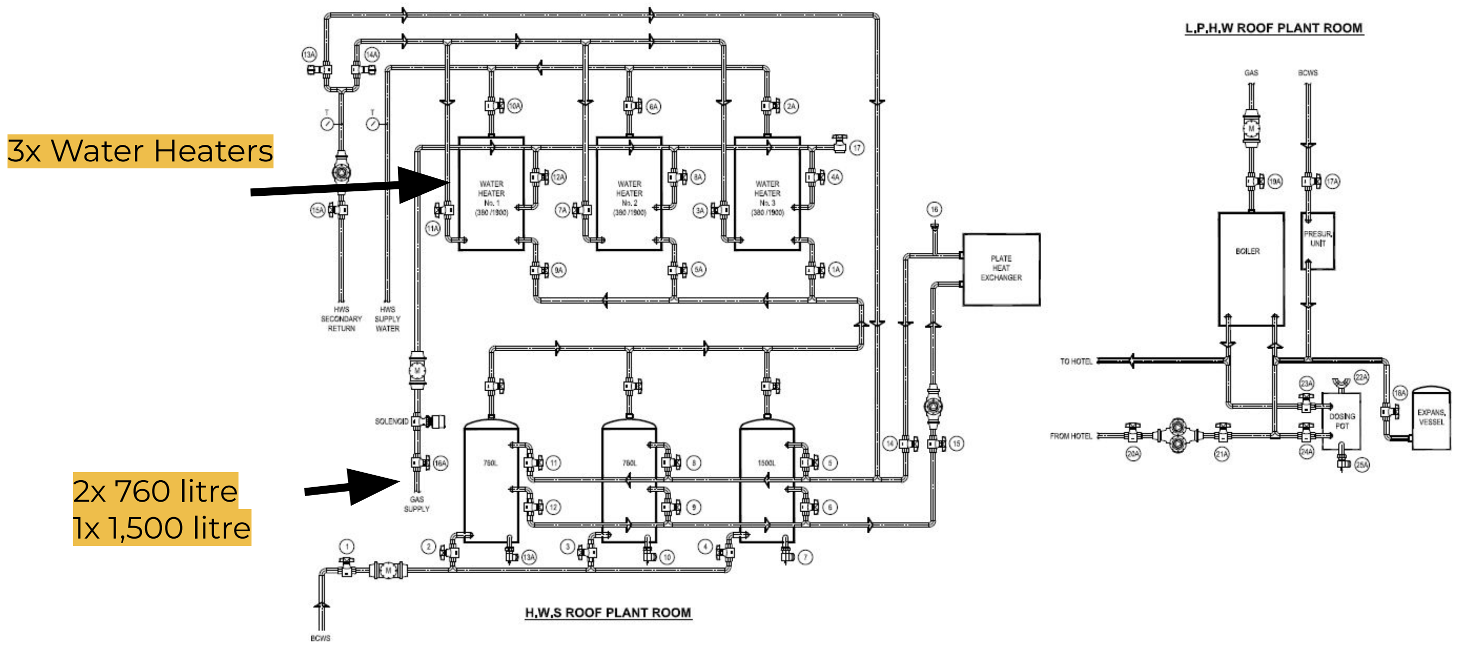


Figure 2: 4564 - M602 AF - Roof Plantroom Schematic

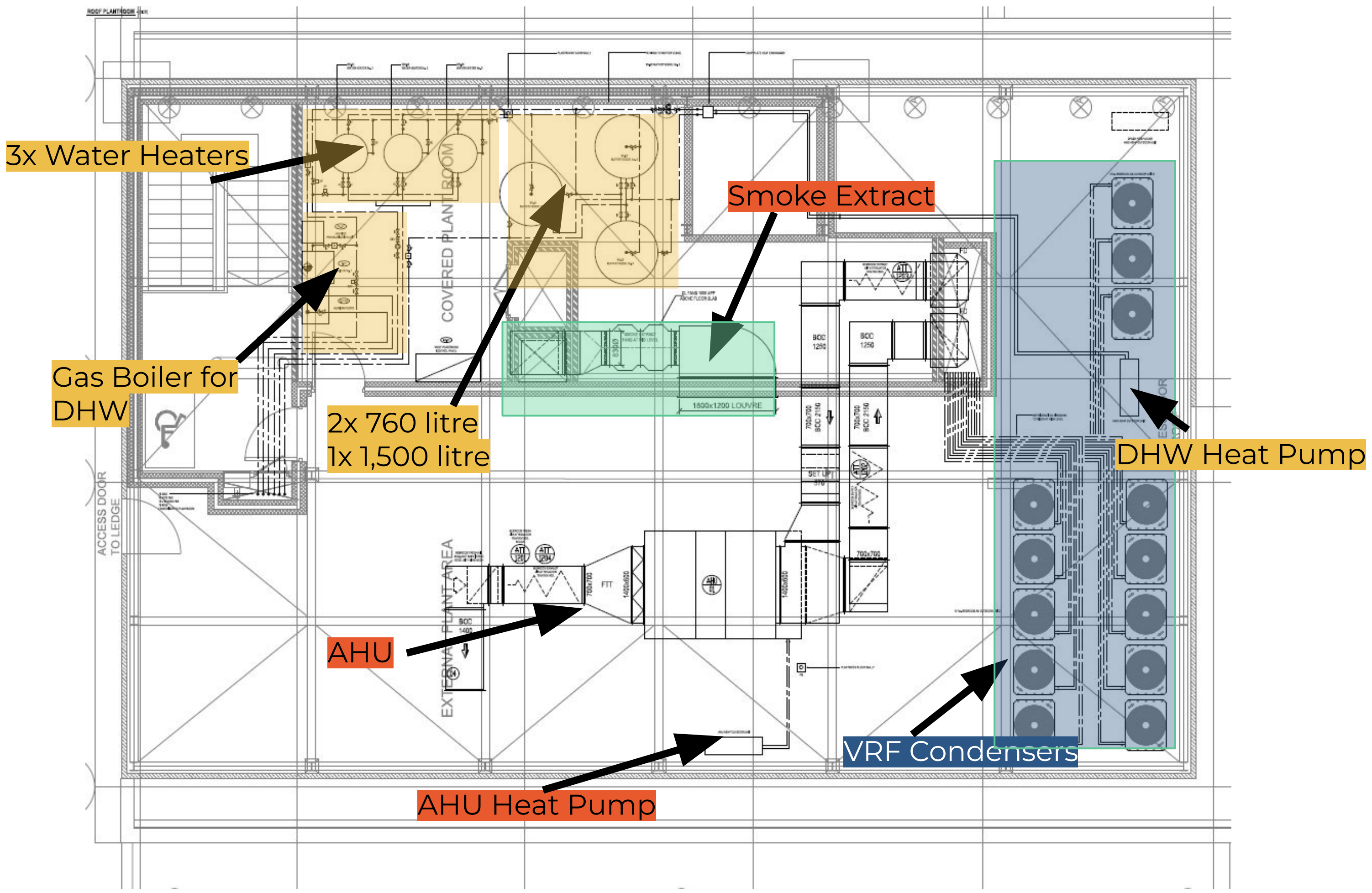


Figure 1: 4564 - M601 AF - Roof Plantroom

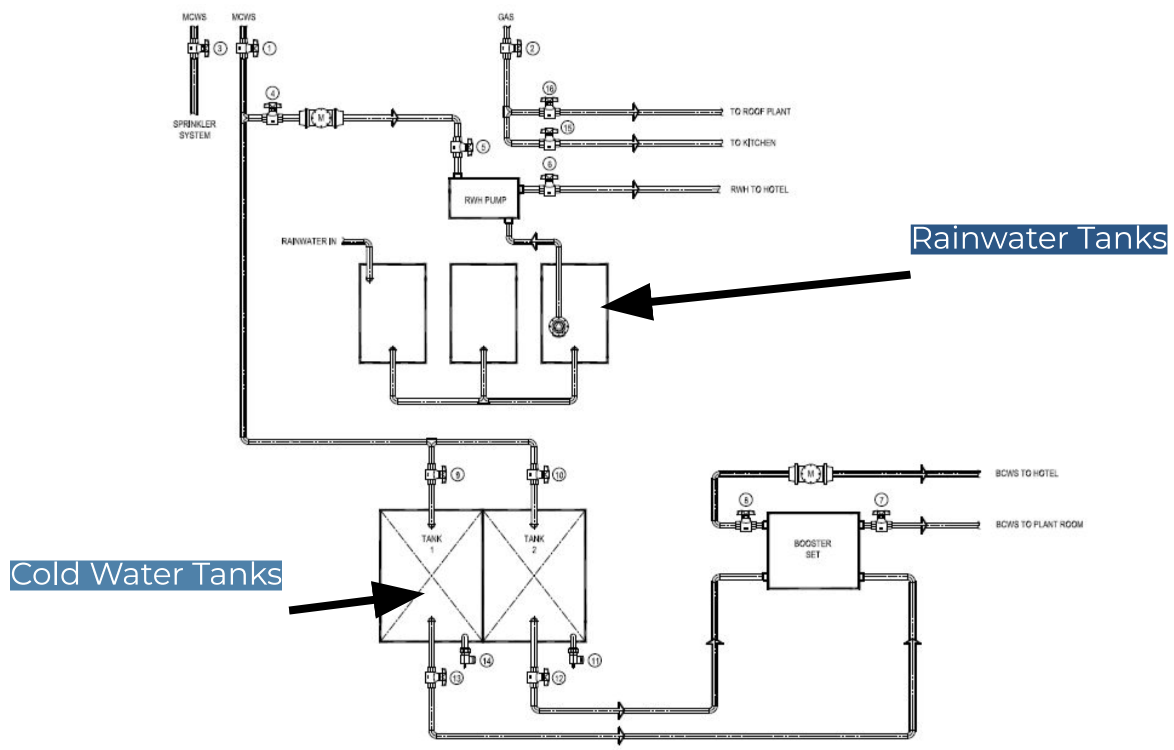


Figure 3: 4564 - M600 AF - Basement Plant room

Policy and Guidance

Regional Policy

Regional Policy is governed by the London Plan (March 2021), which is the overall strategic plan for London which sets out an integrated economic, environmental, and social framework for the development of London over the next 20-25 years. The energy strategy for this scheme follows the energy hierarchy written in the key policy below:

- Policy SI 2 Minimising Greenhouse Gases

1. **Be Lean** - use less energy and manage demand during operation.
2. **Be Clean** - exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
3. **Be Green** - maximise opportunities for renewable energy by producing, storing, and using renewable energy on-site.
4. **Be Seen** - monitor, verify and report on energy performance.

Other policy extracts from the London Plan that are deemed relevant to Energy and/or Sustainability have been set out below for reference:

- Policy SI: 1 Improving Air Quality
- Policy SI: 3 Energy Infrastructure
- Policy SI: 4 Managing Heat Risk
- Policy SI: 5 Water Infrastructure
- Policy SI: 7 Reducing Waste And Supporting The Circular Economy

Local Policy

The Hillingdon Local Plan (2012) is the foundation for how planning is controlled in Hillingdon. The Local Plan is broken into two parts, with Part 1 focused on Strategic Policies and Part 2 comprising the Development Management Policies. The strategic policies which regulate carbon emissions and steer sustainability, and therefore relevant to this assessment, are the following:

- Policy BE1: Built Environment
- Policy EM1: Climate Change Adaptation and Mitigation
- Policy EM6: Flood Risk Management
- Policy EM7: Biodiversity and Geological Conservation
- Policy EM8: Land, Water, Air, Noise
- Policy EM11: Sustainable Waste Management

Assessment Guidance

The guidance for the methodology of energy assessments is set out in the Greater London Authority's Energy Assessment Guidance (June 2020). This document sets out the required scope of a GLA compliant assessment. Therefore, this energy assessment complies with the requirements of the Energy Assessment Guidance (June 2020)

A BREEAM Pre-Assessment of the proposed site has been conducted to assess the scheme's sustainability credentials,, with the aim to achieve BREEAM 'Very Good'. The methodology set out in the BREEAM UK New Construction for Non-Domestic Buildings (2018) was used to carry out the pre-assessment.

1. London Plan (2021)
2. Hillingdon Local Plan Strategic Policies
3. Hillingdon Local Plan Development Management Policies
4. GLA Energy Assessment Guidance (2020)
5. CIBSE TM54
6. BREEAM UK New Construction for Non-Domestic Building (2018)

Section Two

2 Energy

Methodology

The scheme looks to meet Net-Zero Carbon for Operational Energy, in reference to the London Plan energy hierarchy (Policy SI 2 'Minimising Greenhouse Gases'):

1. **Be Lean** - use less energy and manage demand during operation.
2. **Be Clean** - exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
3. **Be Green** - maximise opportunities for renewable energy by producing, storing, and using renewable energy on-site.
4. **Be Seen** - monitor, verify and report on energy performance.

Following the new Part L 2021 Building Regulations that came into effect in June 2022, the GLA Energy Assessment Guidance (June 2022) states that major non-domestic developments must meet a 35 per cent on-site carbon reduction beyond Part L 2021. However, as the software is currently in an interim period between Part L 2013 and Part L 2021 that is yet to be tried and tested, the GLA have stated the following:

"However, as the accompanying Part L 2021 software is not yet available, planning applicants should continue to use the 2020 guidance, spreadsheet and the Part L 2013 methodology until the software has been approved by government and is fully functional."

Therefore, this energy assessment has proceeded using the 2013 methodology by running SBEM calculations against Part L 2013 carbon factors and notional baselines. The outputs were then used in the GLA Carbon Emissions Reporting Spreadsheet 2020 which uses Part L 2013 as a baseline.

Furthermore, this energy assessment has split the results into new build, existing building, and site-wide summaries. This is due to the existing building retaining its energy system and undergoing minimal refurbishment to avoid unnecessary embodied carbon emissions.

IES VE software was used to create a 3D model of the development, as illustrated to the right. An SBEM model was used to calculate the space heating, hot water, lighting, cooling, fans and pumps energy, improvements from low carbon technologies, and therefore the on-site operational energy consumption. Using IES VE, the passive measures for the new build were incrementally improved in order to meet a minimum of 15% carbon reduction at the 'Be Lean' stage, as per Policy SI 2.

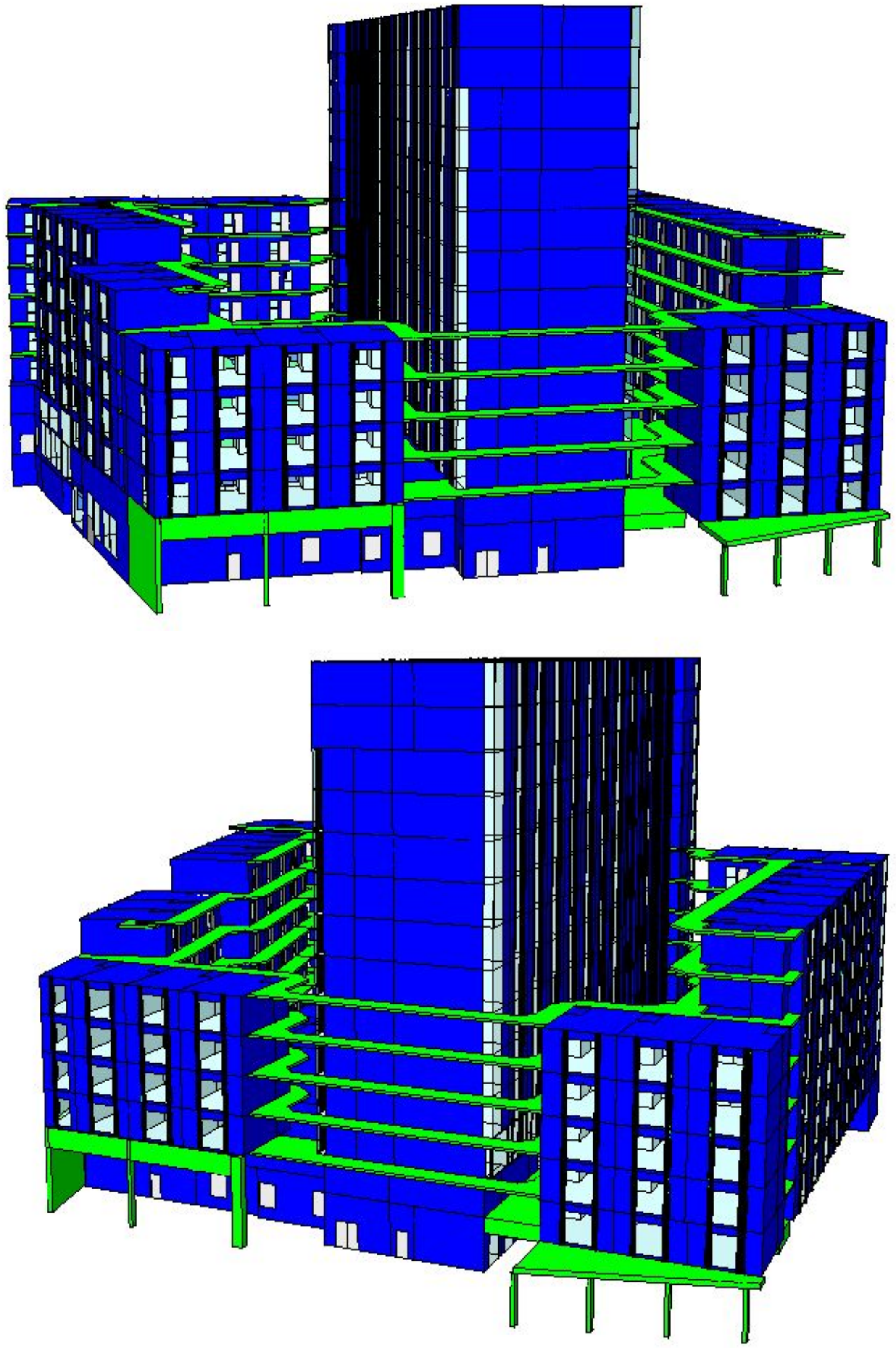


Figure 4: Axonometric view of the 3d model of the proposed scheme developed using IES VE software; southwest view (top), southeast view (bottom)

Be Lean (Demand Reduction)

Passive design measures, including optimising orientation and site layout, natural ventilation and lighting, thermal mass and solar shading are set out in this document. Active design measures, including high efficiency lighting and efficient low-energy extract systems, are also set out below. Building fabric details are set out in the tables to the right.

BUILDING INSULATION

This scheme will provide building insulation U-values improved upon the Building Regulations standard.

At the detailed design stage both standard and natural insulation materials will be considered on merit, feasibility, and pricing.

ORIENTATION AND SITE LAYOUT

The orientation of the hotel rooms is key in maximising the benefits of solar gain in the winter and improving daylight & sunlight access given the constraints of the site.

The scheme is predominantly north-south facing, and west-east facing. All new hotel rooms utilise dual aspect facades, where possible.

The site benefits from utilising podiums that act as courtyards to the hotel rooms either side of the existing hotel building.

The new hotel development blocks any direct southwest and northwest prevailing winds (typically the most prevalent wind direction for London) improving comfort to amenity landscaping by providing microclimates that are cooler in summer and warmer in winter.

NATURAL VENTILATION

Hotel rooms will have openable windows to allow the occupant the flexibility to use passive ventilation prior to utilising mechanical ventilation/cooling.

The courtyards also help with forming dual aspect hotel rooms capable of providing cross-ventilation..

Natural ventilation is a method of supplying fresh air to a space through passive means, typically by utilising differences in pressure and/or temperatures within a space.

As it is currently unknown who the tenants will be to fill the incubator workspaces, both the option for natural ventilation and mechanical ventilation has been provided, allowing the space to be adaptable to changing needs.

Space has been provided for the future retrofit of mechanical ventilation and heating/cooling plant.

LIGHTING

Within the scheme, all fixed light fittings will be low-energy lamps, including storage and infrequently accessed areas. The lux levels within each space will be designed to match relevant Building Regulations and industry guidance to reduce the requirement for additional unregulated lighting.

Communal circulation spaces will have automatic lighting using PIR sensors.

THERMAL MASS

Thermal mass is not commonly deemed to be the most reliable form of controlling heat build-up within hotel/residential room spaces as heat maybe radiated in the evenings.

Whereas, for workshop areas and office uses thermal mass is important to help with night-cooling.

Building Fabric	Input	Unit	Comments
New			
External Wall U-Value	0.15	W/m2k	Include unheated areas
Roof U-Value	0.12	W/m2k	-
Ground Floor U-Value	0.12	W/m2k	-
Window U-Value	1.3	W/m2k	-
Doors U-Value	1.2	W/m2k	-
Thermal Bridge Y-Value	<0.1	W/m2k	-
Window G-Value	0.5	-	-
Air Permeability	3	@50Pa (m.h3/m2)	A low air permeability required to improve mech vent efficiency

Table 1: The SBEM model input variables for reference

Mechanical Ventilation Heat Recovery (MVHR)

Although passive ventilation should be maximised during temperate conditions, as this requires no fan power, there is the potential for heat to be lost to the atmosphere when fresh air is required (from opening windows) simultaneously with heating during colder seasons; therefore, it is advantageous to provide a form of heat recovery that allows for an efficient system that captures the heat exhausting from a room being heated in colder conditions.

All hotel rooms will be installed with mechanical ventilation heat recovery (MVHR) systems offering fresh air supply to the bedroom spaces and extract from the bathrooms; meaning windows will not be required to be open to meet the minimum background ventilation rates. The shared amenity uses will also be provided MVHR/AHU units and the incubator units will be provided space for the future retrofit of MVHR/AHU units depending on their future needs.

The heat recovery aspect will lower space heating consumption. A summer bypass mode will allow for extracting of heat build-up during hotter periods. MVHR units will have the option to be operated within the bedrooms, but also have the collective capability of being overridden via a centralised smart remote controller to avoid use when the room is unoccupied.

Figure 5: ©Titon images of a typical MVHR unit , model HRV1.25 Q Plus

Waste Water Heat Recovery

As the proposed scheme includes a hotel that is expected to have a high domestic hot water demand, the potential for waste water heat recovery systems (WWHRS) is being considered.

WWHRS is a technology that utilises the leftover heat from the waste shower water to preheat the new cold water that replenishes the system. It is an example of an active design measure that reduces a scheme's hot water demand and energy use as it is used to heat up incoming water to the desired temperature through a heat exchanger.

The CO_2 savings from installing WWHRS in the new build scheme is illustrated on the right. To summarise, at the Be Lean stage, the WWHRS improved the regulated CO_2 savings by **19%.**

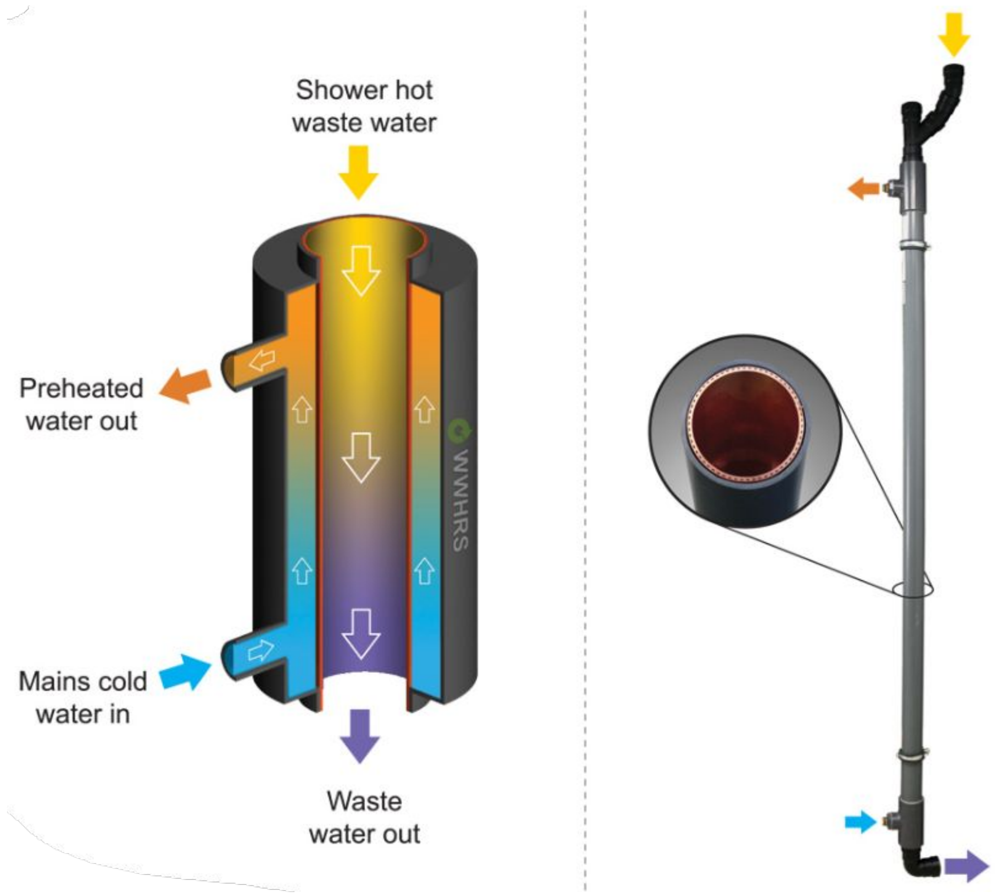


Figure 6: ©Recoup Pipe+ HE example WWHRS product diagram

	Regulated non- domestic carbon dioxide savings (Part L 2013 Baseline)	
	Tonnes CO2 Per Annum	(%)
Savings from energy demand reduction	**60.5**	**8%**
Savings from heat network/CHP	0	0%
Savings from renewable energy	462.3	61%
Cumulative savings	522.8	70%

Table 2: New build savings at each stage of the energy hierarchy, without WWHRS

	Regulated non- domestic carbon dioxide savings (Part L 2013 Baseline)	
	Tonnes CO2 Per Annum	(%)
Savings from energy demand reduction	**204**	**27%**
Savings from heat network/CHP	0	0%
Savings from renewable energy	354.6	47%
Cumulative savings	558.6	74%

Table 3: New build savings at each stage of the energy hierarchy, with WWHRS installed

Overheating Mitigation

Please see Appendix F for full Overheating Assessment.

London Plan 2021 Overheating Policy

Policy SI 4 'Managing Heat Risk' establishes the need for developments to mitigate the impacts of the urban heat island effect. It states that major developments should adhere to the following cooling hierarchy:

1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

Hillingdon Policy

Under Policy EM1 'Climate Change Adaptation and Mitigation', Hillingdon council encourage developments to maximise passive design measures to reduce the impacts of urban heat island effects.

Part O Building Regulations

The Part O Building Regulations Approved Document for 'Overheating mitigation' states: ***Reasonable provision must be made in respect of a dwelling, institution, or any other building containing one or more rooms for residential purposes, other than a room in a hotel.*** Therefore, Part O Building Regulations will not be used for this site, and instead the methodology found within CIBSE TM52 has been applied.

CIBSE TM52

The CIBSE Technical Memorandum 52 (TM) is about predicting overheating in buildings. It is intended to inform designers, developers and others responsible for defining the indoor environment in buildings. The methodology for ensuring cooling demand is reduced without unnecessarily impacting daylight distribution has been adopted from CIBSE TM52. Further information on the methodology and modelling carried out can be found in Appendix C - Overheating Assessment.

Cooling Demand

All passive design measures for the scheme have been investigated before considering cooling. Using the London Plan hierarchy:

- All hotel units will have openable windows for natural ventilation.
- Windows to hotel units have been provided additional external shade through vertical louvres to avoid unnecessary solar gains.
- The solar transmittance of the glazing (g-value) will be 0.5
- Internal curtains/blinds will be provided.
- The provision for cooling will be provided across the site by way of an energy efficient heating/cooling Variable Refrigerant FLow (VRF) system (see later sections for details).

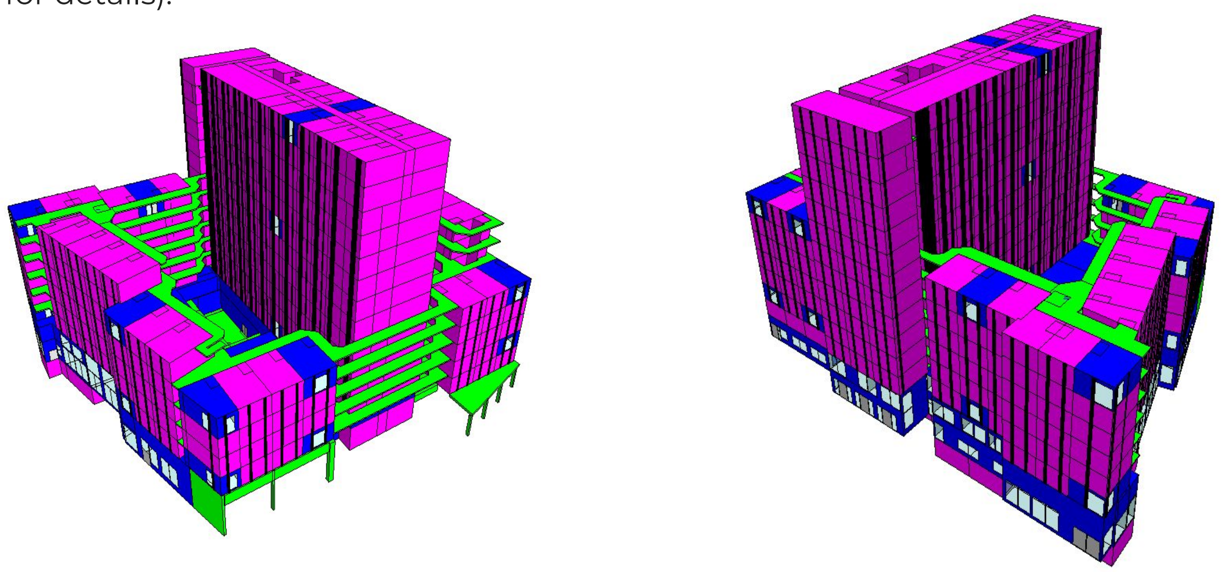


Figure 7: 3d model of the proposed scheme indicating the rooms assessed for overheating (blue)

	Area weighted average nonresidential cooling demand (MJ/m2)	Total area weighted nonresidential cooling demand (MJ/year)
Actual	110	1,500,000
Notional	111	1,470,000

Table 4: Cooling demand for new build

	Area weighted average nonresidential cooling demand (MJ/m2)	Total area weighted nonresidential cooling demand (MJ/year)
Actual	118	946,000
Notional	101	807,000

Table 5: Cooling demand for existing

Be Clean (Heat Supply)

Once demand for energy has been minimised, planning applications should demonstrate how their energy systems will exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly to reduce CO_2 emissions.

As well as carbon dioxide emissions, all combustion processes can emit oxides of Nitrogen (NOx) and, solid or liquid fuelled appliances (such as those using biomass or biodiesel) can also emit Particulate Matter. These pollutants contribute to poor air quality and can have negative impacts on the health of residents and occupants of the development. It is important that these impacts are considered in determining the heating strategy of a development.

Existing Networks, Planned Networks and Supplying heat beyond the site boundary

Where a heat network exists in the vicinity of the proposed development, the applicant should look to prioritise connection and provide evidence of active two-way correspondence with the network operator.

If there is not an existing network, the applicant must investigate whether a network is being planned for the area. Applicants should also investigate opportunities for expanding their heat network to supply heat to local developments and buildings outside the boundaries of their site, particularly if this has the potential to facilitate an area-wide heat network. As shown on the image to the right, the scheme (0JN highlighted red) is located at too greater distance from any existing or proposed heat networks (highlighted orange). Heating demand is considered low due to the quality building fabric; therefore, individual efficient space heating and domestic hot water systems are advised.

It is noted that there is the possibility of the future connection to data centres in the local area where they may be looking at cost-effective ways to 'dump their heat'; therefore, the heat plant room allows space for future heat exchangers to exploit this option.

Space heating and hot water will be provided by a communal system on site, but consideration will be given to the future transition to local heat networks.

The basement heat plant room will therefore have the provision for connecting to a future district heat network, should this be brought forward in the local area, as illustrated on the right.

Figure 8: Location of site postcode (UB4, red) in relation to proposed heat networks (orange)

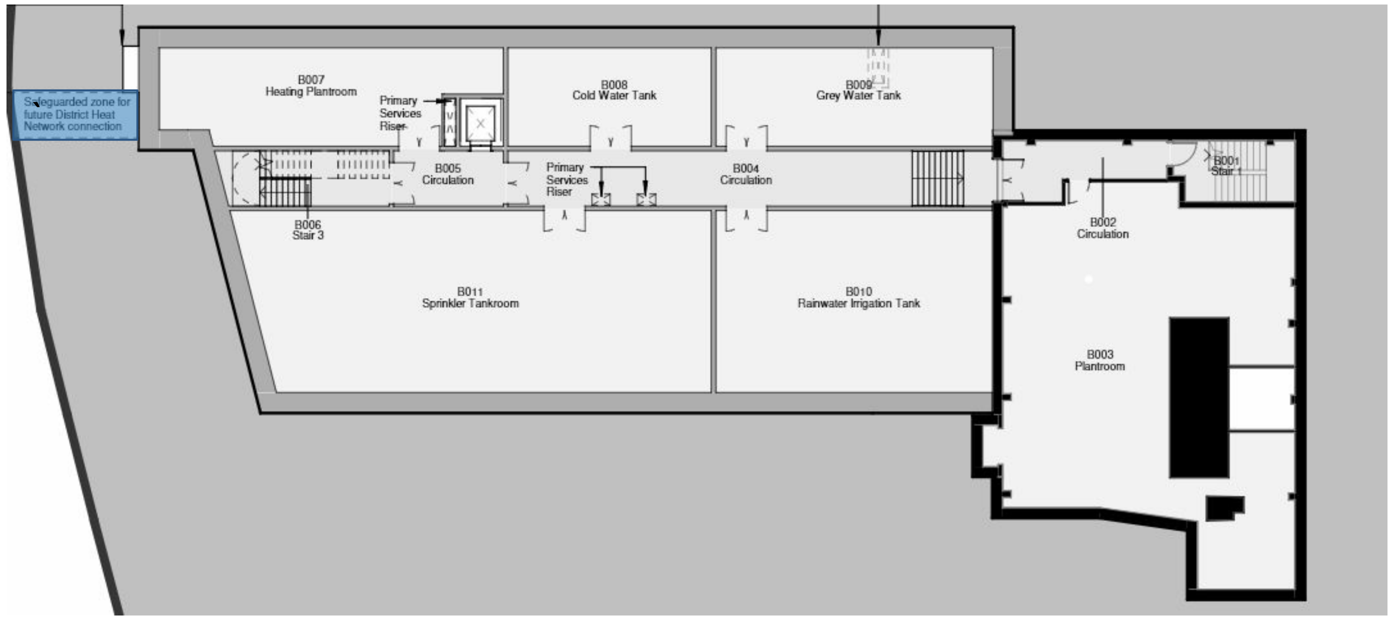


Figure 9: Safeguarded zone for future district heat network connection (blue)

Be Green (Renewable Energy)

For the last step of the Energy Hierarchy, opportunities for producing, storing, and using renewable energy on-site are investigated and maximised to the extent feasible.. The capacity for renewable technologies at the site has been explored with the wider design team. The following technologies were considered:

- Air Source Heat Pump (ASHP)
- Ground Source Heat Pump (GSHP)
- Water Source Heat Pump (GSHP)
- Photovoltaic Solar Panels
- Solar Thermal Hot Water
- Wind Technology

Of the above technologies ASHPs were deemed the most appropriate to supply heating, on the grounds of feasibility, viability, and location of whole life energy and carbon savings. Photovoltaic Solar Panels were deemed the most suitable strategy for generating electricity onsite.

Air Source Heat Pumps (ASHPs)

ASHPs were deemed the most appropriate to supply heat, on the grounds of feasibility, viability and scale of whole life energy and carbon savings. Where heat pumps are proposed, the system needs to be sized appropriately and specified to achieve a high seasonal coefficient of performance to ensure optimum, low carbon operation and peak demand. This applies to any type of heat pump proposals including air source heat pumps (ASHPs), ground source heat pumps (GSHPs), water source heat pumps (WSHPs) or hybrid and ambient loop types of systems.

As the scheme will be utilising cooling, a Variable Refrigerant Flow (VRF) system capable of providing heating and cooling will be used and a separate Domestic Hot Water (DHW) network utilising ASHPs connected to a site-wide network.

The details of the systems will be provided at the detailed design stage on the appointment of Building Services Engineers; therefore, conservative efficiencies for space heating and hot water have been used for the purpose of this report based on default figures for non-domestic uses.

Refrigerant pipe-runs will be minimised and in accordance with guidance from the specific supplier. The hot water storage introduces an element of demand-side flexibility, which, combined with smart controls, will further optimise the scheme's energy and carbon performance, and positively contribute to grid decarbonisation.

The location of the outdoor condenser will be on the roof of the development out of site from any noise-sensitive neighbouring properties. Further detail will be mapped out at the detailed design stage.

Figure 10: (Top) ©Mitsubishi, Y Series VRF Standard Heat Pump (YNW) (Bottom) ©Daikin, example VRF system on roof

Be Green (Renewable Energy)

Air Source Heat pumps (continued)

In order to achieve London's carbon budgets as set out in the Mayor's Environment Strategy, energy efficiency, low carbon electricity and low carbon heat are all essential. There is a consensus that the energy demand of buildings should reduce and electricity is decarbonising at a rapid rate. This means that low carbon heat should be a priority going forward, which is also impacted by the grid decarbonisation as some forms of low carbon heat (e.g. heat pumps) use electricity.

Heat pump systems are widely used in a range of commercial buildings. The GLA's 'Low Carbon Heat: Heat Pumps in London' was used as guidance to determine the type of air pump is most suitable for this scheme.

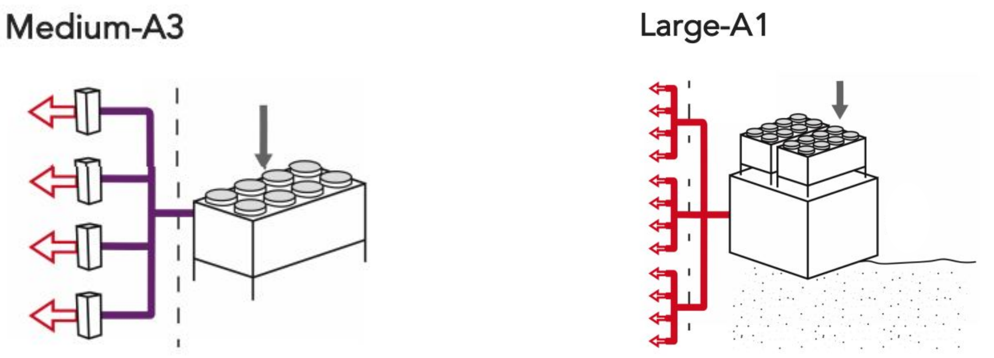


Figure 11: Space Heating and cooling (left) and DHW distribution (right) similar to the systems found in GLA's 'Low Carbon Heat: Heat Pumps in London'.

Space Heating and Cooling

A communal Variable Refrigerant FLow (VRF) system air source heat pump to individual heat pumps were determined to be suitable for the space heating and cooling. This communal system distributes heat around the development using a refrigerant based system.

VRF is a technology that alternates the refrigerant volume in a system to match a building's precise requirements. Only a minimum amount of energy is required for a system to maintain set temperatures, and ensure that it automatically shuts off when no occupants are detected in a room. This unique mechanism is more sustainable in the long run, as end users save on energy costs while reducing their system's carbon emissions.

With up to ~64 indoor air conditioning units connected to one outdoor unit, the VRV system operates similar to a Multi-Split system. Each individual indoor unit determines the capacity it needs based on the current indoor temperature and requested temperature from the remote control (set point).

The total demand among all indoor units will determine how the outdoor unit adjusts the refrigerant volume and temperature. By only supplying the cooling or heating that is needed, the inverter compressor continues to save a large amount of energy during VRV operation. ©Daikin

Domestic Hot Water (DHW)

A separate hot water distribution network will exist throughout the site that will offer instantaneous hot water to each hotel room and connection to incubator and hotel amenity spaces via a hot water heat distribution network.

The source of the heating will be from heat pumps capable of providing efficient heat energy at high temperatures.

For the hotel, it is possible that DHW) may account for over 50% of the total operational energy demand, so there is a real focus on maximising the DHW efficiency. It is noted that there is the possibility of the future connection to data centres in the local area where they may be looking at cost-effective ways to 'dump their heat'; therefore, the heat plant room allows space for future heat exchangers to exploit this option.

Be Green (Renewable Energy)

Photovoltaic Panels (PV)

Photovoltaic solar panels are the preferred on-site renewable generation technology as electricity is off-set on-site. The variables used are set out in the table below and location of the array in the adjoining figure.

The scheme will provide space for approximately 448m2 of PV Panels, displacing 0.45KgCO2/m2 per year.

The indicative location for the PV panels is displayed on the right (red).

PV Item	Description	Unit
Approx. PV array size	448	m2
Assumed panel power	300	Watt panel
Length of panel	1.65	m
Width of panel	0.97	m
Total panel size	1.6	m2
Inclination of panel	Horizontal	-
Total peak power	84	kWp
Assumed # of panels	280	# panels
Total CO2 savings	6200	kgCO2

Table 6: Photovoltaic solar panel parameter assumptions

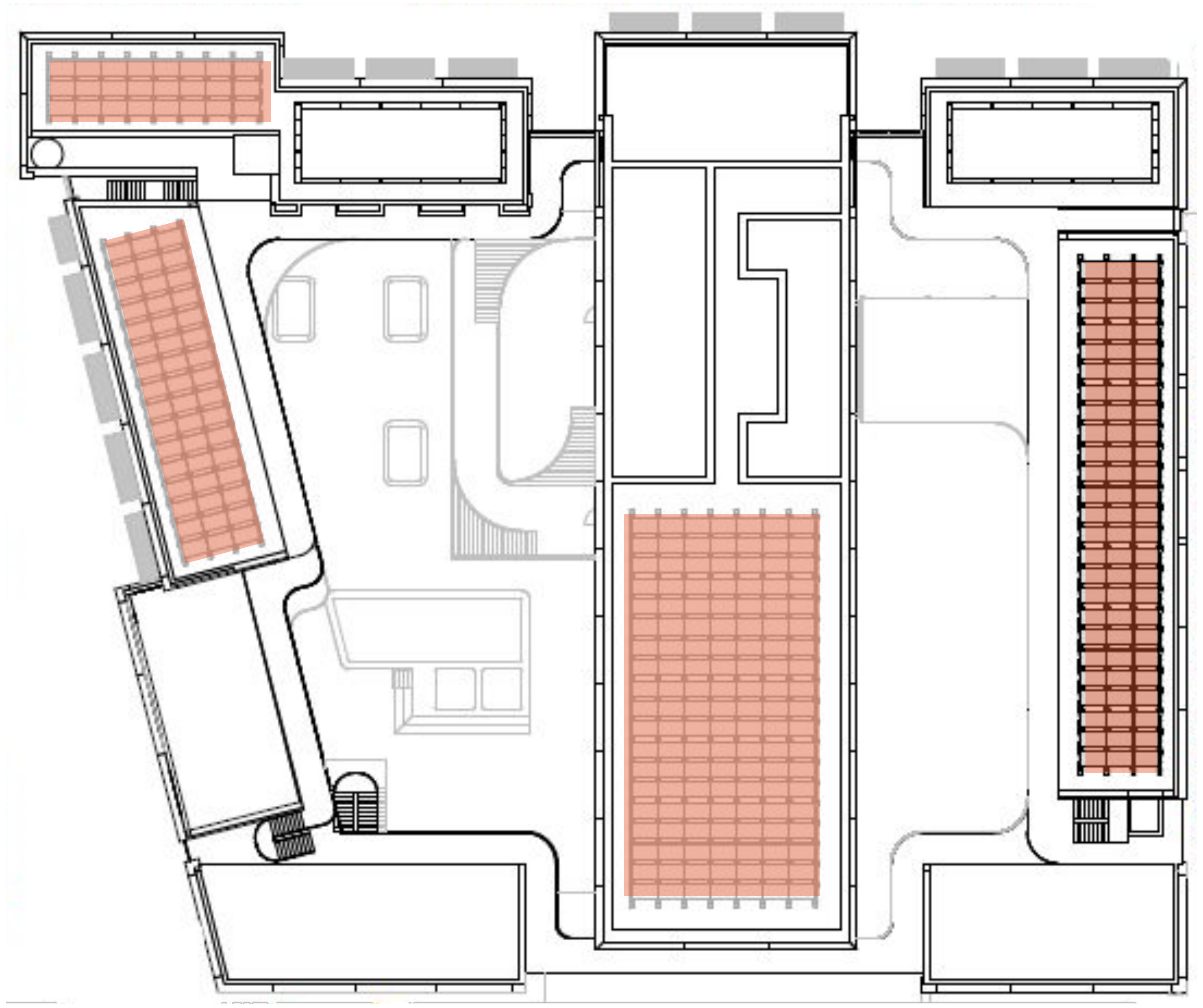


Figure 12: Proposed roof plan with indicative location of PV panels (red)

Be Seen

To truly achieve net zero-carbon buildings, there needs to be a better understanding of the actual operational energy performance of a development and work towards bridging the 'performance gap' between design theory and actual energy use. London Plan Policy SI 2 sets out the 'be seen' requirement for all major development proposals to monitor and report on their actual operational energy performance.

The applicant complies with the requirement to provide accurate and verified estimates of each of the performance indicators of each reporting stage through the appropriate 'be seen' reporting template. To comply with Policy SI 1, this scheme will provide accurate and verified estimates of each of the performance indicators at the relevant reporting stage through the appropriate 'be seen' reporting templates.

This scheme will provide estimates of each of the performance indicators for the planning stage (RIBA Stage 2/3), as illustrated to the right, and then the as-built stage and in-use stage, as required. The webform will be submitted at the same time as this energy assessment and all other planning application documents.

Performance Indicator Group	Requirements at Planning Stage
Contextual	• Location Unique Property Reference Number (UPRN) or Address • Site plan • Typology/use • GIA for each typology/use • Anticipated target dates for each 'be seen' reporting stage
Building Energy Use	• Grid electricity consumption (kWh) • Gas consumption (kWh) • Other fuels consumption (kWh) • District heating/ cooling consumption (if applicable) (kWh)
Renewable Energy Use	• Energy generation (kWh)
Energy Storage	N/A
Plant parameters	N/A
Carbon	• Carbon emissions estimates (tonnes CO_2/m^2) for residential, nonresidential and whole development • Carbon shortfall for the entire development (tonnes CO_2) • Estimated carbon offset amount (£)

Table 7: Be Seen requirements at planning stage

Carbon Summary

The energy strategy follows the energy hierarchy; Use Less Energy (Be Lean), Supply energy efficiently (Be Clean) and use Renewable and low carbon energy (Be Green) as per Policy EM1 of the Hillingdon Local Plan (2012)..

The scheme adopts a fabric-first and passive design approach to reduce energy demand for space heating and eliminate the need for active cooling. Key design elements of the proposals comprise of:

- A well-insulated building fabric shell
- Being airtight, reducing draughts and heat-loss
- Mechanical ventilation with heat recovery (MVHR)

An all-electric, air source heat-pump system is proposed to deliver the space heating and hot water demand for the new development. ASHPs offer a highly energy efficient low carbon solution, that future-proofs the dwelling towards achieving net zero carbon in operation in coming years. Low operational costs and carbon emissions, are complemented with improved air quality on-site due to zero combustion on site, benefitting the health & wellbeing of occupants.

Photovoltaic solar panels are the preferred on-site renewable generation technology as electricity is off-set on-site. The scheme will provide space for approximately 44.1 kWp.

Following the new Part L 2021 Building Regulations that came into effect in June 2022, the GLA Energy Assessment Guidance (June 2022) states that major non-domestic developments must meet a 35 per cent on-site carbon reduction beyond Part L 2021. However, as the software is currently in an interim period between Part L 2013 and Part L 2021 that is yet to be tried and tested, the GLA have stated the following:

"However, as the accompanying Part L 2021 software is not yet available, planning applicants should continue to use the 2020 guidance, spreadsheet and the Part L 2013 methodology until the software has been approved by government and is fully functional."

Therefore, this energy assessment has proceeded using the 2013 methodology by running SBEM calculations against Part L 2013 carbon factors and notional baselines. The outputs were then used in the GLA Carbon Emissions Reporting Spreadsheet 2020 which uses Part L 2013 as a baseline.

Based on the assessment undertaken, the energy strategy set out within this report delivers a new build cumulative CO_2 reduction of **74%** compared to the 2013 baseline. The cumulative CO_2 reduction is broken down by the following:

- 27% at Be Lean
- 0% at Be Clean
- 47% at Be Green

74% **New build cumulative CO_2 reduction (Part L 2013 Baseline)**

New Build CO2 Summary

Following the energy hierarchy process, the new build scheme has opted for passive design features, a highly efficient fabric, mechanical ventilation with heat recovery, opportunities for waste water heat recovery systems, and air source heat pump solutions for space heating and domestic hot water.

Based on the SBEM energy modelling, the regulated carbon emissions of the scheme are 74% lower than the 2013 baseline scheme. The proposed energy strategy therefore delivers a highly efficient, low carbon dwelling that substantially exceeds the on-site carbon reduction target of 35% stipulated by the London Plan (2021).

The new build results summary for the carbon emissions are set to the right.

	Regulated non- domestic carbon dioxide savings	
	Tonnes CO2 Per Annum	(%)
Savings from energy demand reduction	204	27%
Savings from heat network/CHP	0	0%
Savings from renewable energy	354.6	47%
Cumulative savings	**558.6**	**74%**
Cash in-lieu contribution (£)	**550,000**	

Table 8: New build savings at each stage of the energy hierarchy using Part L 2013 baseline

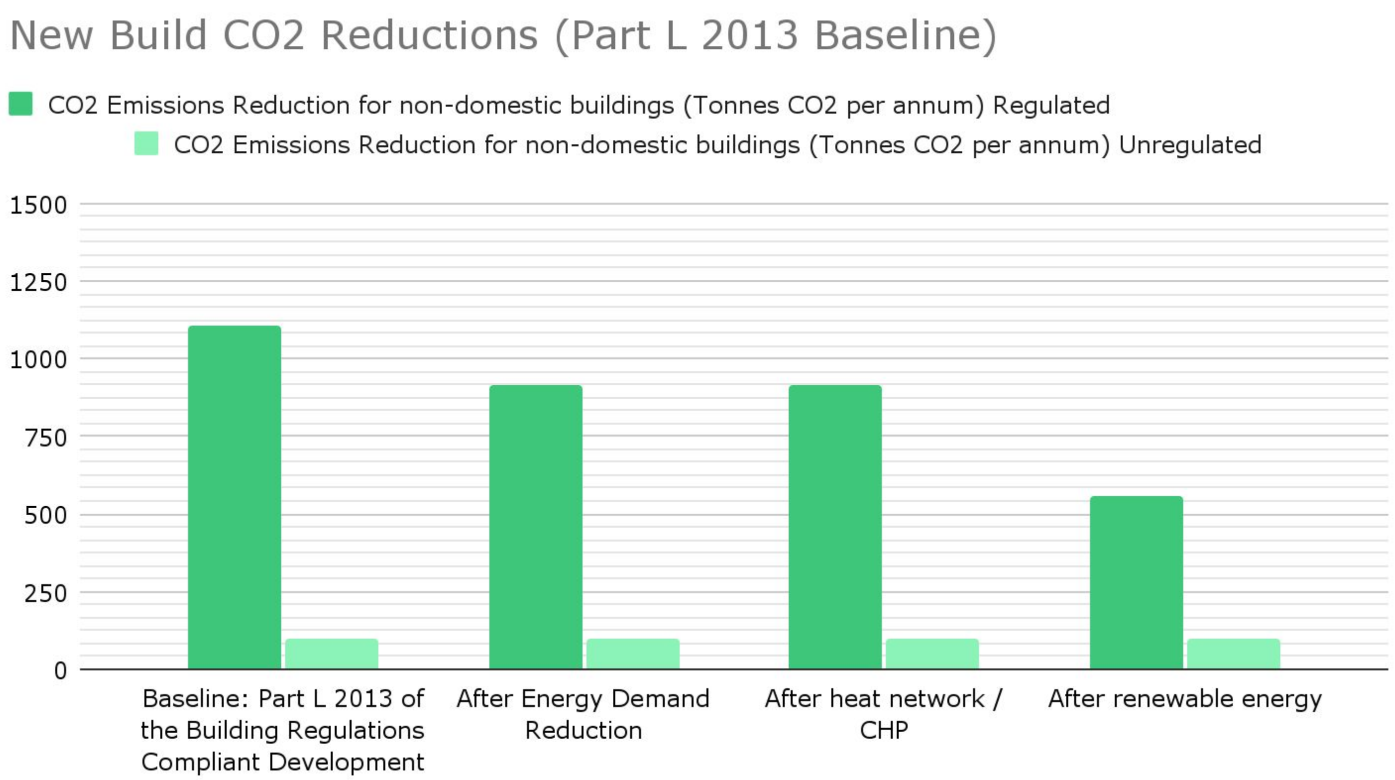


Figure 13: New build savings at each stage of the energy hierarchy using Part L 2013 baseline

Existing CO2 Summary

The existing hotel block already has a fully functioning, relatively modern (circa. 2015), HVAC system in the form of; a refrigerant pipework network connected to bedroom comfort conditioning units in the ceiling void, providing space heating and cooling; these are connected via rooftop outdoor condensers. An Air Handling Unit (AHU) supplies fresh air to each individual hotel room. Domestic Hot Water to the existing hotel building is currently supplied by a mix of gas boilers and heat pumps.

The existing hotel results summary for the carbon emissions are set out to the right.

Building Fabric	Input	Unit	Comments
Existing			
External Wall U-Value	0.55	W/m2k	Include unheated areas
Roof U-Value	0.18	W/m2k	-
Ground Floor U-Value	0.25	W/m2k	-
Window U-Value	0.6	W/m2k	-
Doors U-Value	1.5	W/m2k	-
Thermal Bridge Y-Value	<0.1	W/m2k	-
Window G-Value	0.5	-	-
Air Permeability	3	@50Pa (m.h3/m2)	A low air permeability required to improve mech vent efficiency

Table 9: The SBEM model input variables for reference

	Regulated non- domestic carbon dioxide savings	
	Tonnes CO2 Per Annum	(%)
Savings from energy demand reduction	0	0%
Savings from heat network/CHP	0	0%
Savings from renewable energy	0	0%
Cumulative savings	**0**	**0%**

Table 10: Existing savings at each stage of the energy hierarchy using Part L 2013 baseline

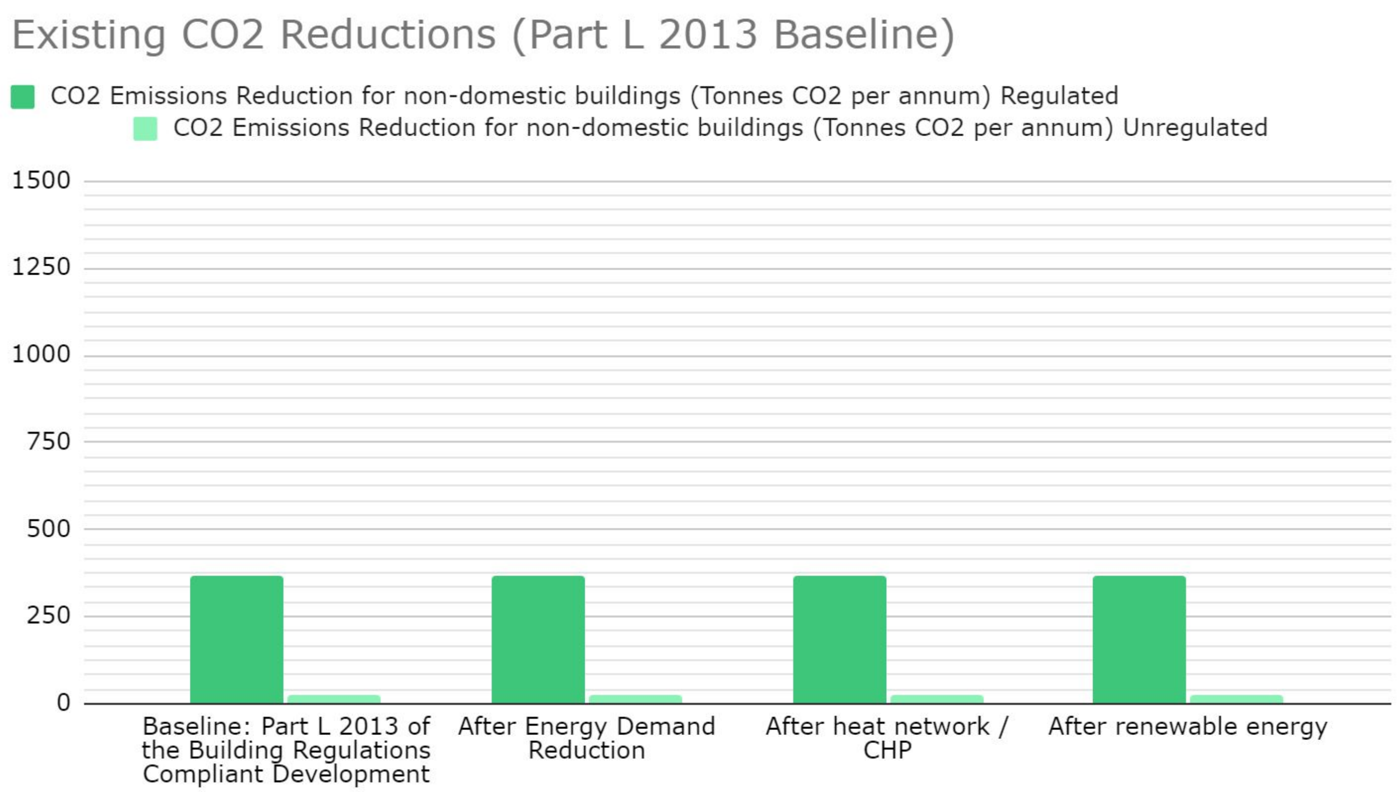


Figure 14: New build savings at each stage of the energy hierarchy using Part L 2013 baseline

Site-Wide CO2 Summary

The site-wide proposal is for the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping. The total proposed site will consist of 435 hotel keys and 23,946m2 gross external area.

The site-wide results summary for the carbon emissions are set out below.

	Regulated non- domestic carbon dioxide savings	
	Tonnes CO2 Per Annum	(%)
Savings from energy demand reduction	204	18%
Savings from heat network/CHP	0	0%
Savings from renewable energy	354.6	32%
Cumulative savings	**558.6**	**50%**

Table 11: Site-wide savings at each stage of the energy hierarchy using Part L 2013 baseline

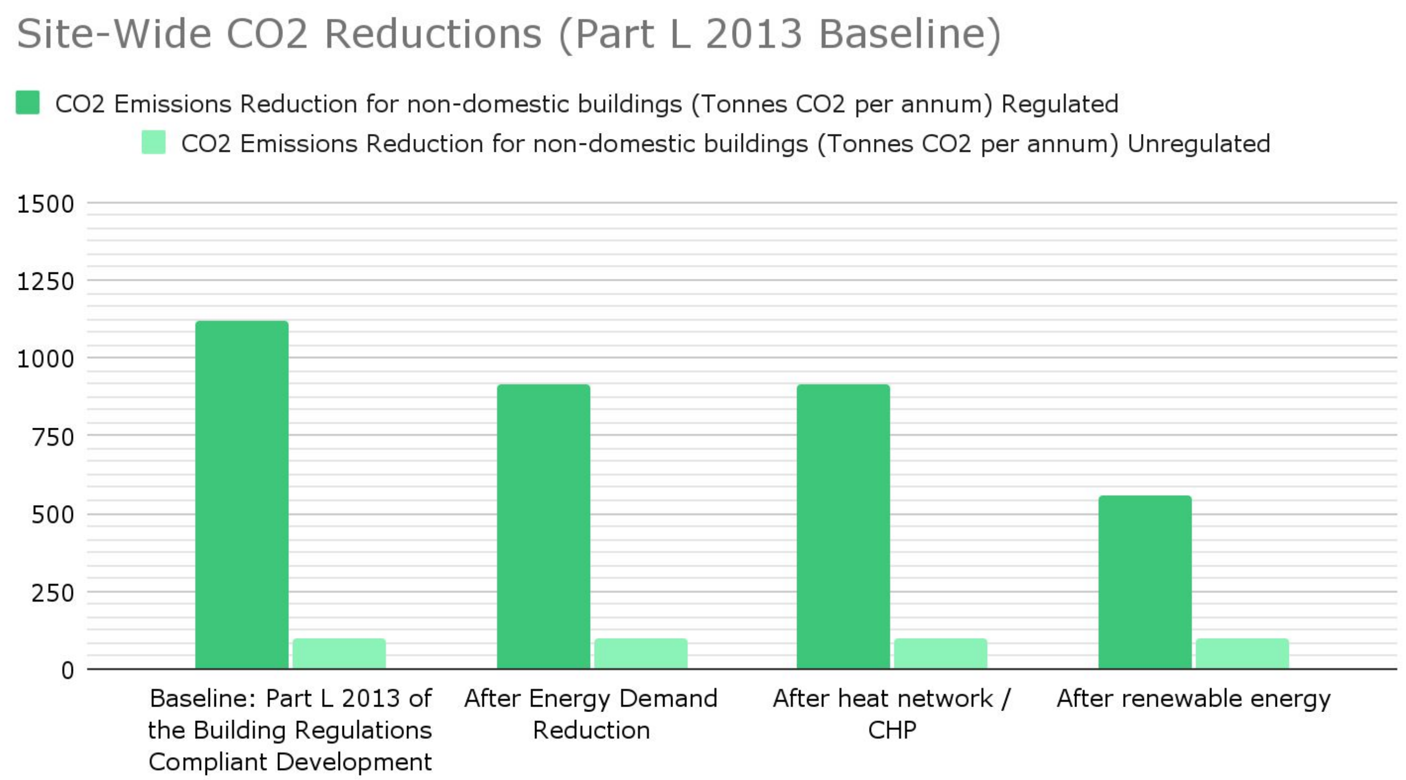


Figure 15: New build savings at each stage of the energy hierarchy using Part L 2013 baseline

Section Three

3 Sustainability

BREEAM Pre-Assessment Summary

A BREEAM 2018 New Construction Pre-Assessment of the proposed site has been conducted, with the aim to achieve BREEAM 'Very Good'. The following 10 categories were assessed and have been used to demonstrate the scheme's sustainability credentials:

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

This report demonstrates that the building has a current targeted score of **67.3%** which equates to a BREEAM rating of 'Very Good' with the potential to achieve a score of **85.52%**, which equates to a BREEAM rating of 'Excellent'. The score breakdown is illustrated to the right, and the credit breakdown for each category is set out on the following pages.

The current BREEAM targeted score provides a small buffer over the target score of 55% (the threshold for Very Good) should credits be lost through design or cost constraints as the project progresses.

It is key for the design team to remain in contact with the assessor throughout the process and to check that all specifications are in line with the pre-assessment to ensure the required level is achieved upon construction. In order to sign off the planning condition, a Design Stage and Post Construction Stage assessment will be required and the reports submitted to the BRE for certification.

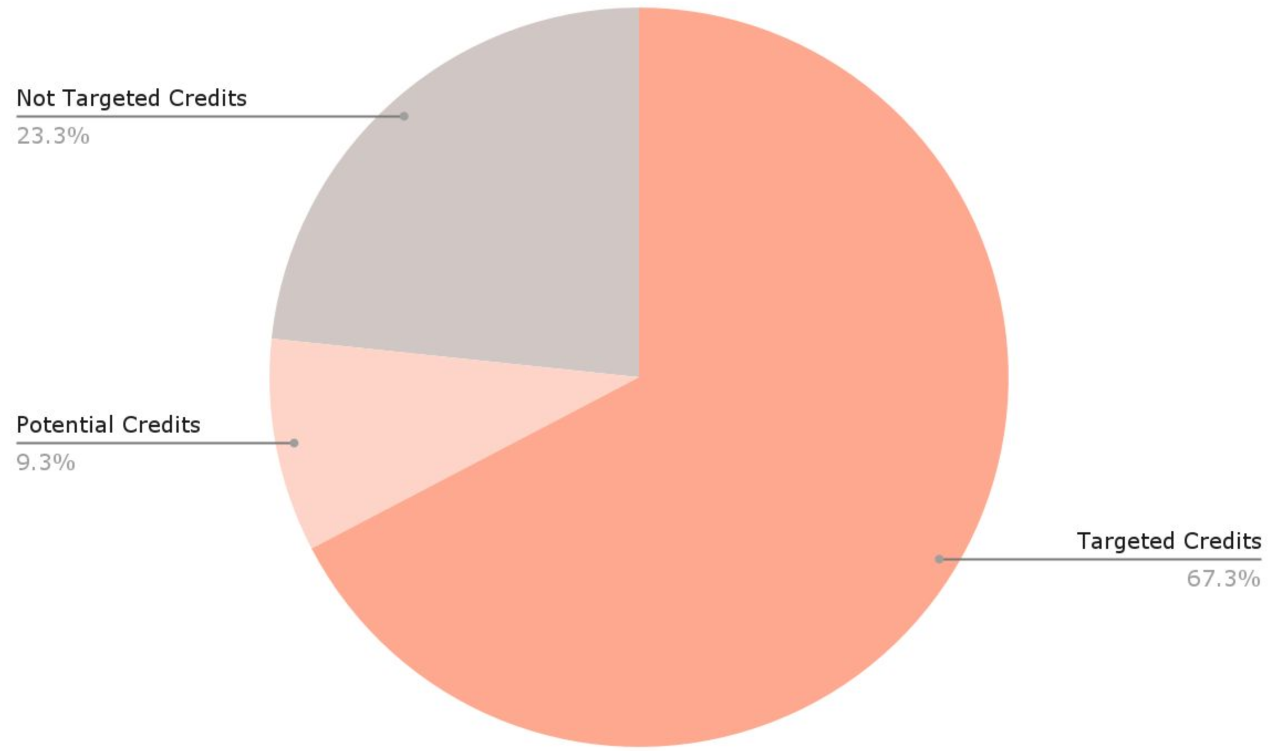


Figure 16: BREEAM 2018 New Construction Pre-Assessment Score Breakdown

BREEAM Category	Credits Available	Targeted Credits	Potential Credits	% of Credits Achieved	Weighting	Section Score
Management	21	13	3	61.90%	11.00%	6.81
Health & Wellbeing	18	11	0	61.10%	14.00%	8.56
Energy	31	24	0	77.40%	16.00%	12.39
Transport	12	7	3	58.30%	10.00%	5.83
Water	9	6	2	66.70%	7.00%	4.67
Materials	14	9	0	64.30%	15.00%	9.64
Waste	10	10	0	100.00%	6.00%	6
Land Use & Ecology	13	12	1	92.30%	13.00%	12
Pollution	12	9	3	75.00%	8.00%	6
Innovation	10	3	11	30.00%	10.00%	3

Table 12: BREEAM 2018 New Construction Pre-Assessment Score Breakdown

BREEAM Pre-assessment

MANAGEMENT

The BREEAM Management category encourages the adoption of sustainable management practices in connection with design, construction, commissioning, handover, and aftercare activities to ensure that robust sustainability objectives are set and followed through into the operation of the building. Issues in this section focus on embedding sustainability actions through the key stages of design, procurement, and initial occupation from the initial project brief stage to the appropriate provision of aftercare.

MAN 01 – PROJECT BRIEF AND DESIGN

Available Credits	Targeted Credits	Potential Credits
4	2	2

Management is required to define of the key phases of the its delivery, which includes roles, responsibilities and contributions. Stakeholders' and consultants' contributions should be highlighted throughout the completion of the Initial Project Brief, Project Execution Plan, Communication Strategy and Concept Design. Management should also ensure that BREEAM AP is appointed at the Concept Design Stage, monitoring and supporting the project team's progress through the provision of feedback. Additional credits are available if a BREEAM AP is appointed in the Developed Design Stage.

MAN 02 – LIFE CYCLE COST AND SERVICE PLANNING

Available Credits	Targeted Credits	Potential Credits
4	2	4

An asset elemental LCC plan is to be outlined and carried out at the Process Stage 2 in line with the pertinent standards. The plan is expected to concretely outline its influence on building and systems design, specifying the minimisation of life cycle costs and maximisation of critical values. A component level LCC should be developed by the end of Process Stage 4, and a capital costs report for the building should be submitted to BRE.

MAN 03 – RESPONSIBLE CONSTRUCTION PRACTICES

Available Credits	Targeted Credits	Potential Credits
6	6	6

This scheme is expected to achieve 100% of the credits associated with MAN 03. This is achieved in practice by ensuring all timber based materials are legally harvested and that best practice pollution prevention policies are implemented on site alongside achieving compliance with an organisational considerate construction scheme. It also covers monitoring the on-site energy, water, and transportation usage from the principal and sub-contractors across all construction processes.

MAN 04 – COMMISSIONING AND HANDOVER

Available Credits	Targeted Credits	Potential Credits
4	3	4

The securement of the credits depends on the development of a schedule for commissioning and testing. When the Building Management System (BMS) is specified, there should additionally be a monitoring of air and water systems commissions, room temperature commissions, controls installation that run autonomously with satisfactory internal conditions prior to handover, BMS schematics and graphics installed and functional before handover, and full training of the facilities team in operation of the system. In order to manage commissions, a team member should be chosen to undertake design reviews and provide commissioning management input. After construction, the quality of the building is to be assessed through tests and inspections. Additionally, technical and non-technical user guides and training schedules should be provided to respectively building occupiers and facilities managers prior to handover.

BREEAM Pre-assessment

HEALTH AND WELLBEING

This category encourages the increased comfort, health and safety of building occupants, visitors, and others within the vicinity. Issues in this section aim to enhance the quality of life in buildings by recognising those that encourage a healthy and safe internal and external environment for occupants.

HEA 01 – VISUAL COMFORT

Available Credits	Targeted Credits	Potential Credits
Up to 6	4	4

Assess risk of glare and internal lighting according to the pertinent standards in order to ensure the comfort of the occupants. In addition to meeting daylight criteria, 95% of floor areas of 95% of spaces should provide an adequate view out, with windows or openings composing at least 20% of surrounding walls.

HEA 02 – INDOOR AIR QUALITY

Available Credits	Targeted Credits	Potential Credits
1	1	1

The building has been designed to minimise the indoor concentration and recirculation of pollutants in the building as follows by providing fresh air into the building and limit the build-up of air pollutants in accordance with the criteria of the relevant standard for ventilation. Additionally, where the occupancy of a room will vary, air quality will be monitored.

HEA 04 - THERMAL COMFORT

Available Credits	Targeted Credits	Potential Credits
2	2	2

100% of credits associated with HEA04 have been targeted. The Thermal Comfort credits require the building to undergo thermal modelling, including dynamic thermal analysis with attention paid to summer and winter operative temperatures, as well as assessment of projected climate change effects. To achieve with this credit, compliance with various industry standards must be met.

HEA 05 - ACOUSTIC PERFORMANCE

Available Credits	Targeted Credits	Potential Credits
1	1	1

To achieve this credit, the building must meet appropriate acoustic performance standards, including indoor ambient noise level where pre-completion acoustic testing is carried out.

HEA 06 – SECURITY

Available Credits	Targeted Credits	Potential Credits
2	0	0

To achieve HEA 06 credits, a security specialist would have to visit the site and conduct an evidence based Security Needs Assessment (SNA) to demonstrate compliance, with all recommendations of the assessment implemented.

HEA 07 - SAFE AND HEALTHY SURROUNDINGS

Available Credits	Targeted Credits	Potential Credits
2	2	2

Cycle paths have been indicated between site entrance, cycle storage, and off-site cycle paths. For pedestrian safety, safe footpaths are indicated around the site, as well as safe drop-off points. External amenity area is also provided for building occupants.

BREEAM Pre-assessment

ENERGY

This category encourages the specification and design of energy efficient building solutions, systems and equipment that support the sustainable use of energy in the building and sustainable management in the building's operation. Issues in this section assess measures to improve the inherent energy efficiency of the building, encourage the reduction of carbon emissions and support efficient management throughout the operational phase of the building's life.

ENE 01 - REDUCTION OF ENERGY USE AND CARBON EMISSIONS

Available Credits	Targeted Credits	Potential Credits
13	13	13

100% of credits associated with ENE 01 have been targeted. Energy modelling The relevant Energy Performance Ratio for New Construction (EPRNC) is achieved. Additionally, operational energy consumption will be calculated during design and post-construction stages.

ENE 02 – ENERGY MONITORING

Available Credits	Targeted Credits	Potential Credits
2	2	2

ENE 02 involves the installation of comprehensive energy meters. The scheme will monitor energy consumption, with the associated monitoring method based on the total useful floor area (if >1000m^2 monitor by end-use and if <1000m^2 use accessible sub-monitors). Additionally, energy supply will be monitored using accessible monitoring and management systems.

ENE 03 - EXTERNAL LIGHTING

Available Credits	Targeted Credits	Potential Credits
1	1	1

100% of credits associated with ENE 03 have been targeted. When there is external lighting, the average initial luminous efficacy should be no less than 70 luminaire lumens per circuit Watt. There should also be automatic control of lighting to avoid electricity waste during daylight hours and presence detection in areas of intermittent pedestrian traffic.

ENE 04 - LOW CARBON DESIGN

Available Credits	Targeted Credits	Potential Credits
3	3	3

Two thirds of the credits available via ENE 04 have been targeted. This entails achieving thermal comfort under HEA 04, and analysis of the design to identify opportunities for passive design solutions which would reduce the total heating, cooling, mechanical ventilation and lighting loads and energy consumption of the scheme. A feasibility study should also identify any local low carbon energy source and in practice this should be integrated with the development.

ENE 05 - ENERGY EFFICIENT COLD STORAGE

Available Credits	Targeted Credits	Potential Credits
2	2	2

To achieve ENE 05 credits, any refrigeration system must be installed in accordance with regulations and must be efficient and demonstrate a saving in indirect GHG emissions over its operational lifetime.

ENE 06 - ENERGY EFFICIENT TRANSPORTATION SYSTEMS

Available Credits	Targeted Credits	Potential Credits
3	3	3

All credits of ENE 06 have been targeted. ENE 06 stipulates that to achieve these credits, escalators, lifts and moving walks must be quantified at an optimum number of units, following usage pattern analysis. Energy consumption for these units should be calculated in accordance with relevant regulations. Lifts must be energy efficient, with regenerative drives used to capture waste heat. Escalators and moving walk must be fitted with a load sensing device or be automated based on passenger sensors to minimise energy usage.

BREEAM Pre-assessment

TRANSPORT

This category encourages better access to sustainable means of transport for building users. Issues in this section focus on the accessibility of public transport and other alternative transport solutions (cyclist facilities, provision of amenities local to a building) that support reductions in car journeys and, therefore, congestion and CO2 emissions over the life of the building.

TRA 01 - TRANSPORT ASSESSMENT AND TRAVEL PLAN

Available Credits	Targeted Credits	Potential Credits
2	**2**	**2**

A site-specific transport assessment and travel plan will be undertaken in order to produce a site specific travel plan that pushes more sustainable transport. The plan will try to increase and improve sustainable modes of transport.

TRA 02 - SUSTAINABLE TRANSPORT MEASURES

Available Credits	Targeted Credits	Potential Credits
10	**5**	**3**

The credit award depends on the Accessible Index (AI) achieved throughout the project, which must be larger than 8 and demonstrate further initiatives of sustainable transport development. Parking capacities should be 10% composed of recharging stations and 5% of priority parking for car sharing scheme participants. Storage spaces for bicycles should be provided to encourage cycling, in addition to collaborations with local authorities to implement propositions related to local cycling networks or pedestrian routes. Regarding education, information on public transport should be made available, and car sharing is to be actively promoted. There should be three existing accessible amenities for the building group, and at least one new amenity being constructed. Additionally, a new site-specific improvement measure should be developed and submitted for review by the BRE.

BREEAM Pre-assessment

WATER

This category encourages sustainable water use in the operation of the building and its site. Issues in this section focus on identifying means of reducing potable water consumption (internal and external) over the lifetime of the building and minimising losses through leakage.

WAT 01 - WATER CONSUMPTION

Available Credits	Targeted Credits	Potential Credits
5	2	4

WAT01 involves conducting a domestic water consuming component assessment and disclosing the efficiency of any water consuming components. Water usage is also benchmarked, with a lower usage of litres per person per day achieving a higher score. The use of a grey water or rainwater system makes additional credits available, provided that this is installed in compliance with applicable regulations.

WAT 02 - WATER MONITORING

Available Credits	Targeted Credits	Potential Credits
1	1	1

All credits pertaining to Water Monitoring have been targeted. This entails ensuring that water meters and easily accessible sub meters are installed which have either a pulse or other open protocol communication system to enable connection to the utility monitoring system. If an existing Building Monitoring System is in situ, then the new meters must be connected.

WAT 03 - WATER LEAK DETECTION

Available Credits	Targeted Credits	Potential Credits
2	2	2

100% of credits associated to WAT 03 have been targeted, which requires the development to install a leak detection system which can detect a major water leak on the mains water supply installed. Flow control devices will also be installed to each WC/ facility which regulate the supply of water according to the demand, minimising any leaks and wastage.

WAT 04 - WATER EFFICIENT EQUIPMENT

Available Credits	Targeted Credits	Potential Credits
1	1	1

WAT 04 requires the identification of all unregulated water demands that could be mitigated or reduced. Processes to identify means of reducing unregulated water demand through either good design or specification which result in a meaningful reduction in the total water demand of the building are encouraged.

Rainwater Harvesting and Greywater Recycling

Following the water BREEAM category, which encourages sustainable water practices, this scheme has considered the use of rainwater harvesting and greywater recycling. The proposed plans have indicated space for one rainwater and one greywater tank in the proposed basement, with the financial and technical feasibility of these systems considered further at post-planning.

Rainwater Harvesting

Rainwater harvesting is a method of sustainable water management, wherein rainwater is captured, filtered, and stored from the roof of a building, with the intent to reuse the water.

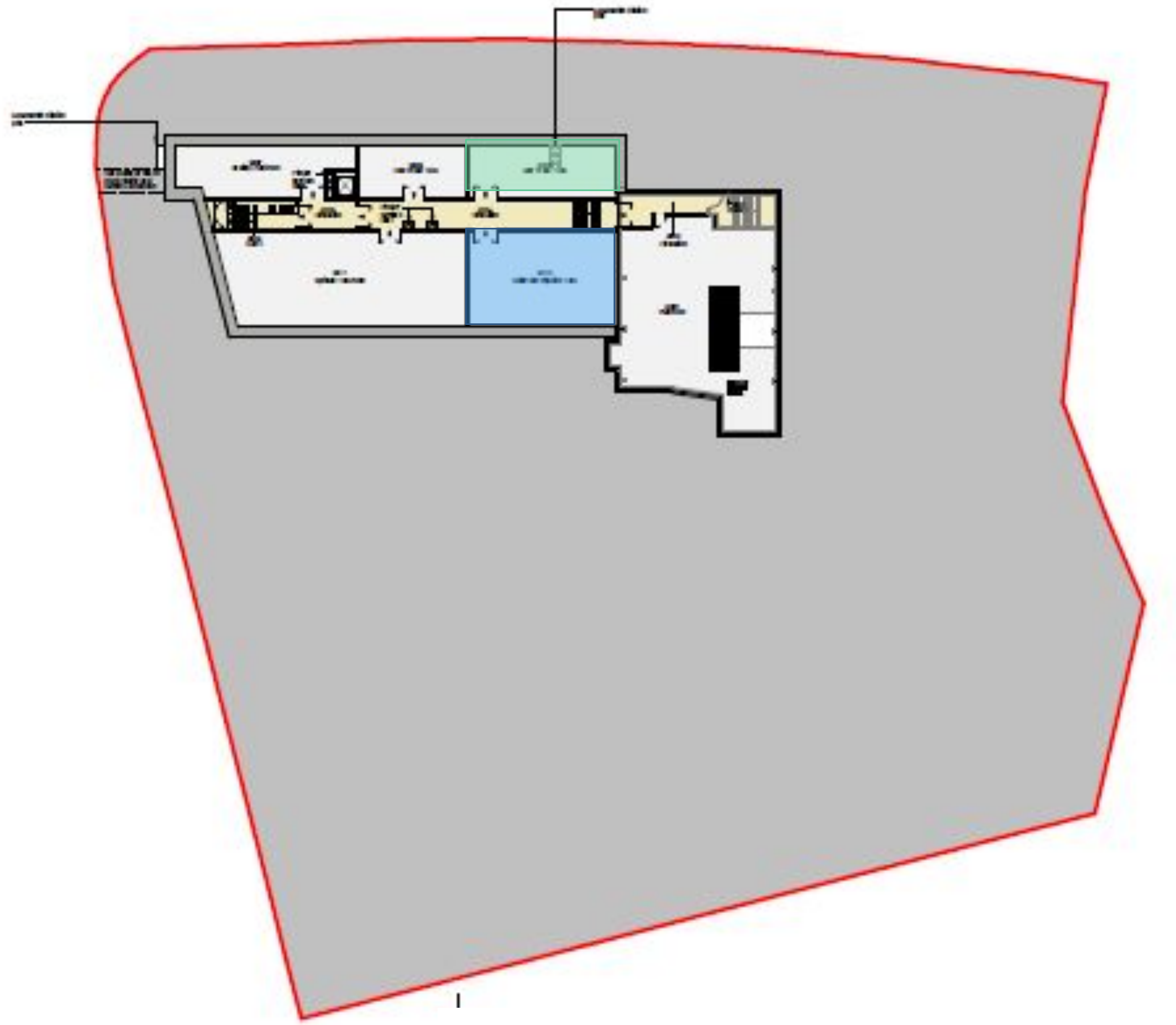
Rainwater harvesting lowers a development's demand for water, increases self-sufficiency to adapt to future scenarios, and it attenuates surfaces run-off, which is a key function of Sustainable Urban Drainage Systems (SuDS).

This scheme is suited for rainwater harvesting as it contains a large roof area and has a high water demand, therefore, space for a rainwater harvesting tank has been indicated in the proposed basement, as illustrated on the right. The rainwater harvesting is expected to be primarily used for irrigation.

Greywater Recycling

Greywater recycling is another method of sustainable water management, wherein waste water from showers, baths, sinks, and other utility water is processed through recycling equipment, with the intent to be reused, primarily for WC flushing. The treatment used to process the waste water contains heavy surfactants and other chemicals, resulting in a 'grey' colour when reused.

This scheme is suited for greywater recycling as the main building use is a hotel, which has high water demand, especially from showers, baths, toilets, and sinks. Therefore, space for a greywater recycling tank has been indicated in the proposed basement, as illustrated on the right.



Indicated space for greywater recycling tank

Indicated space for rainwater harvesting tank

Figure 17: Proposed Basement floor plan with indicated space for rainwater harvesting and greywater recycling

BREEAM Pre-assessment

MATERIALS

This category encourages steps taken to reduce the impact of construction materials through design, construction, maintenance, and repair. Issues in this section focus on the procurement of materials that are sourced in a responsible way and have a low embodied impact over their life including extraction, processing and manufacture and recycling.

MAT 01 - ENVIRONMENTAL IMPACTS FROM CONSTRUCTION PRODUCTS

Available Credits	Targeted Credits	Potential Credits
7	5	5

71% of credits associated with MAT 01 have been targeted. To achieve all credits under MAT 01, during the concept and technical design stage a building life cycle assessment (LCA) must be completed on the superstructure using BREEAM Simplified Building LCA tool, which must be submitted to BRE, along with MAT 02 results. Opportunities to improve environmental impact through substructure modifications are to be investigated.

MAT 02 - ENVIRONMENTAL IMPACTS FROM CONSTRUCTION PRODUCTS

Available Credits	Targeted Credits	Potential Credits
1	1	1

Construction products with Environmental Product Declaration (EPD) that achieve a minimum score of 20 should be specified within the BRE submission stated in MAT 01.

MAT 03 - RESPONSIBLE SOURCING OF MATERIALS

Available Credits	Targeted Credits	Potential Credits
4	1	1

MAT 03 involves ensuring that all timber-based products are legally harvested and traded, while encouraging the principal contractor to source materials in accordance with a sustainable procurement plan. Credits are awarded for responsibly sourced materials.

MAT 05 - DESIGNING FOR DURABILITY AND RESILIENCE

Available Credits	Targeted Credits	Potential Credits
1	1	1

100% of the credits available have been targeted. MAT05 focuses on ensuring that the building incorporates suitable durability and protection measures to prevent damage to vulnerable parts of the building. Materials specified must limit degradation due to environmental factors to maximise their useful life.

MAT 06 - MATERIAL EFFICIENCY

Available Credits	Targeted Credits	Potential Credits
1	1	1

100% of credits associated with MAT 06 have been targeted which encourages exploration of opportunities to identify measures to optimise the use of materials. This exploration must be carried out at several different RIBA stages.

BREEAM Pre-assessment

WASTE

This category encourages the sustainable management (and reuse where feasible) of construction, operational waste and waste through future maintenance and repairs associated with the building structure. By encouraging good design and construction practices, issues in this section aim to reduce the waste arising from the construction and operation of the building, encouraging its diversion from landfill. It includes recognition of measures to reduce future waste because of the need to alter the building in the light of future changes to climate.

WST 01 - CONSTRUCTION WASTE MANAGEMENT

Available Credits	Targeted Credits	Potential Credits
5	5	5

WST 01 requires the development of a resource management plan (RMP) that relates to waste generated on and off site by the buildings design and construction. A pre-demolition audit is required to identify any of the materials are refurbishable/reusable, and if not, to maximise the recovery of material from demolition for high value applications. Efforts must be made to divert materials being sent to landfill, with any waste materials sorted into separate key waste groups.

WST 02 - USE OF RECYCLED AND SUSTAINABLY SOURCED AGGREGATES

Available Credits	Targeted Credits	Potential Credits
1	1	1

To secure WST 02 credits, a pre-demolition audit should be completed to assess existing structures and encourage reuse of site-won material. Identify the type, quantity, location and transportation distance of materials used in the project to calculate Project Sustainable Aggregate points by inputting this information into the BREEAMWst 02 calculator.

WST 03 - OPERATIONAL WASTE

Available Credits	Targeted Credits	Potential Credits
1	1	1

100% of the WST 03 targets have been targeted and to achieve these credits. The development must have dedicated space provided for the segregation and storage of operational recyclable and compostable waste to the specification of BREEAM criteria.

WST 05 - ADAPTATION TO CLIMATE CHANGE

Available Credits	Targeted Credits	Potential Credits
1	1	1

All WST05 credits are being sought, this requires a climate change adaptation strategy to be conducted which looks at the structural and fabric resilience over the materials projected life cycle, from expected extreme weather conditions arising from climate change.

WST 06 - DESIGN FOR DISASSEMBLY AND ADAPTABILITY

Available Credits	Targeted Credits	Potential Credits
2	2	2

WST 06 entails undertaking a study of the easy of disassembly and functional adaptation potential strategy, including recommendations to be incorporated to facilitate future adaptation. These measures should then be implemented at RIBA Stage 4 in accordance with the study's findings. The credits offer a good way to ensure that functional adaptability is included at the design stage and should be integrated with the forthcoming RIBA stages for the building design.

BREEAM Pre-assessment

LAND USE AND ECOLOGY

This category encourages sustainable land use, habitat protection and creation, and improvement of long-term biodiversity for the building's site and surrounding land. Issues in this section relate to the reuse of brownfield sites or those of low ecological value, mitigation and enhancement of ecology and long-term biodiversity management.

LE 01 - SITE SELECTION

Available Credits	Targeted Credits	Potential Credits
2	2	2

LE 01 credits require at least 75% of the proposed development footprint to be situated on an area of land which has previously been occupied and for a contaminated land professional to study the site.

LE 02 - IDENTIFYING AND UNDERSTANDING THE RISKS AND OPPORTUNITIES FOR THE PROJECT

Available Credits	Targeted Credits	Potential Credits
Up to 2	1	1

LE 02 credits requires the site to undertake a BREEAM Ecological Risk Evaluation Checklist and have an evaluation conducted by a Suitably Qualified Ecologist (SQE) as early as possible.

LE 03 - MANAGING NEGATIVE IMPACTS ON ECOLOGY

Available Credits	Targeted Credits	Potential Credits
Up to 3	3	3

To achieve LE 03 credits, plans to mitigate negative ecological impacts should be implemented as early as possible. Any ecological impacts should be managed according to the mitigation hierarchy which follows the SQE's recommendations and either no net loss to ecological value should occur across the whole site. If ecological value is lowered, this impact should be minimised as much as possible.

LE 04 - CHANGE AND ENHANCEMENT OF ECOLOGICAL VALUE

Available Credits	Targeted Credits	Potential Credits
5	3	4

Obtaining the credits of LE 04 depends on the implementation of locally relevant ecological measures that enhance the site's ecological value. Alternatively, the data collected for LE 02 could be used to provide records for local environmental centres, in which case the GN36 - BREEAM, CEEQUAL and HQMEcology Calculation Methodology – Route 2 would be used for credit calculation.

LE 05 - LONG TERM ECOLOGY MANAGEMENT AND MAINTENANCE

Available Credits	Targeted Credits	Potential Credits
2	2	2

In addition to complying to all relevant ecological standards, measures to manage and maintain ecology throughout the project should implemented to achieve the credits for LE 05. A Landscape and Ecology Management Plan covering at least five years after project completion is to be developed, and the occupant of the establishment should be informed on local ecological features, as well as receive a guide for its maintenance and management.

BREEAM Pre-assessment

POLLUTION

This category addresses the prevention and control of pollution and surface water run-off associated with the building's location and use. Issues in this section aim to reduce the buildings impact on surrounding communities and environments arising from light-pollution, noise, flooding and emissions to air, land and water.

POL 01 - IMPACT OF REFRIGERANTS

Available Credits	Targeted Credits	Potential Credits
3	1	3

POL 01 involves systems that use refrigerant, all such systems must comply with relevant regulations and systems using refrigerants should have direct life cycle CO_2 equivalent emissions of less than 100kgCO_2-eq/kW. Alternatively, all refrigerants must have a Global Warming Potential below 10. The systems installed should also have a leak detection system present.

POL 02 - LOCAL AIR QUALITY

Available Credits	Targeted Credits	Potential Credits
2	2	2

POL 02 involves non-combustion systems supplying all heating and hot water or to ensure the emissions from all installed combustion plants do not exceed the levels set.

POL 03 - FLOOD AND SURFACE WATER MANAGEMENT

Available Credits	Targeted Credits	Potential Credits
5	4	5

POL 03 entails conducting a site-specific flood risk assessment (FRA) which takes in to account all current and future sources of flooding. It must be confirmed that the site is in a low-risk flood zone. Designs to mitigate flooding must be bespoke to the site. The drainage systems should be specified to ensure that the new development does not result in a greater runoff rate than it was pre-development. With all drainage, allowances for climate change should be made. POL 03 also states that there should be no discharge from the proposed site for rainfall up to 5 mm.

POL 04 - REDUCTION OF NIGHT TIME LIGHT POLLUTION

Available Credits	Targeted Credits	Potential Credits
1	1	1

POL 04 is to ensure outside lighting pollution has been eliminated on site in a way that does not impact the safety and security of those on site. If the scheme uses outside lighting, the credit can be given if it is designed in accordance with ILP Guidance or for lighting to be switched off between 23:00 and 07:00.

POL 05 - REDUCTION OF NOISE POLLUTION

Available Credits	Targeted Credits	Potential Credits
1	1	1

100% of POL 05 targets have been targeted. These can be achieved where there are no noise sensitive areas within 800m radius of the assessed development. If this is not the case, a noise impact assessment compliant with BS 4142:2014(231) is commissioned.

BREEAM Pre-assessment

INNOVATION

This category aims to support innovation within the construction industry through the recognition of sustainability related benefits which are not rewarded by standard BREEAM issues.

In this instance, the following BREEAM Innovation categories have been targeted:

MAN 03 - RESPONSIBLE CONSTRUCTION PRACTICES

Available Credits	Targeted Credits	Potential Credits
1	1	1

The innovation credit for MAN03 can be obtained where the principle contractor achieves compliance with all criteria of MAN 03 and executes all aspects of the considerate construction scheme to an exemplary level of practice.

HEA 01 - VISUAL COMFORT

Available Credits	Targeted Credits	Potential Credits
1	0	1

To achieve this credit, the scheme would have to meet exemplary daylight factors or meet the criteria for average and minimum point daylight illuminance.

ENE 01 - REDUCTION OF ENERGY USE AND CARBON EMISSIONS

Available Credits	Targeted Credits	Potential Credits
5	2	5

To achieve all credits, the scheme must achieve an EPRNC greater or equal to 0.9, and net-zero regulated CO2 emissions where all emissions are off-set on site. Additionally, all available credits in ENE 02 must be met and a post occupancy stage energy modelling is undertaken.

MAT 01 - ENVIRONMENTAL IMPACTS FROM CONSTRUCTION PRODUCTS

Available Credits	Targeted Credits	Potential Credits
3	0	3

To achieve all 3 credits, opportunities to reduce environmental impacts should be set out during the concept design. The appraisal credits for Man 02 must be achieved and a third party must carry out the building life cycle assessment.

MAT 03 - RESPONSIBLE SOURCING OF CONSTRUCTION PRODUCTS

Available Credits	Targeted Credits	Potential Credits
1	0	1

To achieve this credit, all credits for MAT 03 must be achieved and then the responsible sourcing percentage of available points achieved must be equal to or greater than 50%.

WST 01 - CONSTRUCTION WASTE MANAGEMENT

Available Credits	Targeted Credits	Potential Credits
1	0	1

The securement of this credit depends on the maintenance of waste generation at a rate of 1.6m^3/ 1.9 tonnes per 100m^2. The waste diverted from landfill (volume/tonnage) should be 85%/90% for non-demolition, 85%/95% for demolition and 95%/95% for evacuation. Alternatively, waste generated should be allocated to specific projects, the construction of resource efficiency credits are to be achieved, and the diversion from landfill of non-hazardous construction and demolition waste should be above or equal to BREEAM benchmarks.

WST 02 - USE OF RECYCLED AND SUSTAINABLY SOURCED AGGREGATES

Available Credits	Targeted Credits	Potential Credits
1	0	1

To achieve this credit, the Project Sustainable Aggregate Points score must be equal to or greater than 6.

WST 05 - ADAPTATION TO CLIMATE CHANGE

Available Credits	Targeted Credits	Potential Credits
1	0	1

To achieve this credit, all following credits must be achieved: HEA 04 (Thermal comfort), ENE 01 (Reduction of energy use and carbon emissions), ENE 04 (Low carbon design), WAT 01 (Water consumption), WST 05 (Adaptation to Climate Change), MAT 05 (Designing for durability and resilience), POL 03 (Flood and surface water management).

Section Four

4 Conclusion

Conclusion

Love Design Studio have prepared this Energy and Sustainability Statement on behalf of Infinite Partners (the applicant) as part of a planning application to the London Borough of Hillingdon (the Local Planning Authority). The scheme is considered an application of Potential Strategic Importance (PSI). It will therefore be referred to the GLA Planning Authority.

The proposal is for the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping. The total proposed site will consist of 435 hotel keys and 23,946m2 gross external area.

Energy Breakdown

The energy strategy follows the energy hierarchy; Use Less Energy (Be Lean), Supply energy efficiently (Be Clean) and use Renewable and low carbon energy (Be Green) as per Policy EM1 of the Hillingdon Local Plan (2012).

The scheme adopts a fabric-first and passive design approach to reduce energy demand for space heating and reduce the demand for active cooling. Key design elements of the proposals comprise of:

- A well-insulated building fabric shell
- Being airtight, reducing draughts and heat-loss.
- Provision for Mechanical ventilation with heat recovery (MVHR)
- Provision for Waste water heat recovery systems (WWHRS)

An all-electric, air source heat-pump system is proposed to deliver the space heating and hot water demand for this scheme. ASHPs offer a highly energy efficient low carbon solution, that future-proofs the dwelling towards achieving net zero carbon in operation in coming years. Low operational costs and carbon emissions, are complemented with improved air quality on-site due to zero combustion on site, benefitting the health & wellbeing of occupants.

Photovoltaic solar panels are the preferred on-site renewable generation technology as electricity is off-set on-site.

Based on the assessment undertaken, the energy strategy set out within this report delivers a new build cumulative CO_2 reduction of **74%** compared to the 2013 baseline. The cumulative CO_2 reduction is broken down by the following:

- 27% at Be Lean
- 0% at Be Clean
- 47% at Be Green

Sustainability

A BREEAM 2018 New Construction Pre-Assessment of the proposed site has been conducted, with the aim to achieve BREEAM 'Very Good'. The following 10 categories were assessed and have been used to demonstrate the scheme's sustainability credentials:

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

This report demonstrates that the building has a current targeted score of 67.3% which equates to a **BREEAM rating of 'Very Good'** with the potential to achieve a score of 85.52%, which equates to a BREEAM rating of 'Excellent'. The score breakdown is illustrated to the right, and the credit breakdown for each category is set out on the following pages.

The current BREEAM targeted score provides a small buffer over the target score of 55% (the threshold for Very Good) should credits be lost through design or cost constraints as the project progresses.

Conclusion

Energy Strategy

The new development will be fossil-fuel free and will include a site wide hot water distribution network supplied by energy efficient heat pumps.

The new basement heat plant room will have the provision for connecting to a future district heat network, should this be brought forward in the local area (pg.17, fig.9).

For the hotel, it is possible that Domestic Hot Water (DHW) may account for over 50% of the total operational energy demand, so there is a real focus on maximising the DHW efficiency. It is noted that there is the possibility of the future connection to data centres in the local area where they may be looking at cost-effective ways to 'dump their heat'; therefore, the heat plant room allows space for future heat exchangers to exploit this option. The option for including Waste Water Heat Recovery Systems (WWHRS) will be explored at the detailed design stage.

The scheme adopts a fabric-first and passive design approach to reduce energy demand for space heating and active cooling. For when heating and cooling is required the new hotel and adjoining amenity areas will be served by a Variable Refrigerant Flow (VRF) system, effectively allowing for energy to be transferred efficiently across the site where it is required most via the interconnection of BC controllers which intelligently transfers energy around the system, drawing on energy from the outdoor units.

Each hotel room will have a Mechanical Ventilation Heat Recovery (MVHR) unit to provide fresh air efficiently in winter and the option for natural ventilation.

The VRF and MVHR units will have the option to be operated within the bedrooms, but also have the collective capability of being overridden via a centralised smart remote controller to avoid use when the room is unoccupied.

The strategy for the incubator spaces is to consider future functional adaptability to avoid unnecessary demolition works should tenants change. The incubator workspaces will be provided with capped off services from the hot water network but will also have the flexibility to adopt their own HVAC solutions, whether it be; highly efficient split/multi split systems for space heating and cooling, simple direct electric heating panels and/or space for mechanical ventilation (depending on the tenant's future needs and preferences).

The existing hotel block already has a fully functioning, relatively modern (circa. 2015), HVAC system in the form of; a refrigerant pipework network connected to bedroom comfort conditioning units in the ceiling void, providing space heating and cooling; these are connected via rooftop outdoor condensers. An Air Handling Unit (AHU) supplies fresh air to each individual hotel room. DHW to the existing hotel building is currently supplied by a mix of gas boilers and heat pumps.

All the rooftop units will look to be repositioned to the higher part of the roof rather than fully replaced. The decision for repositioning is to align with the aims of the scheme to avoid the unnecessary increase of embodied carbon emissions (building services can often account for >30% of total embodied emissions in refurbishments). If deemed technically feasible, the boilers will either be replaced with heat pumps or the option for connecting to the site wide DHW network.

The basement currently has space available for water recovery systems in the form of a rainwater harvesting tank room and a grey water tank room. The financial and technical feasibility of adopting these technologies and their preferred uses (irrigation versus communal toilet flushing uses) will be considered at the detailed design stage.

The scheme looks to meet Net-Zero Carbon for Operational Energy, in reference to the London Plan energy hierarchy (Policy SI 2). An SBEM model was used to calculate the space heating, hot water, lighting, cooling, fans and pumps energy, improvements from low carbon technologies, and therefore the on-site operational energy consumption.

Following the new Part L 2021 Building Regulations that came into effect in June 2022, the GLA Energy Assessment Guidance (June 2022) states that major non-domestic developments must meet a 35 per cent on-site carbon reduction beyond Part L 2021. However, as the software is currently in an interim period between Part L 2013 and Part L 2021 that is yet to be tried and tested, the GLA have stated the following:

"However, as the accompanying Part L 2021 software is not yet available, planning applicants should continue to use the 2020 guidance, spreadsheet and the Part L 2013 methodology until the software has been approved by government and is fully functional."

Therefore, this energy assessment has proceeded using the 2013 methodology by running SBEM calculations against Part L 2013 carbon factors and notional baselines. The outputs were then used in the GLA Carbon Emissions Reporting Spreadsheet 2020 which uses Part L 2013 as a baseline.

The scheme targets a >15% CO_2 reduction at the 'Be Lean' Stage as per the Adopted London Plan 2021 targets. The scheme also significantly exceeds the 35% CO_2 reduction on-site target compared to Part L 2013 baselines to make an allowance for the new Part L 2021 Building Regulations. Where space on the roof is available photovoltaic solar panels are provided. The scheme may offset the remaining emissions through a carbon offset payment.

Section Five

5 Appendices

Appendix A - GLA Summary Tables

SAP 2012 Performance

Domestic

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	**0.0**	**0%**
Annual savings from off-set payment	0.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**0**	-
Cash in-lieu contribution (£)	**0**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SAP 10.0 Performance

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	0.0	0%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	0.0	0%
Cumulative on site savings	**0.0**	**0%**
Annual savings from off-set payment	0.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**0**	-
Cash in-lieu contribution (£)	**0**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Non-domestic

SAP 2012 Performance

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	874.8	177.4
After energy demand reduction (be lean)	659.9	177.4
After heat network connection (be clean)	659.9	177.4
After renewable energy (be green)	431.2	177.4

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	214.9	25%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	228.7	26%
Total Cumulative Savings	**443.6**	**51%**
Annual savings from off-set payment	431.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**12,937**	-
Cash in-lieu contribution (£)	**1,229,055**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SAP 10.0 Performance

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	752.2	79.6
After energy demand reduction (be lean)	548.2	79.6
After heat network connection (be clean)	548.2	79.6
After renewable energy (be green)	193.6	79.6

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	204.0	27%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	354.6	47%
Total Cumulative Savings	**558.6**	**74%**
Annual savings from off-set payment	193.6	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**5,808**	-
Cash in-lieu contribution (£)*	**551,772**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE

SAP 2012 Performance

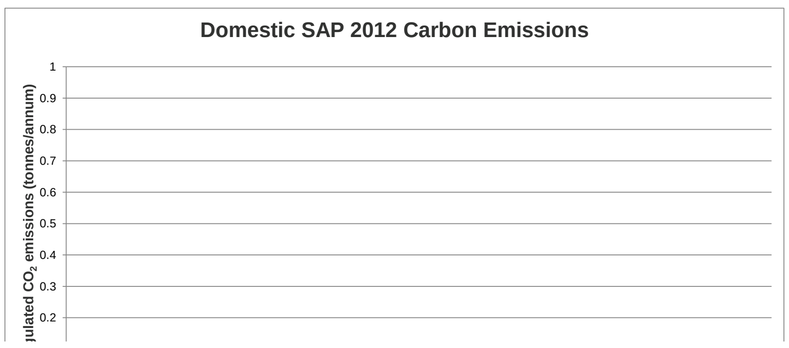
	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	874.8		
Be lean	659.9	214.9	25%
Be clean	659.9	0.0	0%
Be green	431.2	228.7	26%
Total Savings	-	443.6	51%
	-	CO_2 savings off-set (Tonnes CO_2)	-
Off-set	-	**12,937.4**	-

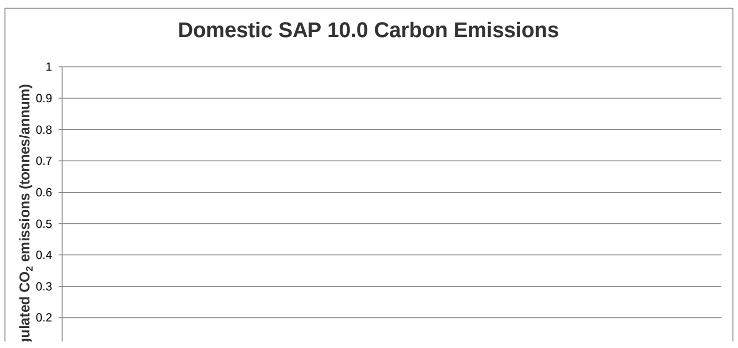
SAP 10.0 Performance

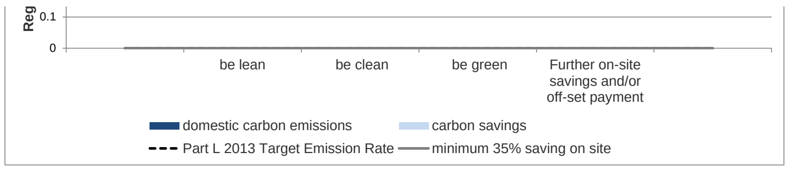
	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	752.2		
Be lean	548.2	204.0	27%
Be clean	548.2	0.0	0%
Be green	193.6	354.6	47%
Total Savings	-	558.6	74%
	-	CO_2 savings off-set (Tonnes CO_2)	-
Off-set	-	**5,808.1**	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	0.00	0.00	

	Area weighted non-domestic cooling demand (MJ/m^2)	Total area weighted non-domestic cooling demand (MJ/year)
Actual		
Notional		






Reg
0.1
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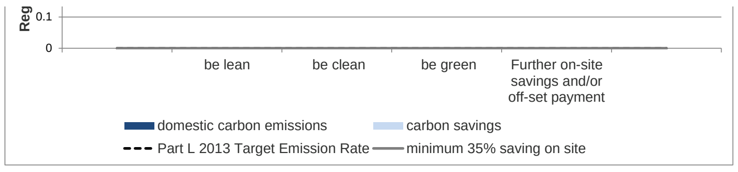
be lean
be clean
be green
Further on-site savings and/or off-set payment
domestic carbon emissions
carbon savings
Part L 2013 Target Emission Rate
minimum 35% saving on site


Reg
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be lean
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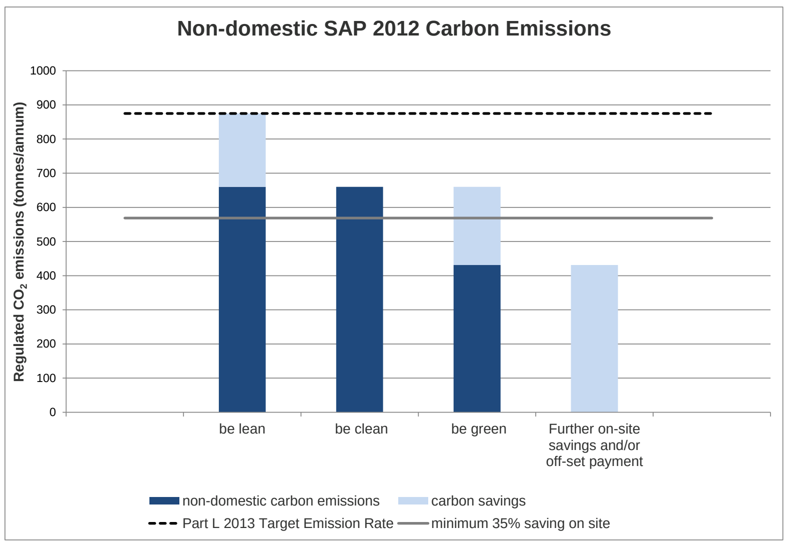
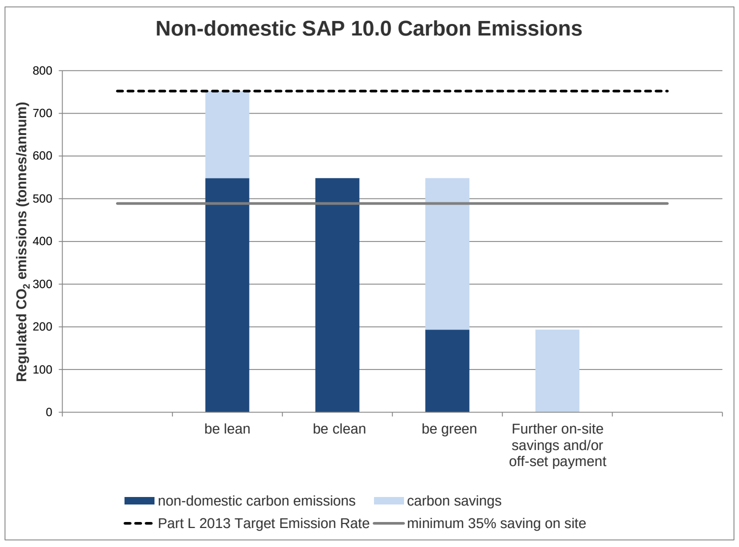
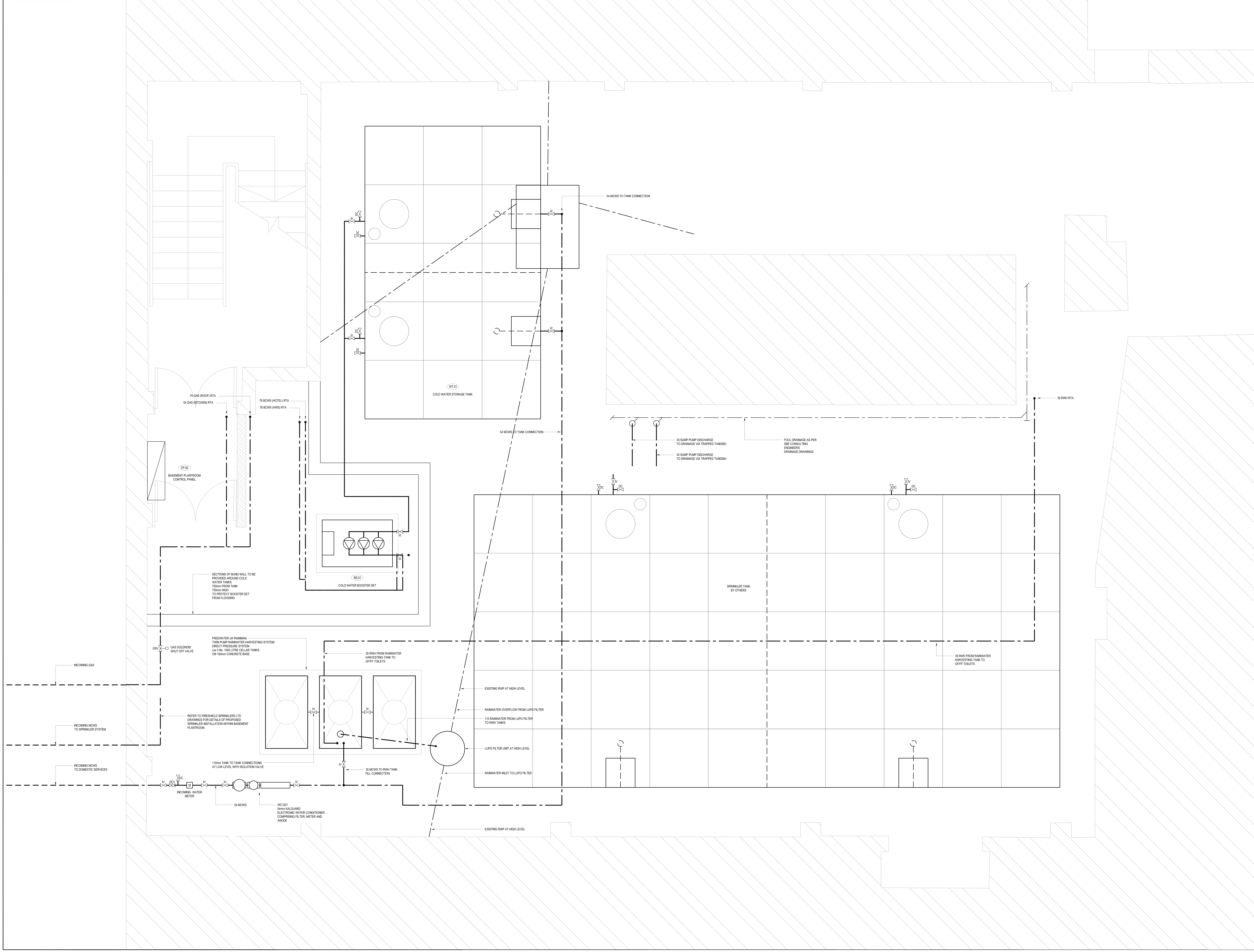
Further on-site savings and/or off-set payment
domestic carbon emissions
carbon savings
Part L 2013 Target Emission Rate
minimum 35% saving on site


Non-domestic SAP 2012 Carbon Emissions
Regulated CO2 emissions (tonnes/annum)
1000
900
800
700
600
500
400
300
200
100
0
be lean
be clean
be green
Further on-site savings and/or off-set payment
non-domestic carbon emissions
carbon savings
Part L 2013 Target Emission Rate
minimum 35% saving on site


Non-domestic SAP 10.0 Carbon Emissions
Regulated CO2 emissions (tonnes/annum)
800
700
600
500
400
300
200
100
0
be lean
be clean
be green
Further on-site savings and/or off-set payment
non-domestic carbon emissions
carbon savings
Part L 2013 Target Emission Rate
minimum 35% saving on site

Appendix B - Existing Plant Room Drawings

BASEMENT PLANTROOM - (1:20)



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2. DO NOT SCALE.
3. PLANT AND EQUIPMENT SHOWN BASED ON CURRENT VITEC SCHEDULES OF EQUIPMENT.
4. ALL PLANT AND EQUIPMENT TO BE INSTALLED FULLY IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

Rev	Drawn	App	Date	Description
AF	NC	NC	29/04/2016	AS FITTED

Drawing Status

AS FITTED

Client

ETS (SW) LTD

Project:

HEATHROW GATE
27 UXBRIDGE ROAD, HAYES

Drawing Title:

MECHANICAL ENGINEERING SYSTEMS
BASEMENT PLANTROOM

Designed: Neil Clarke	Signed	Date: 19/06/2015
Drawn: Neil Clarke	Signed	Date: 19/06/2015
Checked: Ian Parkin	Signed	Date: 19/06/2015
Approved: Geraint Harris	Signed	Date: 19/06/2015

Original Scale	Original Size
1:20	A0

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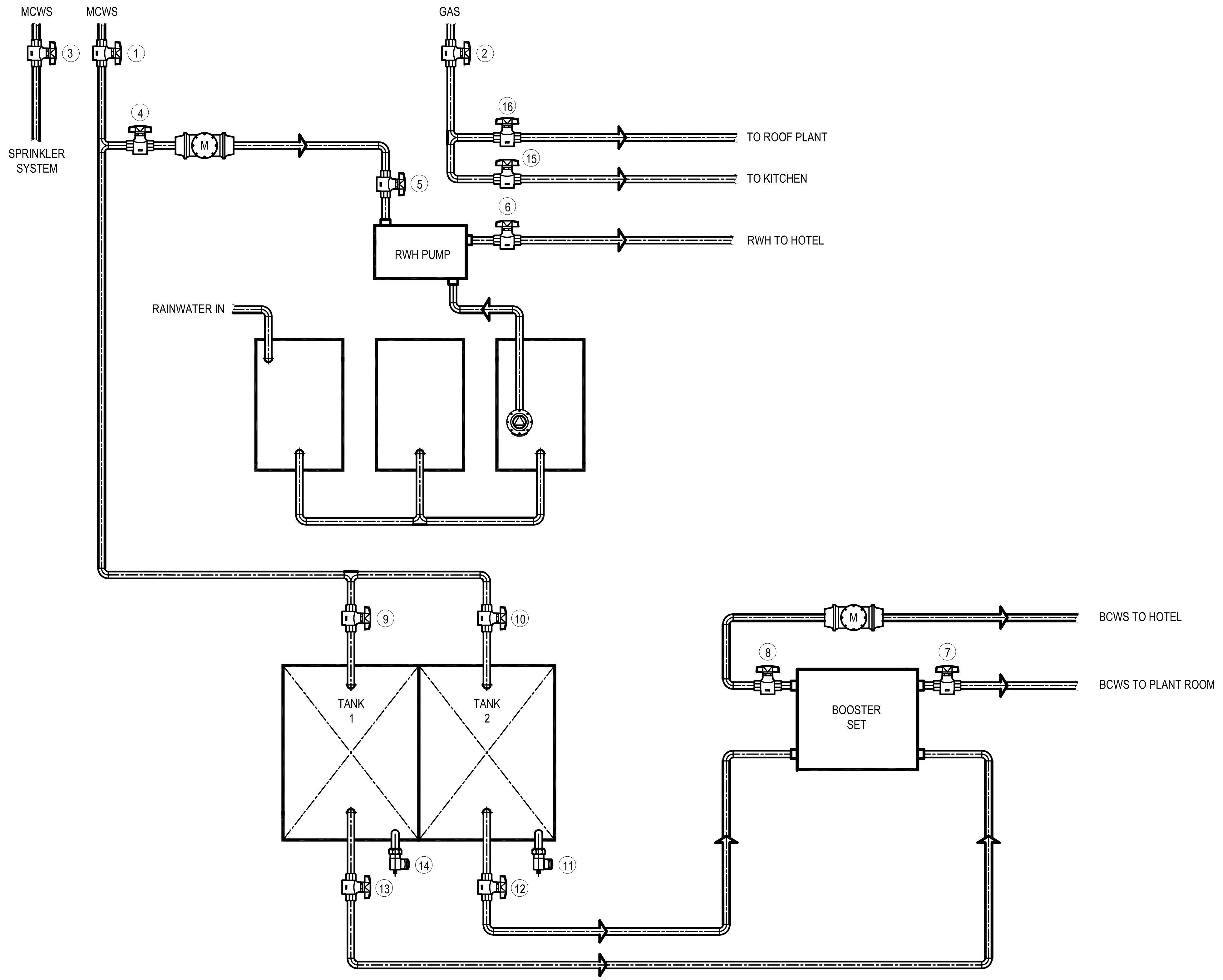
Project No.	Drawing No.	Rev.
4564	M600	AF



Drawing Status

AS FITTED

AF	ML	NC	29/04/2016	AS FITTED	NTS	A3
Rev	Drawn	App	Date	Description	Original Scale	Original Size

Designed / Drawn: Neil Clarke	Date: 06/03/2015	
Checked: Ian Parkin	06/03/2015	Original Size: A3
Approved: Geraint Harris	Date: 06/03/2015	Rev.: AF

Project:

HEATHROW GATE
27 UXBRIDGE ROAD, HAYES

Drawing Title:

MECHANICAL ENGINEERING SYSTEMS
BASEMENT PLANTROOM SCHEMATIC

Client

ETS (SW) LTD

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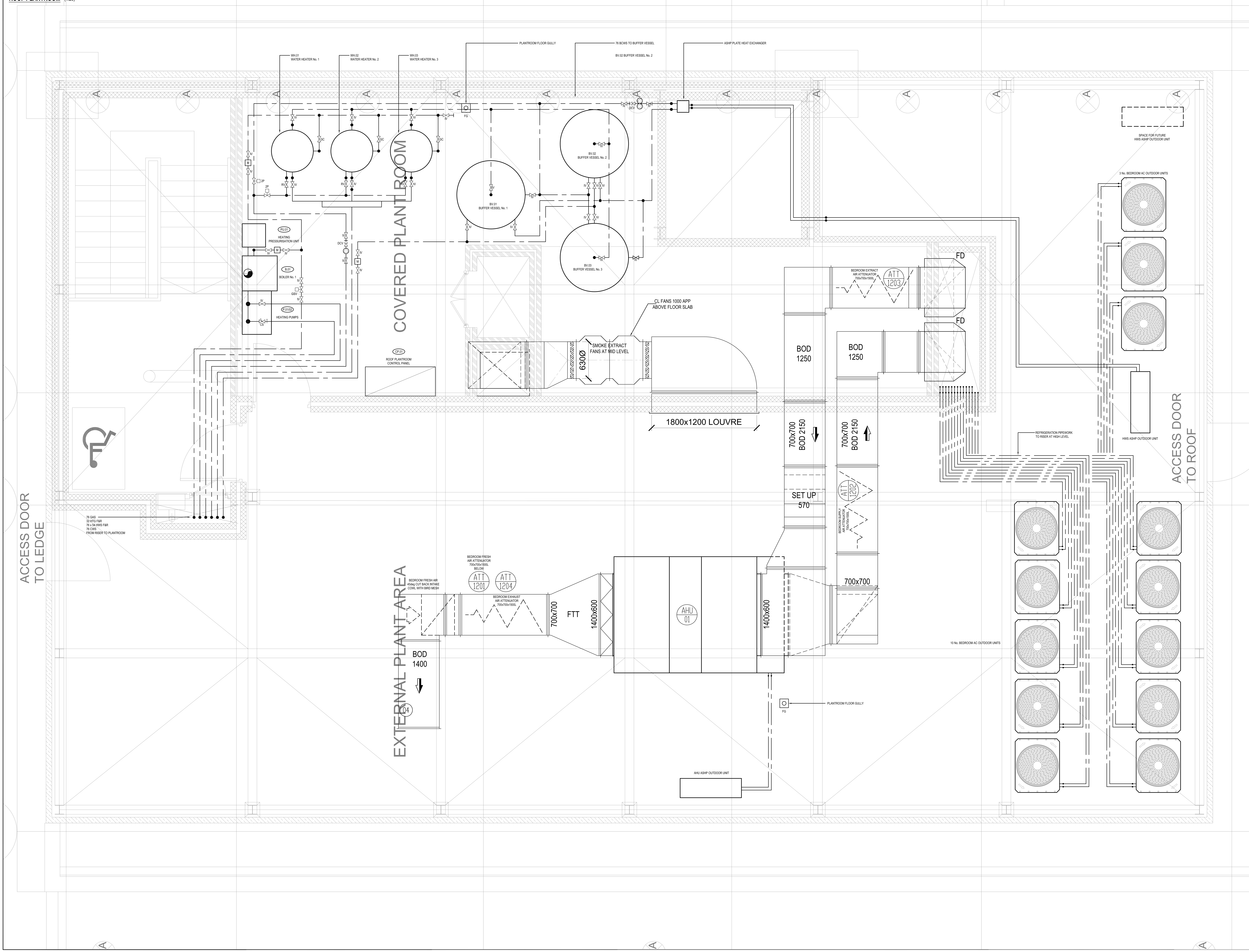
Project No.	Drawing No.	Rev.
4564	**M603**	**AF**

ROOF PLANTROOM - (1:20)



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Rev	Drawn	App	Date	Description
AF	NC	NC	29/04/2016	AS FITTED

Drawing Status

AS FITTED

Client: ETS (SW) LTD

Project:

HEATHROW GATE
27 UXBRIDGE ROAD, HAYES

Drawing Title:

MECHANICAL ENGINEERING SYSTEMS
ROOF PLANTROOM

Designed: Neil Clarke	Signed	Date: 06/03/2015
Drawn: Neil Clarke	Signed	Date: 06/03/2015
Checked: Ian Parkin	Signed	Date: 06/03/2015
Approved: Geraint Harris	Signed	Date: 06/03/2015
Original Scale: 1:50		Original Size: A0

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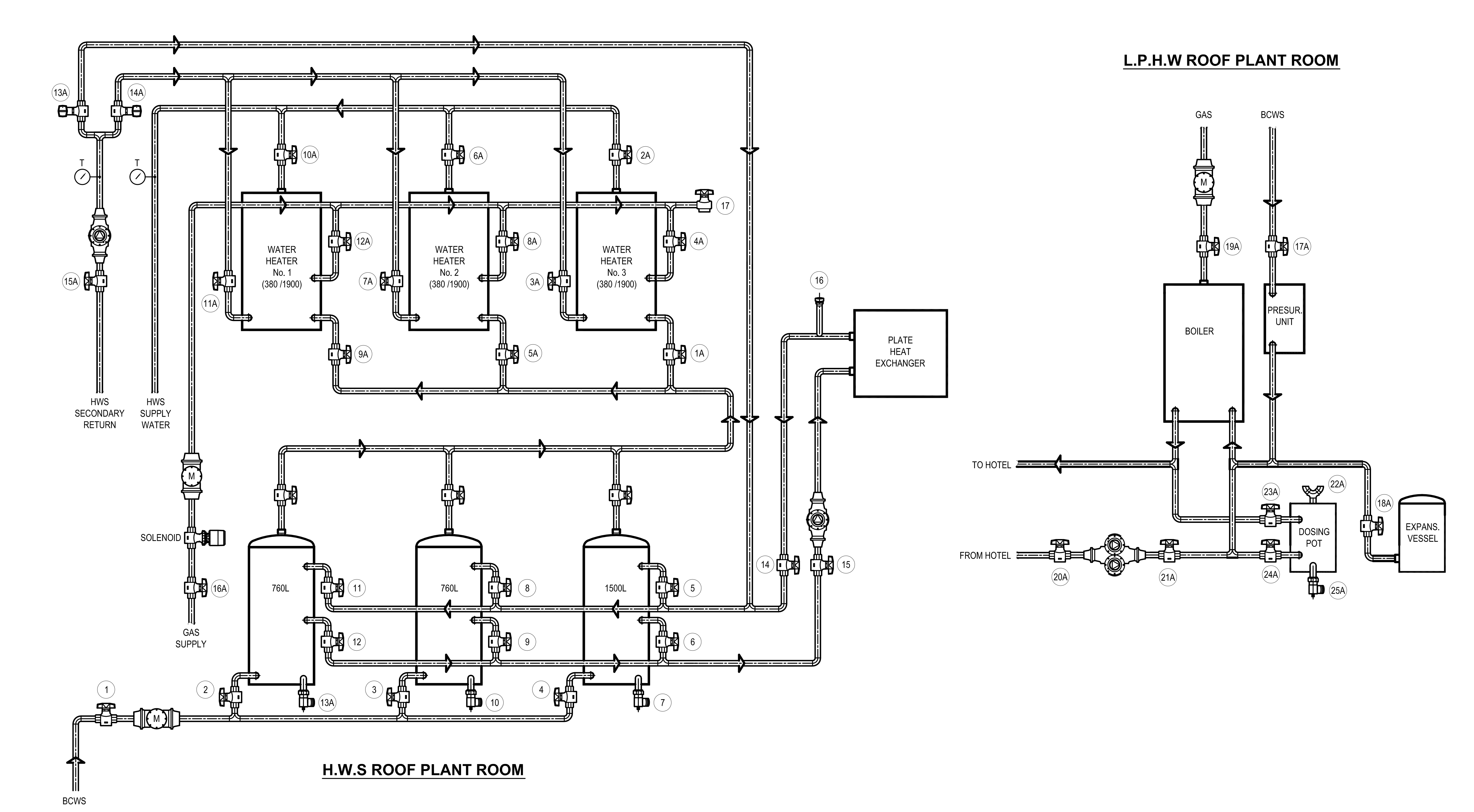
Project No.	Drawing No.	Rev.
4564	M601	AF



Drawing Status

AS FITTED

AF	ML	NC	29/04/2016	AS FITTED	NTS	A3
Rev	Drawn	App	Date	Description	Original Scale	Original Size

Designed / Drawn: Neil Clarke	Date: 06/03/2015	
Checked: Ian Parkin	06/03/2015	Original Size: A3
Approved: Geraint Harris	Date: 06/03/2015	Rev.: AF

Project:

HEATHROW GATE
27 UXBRIDGE ROAD, HAYES

Drawing Title:

MECHANICAL ENGINEERING SYSTEMS
ROOF PLANTROOM SCHEMATIC

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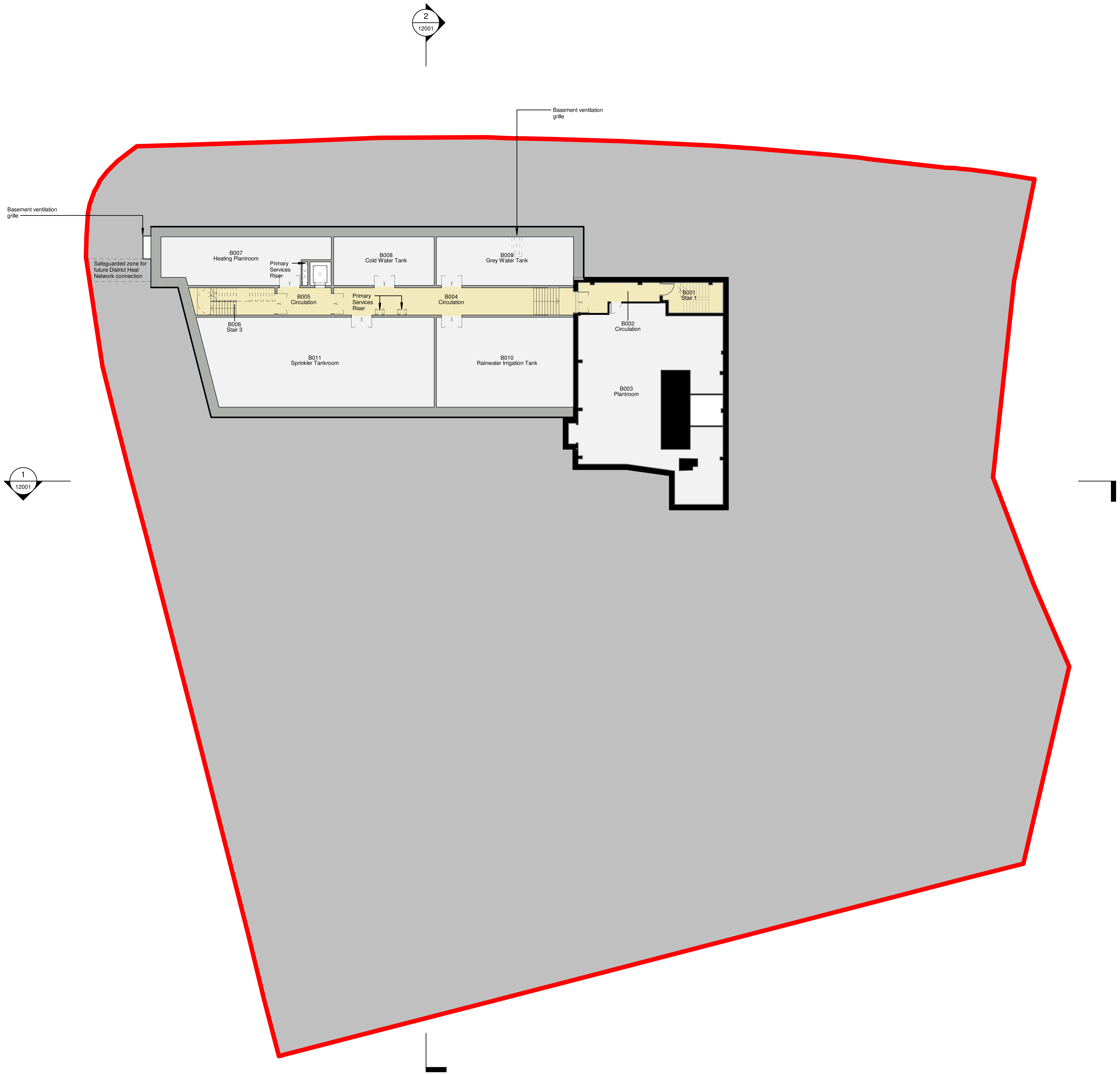
Project No.	Drawing No.	Rev.
4564	M602	AF

Appendix C - Proposed Energy Centre



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- All omissions and discrepancies to be reported to the Architect immediately.
- This drawing is to be read in conjunction with all related Architect's and Engineer's drawings and any other relevant information.
- All proposed landscaping is indicative
- All internal floorplate drawings are indicative only
- **EXISTING BUILDING DISCLAIMER:**
  This is a project with an existing building, hence all Designs are based on available surveys. All proposals to be reviewed on site prior to construction to ensure suitability of design in relation to existing conditions.

Key:

- Incubator
- Amenity
- Circulation
- External Amenity
- Walkway
- Services/Plant
- Room - Accessible
- Room - Medium
- Room - Standard
- Room - Small
- Room - Existing Medium
- Room - Existing Large
- Room - Central Small
- Public Realm Extent
- Existing accommodation to be refurbished

revision	date	by	appr	description

Key Plan

1:200 graphical scale 0.00m 1.00m 2.00m 4.00m 6.00m 8.00m

NORTH

Client
Infinite

Project Name
Infinite Hayes

Project Address
27 Uxbridge Rd
Hayes, UB4 0JN

Design Stage
Planning

Drawing Title
Proposed Basement Floor Plan

Scale	Sheet Size	Date
1 : 200	A1	13/09/22
1 : 400	A3	

Drawn	Checked	Approved
JPB	CW	SG

Revision

Suitability Code

Drawing No.
INF - HAP - ZZZ - B01 - DR - A - 10001

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Appendix D - Low/Zero Carbon Feasibility

Appendix D - Air Source Heat Pumps

Description	Advantages	Things to consider
Air Source Heat Pumps Air Source Heat Pumps Heating and/or Hot Water		
An air source heat pump (ASHP) works by transferring heat absorbed from the outside air to an indoor space, such as a home or an office via the wet central heating systems to heat radiators and provide domestic hot water. Heat pumps work similarly to a refrigerator: they absorb heat and transfer it to another medium. Typically, two types: - Air to air heat pumps, which absorb heat from the outside air and then transfer it directly into your home via a fan system to heat a room. Air-to-air heat pumps require a warm air circulation system to move the warm air around your home. They will not provide you with hot water as well. Air-to-air heat pumps are not eligible for the UK government's Renewable Heat Incentive (RHI) scheme. - Air to water heat pumps, which absorb heat from the outside air and then transfer it via your central heating system to provide hot water heating, radiator, or underfloor heating in an indoor space (or all three). An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. This makes them more suitable for underfloor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time. You'll need a place outside where a unit(s) can be fitted to a wall or placed on the ground. It will need plenty of space around it to get a good flow of air. The external unit is connected to an internal unit containing circulation pumps and hot water, which is usually smaller than the average boiler. As a general rule, air source heat pumps are easier to install than ground source heat pumps, as they do not require any land to be dug up for installation. The size of the air source heat pump will vary depending on your home's heat demand – the bigger the home, the bigger the heat pump unit you'll need. Air-to-water heat pumps are the most common model in the UK. Air source heat pumps perform particularly well with underfloor heating systems or warm air heating because they operate at low temperatures. Homes without an existing central heating system will require one to be installed for an air source heat pump to work. An air source heat pump is subject to fluctuating air temperatures and has to work harder to produce heat when the outside air temperature is lower. This means that in the colder months, when the heat pump is likely to be relied on the most, it will use more units of electricity to produce the same amount of heating as a ground source heat pump in the same period of time.	- It could lower your fuel bills, especially if you replace conventional electric heating - It could provide you with an income through the UK government's Renewable Heat Incentive (only applies to air-to-water heat pumps) - It could lower home carbon emissions - There are no fuel deliveries needed - It can heat your home as well as your water - It can be easier to install than a ground source heat pump - While air source and ground source heat pumps function differently, with air source heat pumps absorbing heat from the air outside while ground source heat pumps extract heat from the ground via pipes, they can bring the same benefits to your underfloor heating system. Due to the low temperatures required for underfloor heating, air source and ground source heat pumps are an ideal way to heat the system at a lower running cost.	- Running costs will vary depending on several factors including the size of the development, how well insulated it is, and what room temperatures you are aiming to achieve. - Although swapping a gas/oil boiler with ASHPs typically helps the environment by using high efficiency systems with electricity; electricity is still approximately 3-4 times more expensive than natural gas, so efficiency of the system is key. - ASHP efficiencies are most effective with lower temperatures i.e. 30degC-50degC so work well with underfloor heating solutions; however, if they are paired to hot water solutions that require higher temperatures 60degC+ then the efficiency rapidly drops and often immersion heaters within the tanks automatically switch on which can significantly increase the electricity bills. - While air source heat pumps don't take up too much outdoor space, the unit will be visible from the outside of the property (unless located on a roof or behind a barrier), so it's best to check with the local planning authority first, to find out if you need planning permission. As the unit is above ground, it will produce a noise similar to that of an air conditioning unit, which could be bothersome to you or your neighbours. More info: https://energysavingtrust.org.uk/advice/installing-renewables/ - If the heat pump is providing hot water, then this could limit the overall efficiency. You might want to consider solar water heating to provide hot water in the summer and help keep your heat pump efficiency up. - Learn how to control the system so you can get the most out of it. You will probably need to set the heating to come on for longer hours, but you might be able to set the thermostat lower and still feel comfortable. The installer should explain to you how to control the system so you can use it most effectively.

Appendix D - Ground Source Heat Pumps

Description	Advantages	Things to consider
Ground Source Heat Pumps Ground Source Heat Pumps Heating and/or Hot Water		
Ground source heat pumps (GSHPs) use pipes that are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in your home. A ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in your garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year. The length of the ground loop depends on the size of your home and the amount of heat you need. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead.	- It could lower your fuel bills, especially if compared to conventional electric heating. - It could provide an income through the government's Renewable Heat Incentive (RHI). - It could lower home carbon emissions, depending on which fuel you are replacing. - There are no fuel deliveries needed. - It will heat your home as well as your water. - There is minimal maintenance required. - Unlike gas and oil boilers, heat pumps deliver heat at lower temperatures over much longer periods. - In winter, it may need to be on constantly to heat buildings efficiently, but radiators won't feel as hot to the touch as with a gas or oil boiler. - Often they are more difficult to install than air source heat pumps, but ground source heat pumps are often more energy efficient. - Ground source heat pumps can perform better with underfloor heating systems or warm air heating than with radiator-based systems because of the lower water temperatures required. - When you consider the time of year you would typically rely on your heat pump the most – when temperatures drop during the winter months – it's easy to understand why the ground source heat pump wins in terms of efficiency. The temperature of the ground is fairly fixed at a constant 10 – 13°C all year round, so a ground source heat pump remains consistently efficient throughout the year, unaffected by seasonal changes. - While air source and ground source heat pumps function differently, with air source heat pumps absorbing heat from the air outside while ground source heat pumps extract heat from the ground via pipes, they can bring the same benefits to your underfloor heating system. Due to the low temperatures required for underfloor heating, air source and ground source heat pumps are an ideal way to heat the system at a lower running cost.	- The ground needs to be suitable for digging a trench or a borehole and accessible to digging machinery. - The ground loop can be installed in two ways, vertically or horizontally, but each will take up a certain amount of space in the garden/site boundary and you'll need to check the ground is suitable for digging. - If you want to put the pipes in vertically, you'll need specialist machinery to drill a borehole, which will increase the cost of installation. Opting to lay the pipework horizontally is a cheaper method of installing a ground source heat pump, but you'll need a lot more space, so it's only suitable if you've got a large garden. - GSHP efficiencies are most effective with lower temperatures i.e. 30degC-50degC so work well with underfloor heating solutions; however, if they are paired to hot water solutions that require higher temperatures 60degC+ then the efficiency rapidly drops and often immersion heaters within the tanks automatically switch on which can significantly increase the electricity bills. Sizing: The heat loss of the property is determined by how well the building is insulated. If the insulation is not known then it becomes difficult to size the heat pump accurately. The only way this can be achieved with any degree of accuracy is to commission a Heat Loss calculation according to BS EN12831 which takes into account the build, insulation, heating system, etc and can be used to determine a peak heat load. This is a key requirement of the Renewable Heat Incentive Scheme. Insulation: Insulation plays a big part in how effective a heat pump operates. Reducing the energy requirement for any building should be a central theme to the design process. Any investment in an upgraded insulation specification will have a far swifter pay-back than the return on any renewable technology. For this reason, consideration should be given to improving the insulation level as much as practically possible. There is also a concern for un-insulated buildings that the actual heat emitting device, i.e. radiators, under-floor, etc. will not output enough heat at the heat pump's lower flow temperatures to obtain a warm enough temperature within the building. This is a particular concern when the temperature outside is cold. As a guide, a building post 1985 with cavity wall insulation, double glazing and 300mm thick loft insulation, will have a peak heating load of ~50W/m2. A property built before 1985 with single glazing we would assume has a peak heating load of 70W/m2 or greater. In cases of very poor insulation the low temperature output from the heat pump may mean that the building will never get warm and that the running costs for the heat pump are increased. It is important to ensure that the correct amount of pipe for the application is buried and that it is buried correctly. If insufficient pipe is installed then the ground could potentially run out of energy mid heating season, leaving the occupants without heat. It is important to remember that if the heat pump is producing Domestic Hot Water as well as space heating, an additional amount of ground array is required simply as there is an additional all year round load on the ground. As a guide, roughly 2 to 2.5 times the area being heated is required to install horizontal ground arrays. If there is insufficient land available an alternative to horizontally laid ground arrays is a vertical drilled borehole. These can be down to a depth of over 100m. Drilling a borehole is a specialist activity and as such can be expensive.

Appendix D - Water Source Heat Pumps

Description	Advantages	Things to consider
Water Source Heat Pumps Open/Closed Loop System Heating/Cooling and/or Hot Water		
Water source heat pumps (WSHPs) work by extracting heat from a body of water and converting it into useful energy to heat your home. They use a series of submerged pipes containing a working fluid to absorb the heat from a river, lake, large pond or borehole. This is then turned into useful heat for space heating and hot water, through compressing the working fluid so it can give the heat off at a higher temperature. Closed loop systems These water source heat pumps have sealed pipes filled with fluid (antifreeze), which are submerged beneath the water, never coming into contact with water directly. As the fluid flows through the pipes it is heated by the water body and returns to the heat pump. Open loop systems Water flows through the pump to extract its heat in an open loop system, before being discharged back to its source. These can be more efficient than closed loop pumps, but you need to gain consent from either the Environment Agency, for England or Wales, or the Scottish Environment Protection Agency (SEPA) in Scotland to discharge the water, and possibly additional permission to extract it. Accessing the aquifer's water directly and extracting heat from that is a way of using an open-loop system. This is usually done with two boreholes. One abstraction borehole with a pump at the bottom to lift the water to the surface for the heat pump to use and another borehole some distance away to re-inject the water back into the aquifer. Hence open-loop. Hybrid heat pumps These involve a second heating source running alongside the water source heat pump system. These are particularly suited to older homes, where it's not possible to insulate the property sufficiently to optimise the pump's performance.	Water source heat pumps are often more efficient than ground and air source devices. This is because heat transfers better in water, while water temperatures are generally more stable throughout the year (between 7 and 12 degrees on average), which is higher than the average air and ground temperature in winter. Submerged pipework in a body of water absorbs heat energy from its surroundings in the same manner as it would if buried in the ground. The submerged pipes, typically closed loop systems such as pond mats, transfer the water's heat energy to the heat pump. The water source heat pump then compresses and upgrades this temperature, delivering heating and hot water to radiators or underfloor heating inside the property. When water is used as the heat source in open loop systems, a secondary heat exchanger is used, so the heat pump itself remains on a closed loop containing glycol. A secondary exchanger can take several forms; loops of pipe or metal panels immersed in the source water, or a gasket plate heat exchanger with the water piped to it. Water has a high capacity to hold heat in relation to its volume; it readily absorbs heat and readily delivers it: it enjoys a high transfer rate. It is more efficient for a heat pump to exchange heat with water than air – which enables a water source heat pump to outperform an air source heat pump. The thermal capacity and thermal inertia of water enables it to retain some of the solar heat gained in the summer through to the winter. Groundwater in aquifers is warmer than the air temperature on cold winter days and thus provides a more attractive input temperature to a heat pump. The London Aquifer, for instance, maintains a steady temperature of 14°C throughout the year. A well engineered groundwater heat pump system has access to a large volume of water: this enables it to extract heat from a very large heat source whose temperature will not change significantly as relatively small amounts of heat are extracted from it. It is possible to access financial support for installing a water source heat pump through the Renewable Heat Incentive scheme, which pays a rate for units of heat generated. In Scotland, water source heat pumps may also qualify for funding through the Scottish Government funded Home Energy Scotland Loan. Both these schemes require that the installer and product installed are certified under the Microgeneration Certification Scheme (MCS) and all MCS installers must be members of a consumer code and work must adhere to their code's standards.	When you install a water source heat pump, you might need to install underfloor heating and larger radiators to get the best performance out of the technology, similar to when you install an air or ground source heat pump. Overall, this could represent an expensive undertaking. The disadvantages of an open loop heat pump system include the need to meet the additional engineering challenges of dealing with water which may contain debris, unstable pH values or biological growth and may call for additional pumping loads. It will also be necessary to meet the abstraction requirements of the Environmental Agency on all but the smallest of schemes. The key disadvantage of using a very large body of water to achieve heat exchange with a relatively constant temperature is that you are not able to store summer heat in that body of water – to have the benefit of retrieving those higher temperatures in winter. As using an open-loop system negates the need for the glycol/water solution and hundreds of meters of 40mm collector array pipe, it is often quoted as being cheaper to install. There are of course good reasons why we will not normally specify an open-loop system, the main one being hidden costs. The hidden costs of an open-loop system come from the need to regularly clean the heat exchanger, run and service the abstraction pump and obtaining and maintaining a water abstraction licence from the Environment Agency, the cost of which varies by region across the UK. Another consideration should be the cost of pumping water from the bottom of a borehole to the surface. A recent example for a modest domestic dwelling showed that a 30kW heat pump system would require about 13,000m3 of water each year to be pumped from the bottom of the borehole to the heat pump at ground level. At the abstraction cost of £0.02751p per m3 this equates to around £360 each year. A cost not required for a closed-loop system. The running costs of an abstraction pump are much higher than those of a closed-loop system circulation pump. A closed-loop system requires a much smaller pump due to the balance of pressure in the loop, rather than having to lift vast volumes of water from a great depth. Based on a 2,200 run-hour cycle per year, an open-loop pump would cost about £ 860 in electricity as opposed to the £60 a year running cost of a closed-loop pump.

Appendix D - Photovoltaic Solar Panels

Description	Advantages	Things to consider
Solar Panels Photovoltaic Electricity Generation		
Solar electricity panels, also known as photovoltaics (PV), capture the sun's energy and convert it into electricity that you can use in your home. By installing solar panels you can generate your own renewable electricity. Solar PV cells are made from layers of semiconducting material, usually silicon. When light shines on the material, electrons are knocked loose, creating a flow of electricity. The cells don't need direct sunlight to work, they can work on a cloudy day. However, the stronger the sunshine, the more electricity generated. Solar PV cells are grouped into modules, and modules are usually grouped into solar arrays. Modules and arrays come in a variety of shapes and sizes. Most PV systems are made up of panels that fit on top of your roof, but you can also install on the ground, or fit solar tiles. The electricity generated is direct current (DC), whereas the electricity you use for household appliances is alternating current (AC). An inverter is installed along with the system to convert DC electricity to AC.	During daylight hours, you'll be generating electricity even on cloudy days, but during the evening you'll be using electricity from the mains. Reducing your electricity use can help lower your bills and reduce your carbon footprint. You can combine PV with other space-heating renewable technologies such as heat pumps, solar thermal systems and wind turbines. These technologies work well with each other, as PV can be set up to help power a heat pump, for example, or several of these systems can feed into a thermal store. With most PV systems, there will be times when the electricity you generate is more than you can use or store, so the surplus will be exported to the grid to be used by somebody else. If you want to be paid for exporting, you need to make sure you're getting an export payment. If you were able to claim the feed-in tariff (this closed to new applications at the end of March 2019), then you will be getting export payments as part of that. If not, you need to find an energy company that will pay you for this surplus. Following the closure of the Feed-in Tariff scheme to new solar PV system applicants in March 2019, the Smart Export Guarantee (SEG) was introduced to provide financial support to small-scale renewable energy generators for the electricity they export to the grid. The savings from solar PV with the SEG are considerably higher than without it. In Great Britain, the Smart Export Guarantee pays you for the electricity you generate. PV Divert Most of the time your solar PV system either: isn't generating enough energy for your household's demand, and is supplemented by importing electricity from the grid, or is generating excess electricity surplus to your demand, and exporting that electricity back to the grid. If you are getting export payments via Smart Export Guarantee or if you aren't getting paid for exports at all, you might be looking for a way to use more of your generated energy within your home. Instead of sending it to the grid, that surplus electricity could power the immersion heater in a hot water tank, storing hot water for you to use later. A PV diverter would allow you to do this, provided you have a hot water cylinder. This is typically the lowest upfront cost option for increasing in-home use, particularly if you install at the same time as your panel installation. It is a reliable and low maintenance piece of kit that directs your excess energy to power your immersion heater, instead of exporting to the grid. On its own, excess solar energy is unlikely to meet all of your hot water needs, but it can help reduce your bills. If you're interested in using PV diverter, speak with your installer. They might also suggest increasing the number of panels on your roof to provide more electricity for your hot water needs.	For domestic systems, PV systems will be working at its peak during daylight hours, so it's a good idea to think about reorganising domestic activities such as washing, dishwashing and ironing. If you're home most of the day, then this will be easier to do, but if you work during the day then try setting up timers for your dishwasher and washing machine. Solar PV needs little maintenance. Keep an eye on nearby trees to ensure they don't begin to overshadow them. In the UK, panels that are tilted at 15° or more have the benefit of being cleaned by rainfall to ensure optimal performance. Debris is more likely to accumulate if you have ground mounted panels, or if you live in an area with more dust in the air. In these cases, you might need to have the panels cleaned. Once fitted, your installer should leave written details of any maintenance checks that you should carry out from time to time to ensure everything is working properly. This should include details of the main inverter fault signals and key troubleshooting guidance. Ideally, your installer should demonstrate this to you at the point of handover. Keeping a close eye on your system and the amount of electricity it's generating (alongside the weather conditions) will familiarise you with what to expect and alert you to when something might be wrong. The panels should last 25 years or more, but the inverter is likely to need replacing sometime during this period. Consult with your installer for exact maintenance requirements before you commit to installing a solar PV system.

Appendix D - Solar Thermal Panels

Description	Advantages	Things to consider
Solar Panels Solar Thermal Heating and/or Hot Water		
Solar water heating systems use solar panels, called collectors, fitted to your roof. These collect heat from the sun and use it to heat up water that is stored in a hot water cylinder. A boiler or immersion heater can be used as a back up to heat the water further to reach the temperature you want. There are two types of solar water heating panels: - evacuated tubes – a bank of glass tubes mounted on the roof tiles - flat plate collectors, which can be fixed on the roof tiles or integrated into the roof	- The system works all year round, though you'll need to heat the water further with a boiler or immersion heater during the winter months. - Sunlight is free, so once you've paid for the initial installation your hot water costs will be reduced. - Solar hot water is a green, renewable heating system and can reduce your carbon dioxide emissions.	- The cost of installing a typical solar water heating system is in the region of £4,000 – £5,000 for a home system. Savings are moderate – the system can provide most of your hot water in the summer, but much less during the winter months. - You'll need around five square metres of roof space for a typical house, which faces East to West through South and receives direct sunlight for the main part of the day. The panels don't have to be mounted on a roof, however. They can be fixed to a frame on a flat roof or hang from a wall. - If a dedicated solar cylinder is not already installed, then you will usually need to replace the existing cylinder or add a dedicated cylinder with a solar heating coil. - Many conventional boiler and hot water cylinder systems are compatible with solar water heating. If your boiler is a combination – or combi – boiler and you don't currently have a hot water cylinder, a solar hot water system may not be compatible. - You don't need planning permission for most home solar water heating systems, as long as they're below a certain size. However, you should check with your local planning officer, especially if your home is a listed building, or in a conservation area or World Heritage Site. - A competent accredited installer will be able to assess your home and help you choose the best setup to meet your needs.

Appendix D - Wind Turbines

Description	Advantages	Things to consider
Wind Turbines		
Wind turbines harness the power of the wind and use it to generate electricity. When the wind blows, the blades are forced round, driving a turbine that generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine: · pole mounted – these are free standing and are erected in a suitably exposed position, with generation capacity of about 5-6kW · building mounted – these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1-2kW in size Battery-less grid tied systems: Often considered to be the best kind of wind turbine, the battery-less grid tied systems are simple, environmentally friendly, and high performance. These turbines produce as much electricity as possible, also feeding into the grid. They're great for anybody wishing to reduce reliance on energy companies, but not so good if you're looking to go off-grid entirely. The problem is that there's no storage for the energy, so when the wind stops blowing you're back to buying energy from the grid. Grid-tied system with battery backup: The problem we mentioned above can be remedied by using a grid-tied turbine with battery storage. It's the same premise, but with a bank of batteries that stores electricity and feeds it back into the system if there is a grid power cut. The only downside is that the battery can be expensive. Off-grid systems: If you are hoping to limit your dependence on the mains as much as possible, you will need a larger turbine, or multiple smaller turbines – size matters. If you're just looking to produce enough electricity for some garden lights then you'd be okay with a smaller one.	You may be able to claim Smart Export Guarantee (SEG) payments for any surplus electricity you export to the grid. The Smart Export Guarantee replaced the previous Feed-in Tariff, which closed to new applications at the end of March 2019. A well-sited 6kW pole mounted turbine could typically earn about £440 per year in SEG payments.	The cost of a system will depend on the size and the mounting method. Building-mounted turbines cost less to install than pole-mounted ones, but they tend to be less efficient. For equipment and installation, a 6kW pole-mounted system costs between £23,000 and £34,000. Building-mounted turbines tend to be less efficient than pole-mounted ones. A well-sited 6kW turbine can generate around 9,000kWh a year, which could save you around £250 a year on your electricity bills. Maintenance checks are necessary every few years, and will generally cost around £100 to £200 per year depending on turbine size. A well-maintained turbine should last more than 20 years, but you may need to replace the inverter at some stage during this time, at a cost of £1,000 to £2,000 for a large system. For off grid systems, batteries will also need replacing, typically every six to 10 years. The cost of replacing batteries varies depending on the design and scale of the system. Any back-up generator will also have its own fuel and maintenance costs. The building may require increased structure to support the turbine if a turbine is included as part of the building.

Appendix E - Building Regulations UK Part L Reports (BRUKL)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

461_Uxbridge Road Model_220615

As designed

Date: Fri Aug 12 12:13:07 2022

Administrative information

Building Details

Address: 27 Uxbridge Road, Hayes, London, UB4 0JN

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	67.9
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	67.9
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	52.2
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	0.15	0.15	"00000001_W1"
Floor	0.25	0.12	0.12	"00000001_F"
Roof	0.25	0.12	0.12	"00000025_C"
Windows***, roof windows, and rooflights	2.2	1.31	1.8	"00000025_C_O0"
Personnel doors	2.2	1.2	1.2	"0000001A_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a-Limit}$ = 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	3.8

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	<0.9

1- Be Lean VRF INCUBATOR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	3	-	-	-
Standard value	0.91*	2.6	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- Be Lean VRF HOTEL

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	3	-	-	-
Standard value	0.91*	2.6	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- Be Lean DHW

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	3	-	1.6	0.65
Standard value	0.91*	3.2	N/A	1.6^	0.5
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.

1- SYST0005-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	0
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
0002_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
0003_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0004_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0005_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0006_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0011_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0012_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0013_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0014_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0015_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0016_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0017_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0018_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0019_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0020_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0021_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0023_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0026_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0027_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0033_Storage	-	1.1	-	-	-	-	-	-	-	-	N/A
0052_Bath I	0.3	-	-	1.6	-	-	-	-	-	0.8	0.5
10039	-	-	-	1.6	-	-	-	-	-	0.8	0.5
10048	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1041_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1042_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1043_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1044_Events	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1045_Events	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1053_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
12095_Amenity	-	-	-	1.6	-	-	-	-	-	0.8	0.5
2063_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8039_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B000_Lift	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B003_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B004_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B008_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B009_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B010_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B011_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B012_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0010_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0009_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0008_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5

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
1016_BOH	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0007_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0001_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0024_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0025_Plant	-	0.3	-	-	-	-	-	-	-	-	N/A
0022_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0033_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1045_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1006_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Sauna	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_changing	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1022_gym	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1015_Kitchen	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1012_Bar	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1013_Bath	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1017_Lounge	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1001_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1002_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1004_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_changing	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0119_Restaurant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Plant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Plant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
100100_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
110110_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
12045_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
2013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
2036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2038_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2038_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
3022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
4008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
4031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
5019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
6004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
6035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7011_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7011_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7014_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7014_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
7035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7080_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8080_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9090_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B005_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B006_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B007_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
B024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0007_Lift	-	1.1	-	-	-	-	-	-	-	-	N/A
10_Lift	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0028_Storage	-	0.3	-	-	-	-	-	-	-	-	N/A
12043_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1267_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B014_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
0002_Storage	100	-	-	62
0003_Storage	100	-	-	10
0004_Storage	100	-	-	10
0005_Storage	100	-	-	10
0006_Corr	-	100	-	190
0011_Incub	100	-	-	133
0012_Incub	100	-	-	135
0013_Incub	100	-	-	133
0014_Incub	100	-	-	135
0015_Incub	100	-	-	133
0016_Incub	100	-	-	135
0017_Incub	100	-	-	131
0018_Incub	100	-	-	133
0019_Incub	100	-	-	131
0020_Incub	100	-	-	133
0021_Incub	100	-	-	192
0023_Incub	100	-	-	720
0024_Stairs	-	100	-	74
0026_Plant	100	-	-	100
0027_Plant	100	-	-	158
0033_Storage	100	-	-	83
0052_Bath I	-	100	-	151

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
10039	-	100	-	185
10048	-	100	-	15
1041_Incub	100	-	-	194
1042_Incub	100	-	-	118
1043_Incub	100	-	-	117
1044_Events	100	-	-	208
1045_Events	100	-	-	472
1053_Corr	-	100	-	95
1204_Plant	100	-	-	420
12095_Amenity	-	100	-	163
2063_Amenity	-	100	15	202
8039_Corr	-	100	-	185
B000_Lift	-	100	-	19
B003_Plant	100	-	-	614
B004_Plant	100	-	-	67
B008_Plant	100	-	-	278
B009_Plant	100	-	-	177
B010_Plant	100	-	-	138
B011_Plant	100	-	-	296
B012_Plant	100	-	-	486
0010_Incub	100	-	-	498
0009_Incub	100	-	-	476
0008_Incub	100	-	-	539
1016_BOH	-	100	-	17
0007_Corr	-	100	-	105
0001_Corr	-	100	-	514
0024_Incub	-	100	-	66
0025_Plant	25	-	-	296
0022_Incub	100	-	-	230
0033_Storage	100	-	-	40
1045_Corr	-	100	-	141
1006_Amenity	-	100	15	43
10_Sauna	-	100	-	109
1006_changing	-	100	-	15
1022_gym	-	100	-	197
7017_Amenity	-	100	-	127
1015_Kitchen	-	100	-	901
1012_Bar	-	100	15	334
1013_Bath	-	100	-	128
1017_Lounge	-	100	15	696
1001_Incub	100	-	-	166
1002_Incub	100	-	-	166
1004_Incub	100	-	-	177

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
1006_changing	-	100	-	22
1006_Amenity	-	100	-	98
10_Corr	-	100	-	44
0119_Restaurant	-	100	15	562
1319_Plant	100	-	-	261
1319_Plant	100	-	-	139
10_Corr	-	100	-	193
10008_Bed N	-	100	-	58
100100_Bath N	-	100	-	19
10081_Bath N	-	100	-	19
10081_Bed N	-	100	-	54
10082_Bath N	-	100	-	19
10082_Bed N	-	100	-	59
11008_Bed N	-	100	-	58
110110_Bath N	-	100	-	19
11081_Bath N	-	100	-	19
11081_Bed N	-	100	-	54
11082_Bath N	-	100	-	19
11082_Bed N	-	100	-	59
12043_Bath N	-	100	-	23
12043_Bed N	-	100	-	43
12044_Bath N	-	100	-	23
12044_Bed N	-	100	-	42
12045_Bath N	-	100	-	23
12045_Bed N	-	100	-	43
12046_Bath N	-	100	-	23
12046_Bed N	-	100	-	43
12047_Bath N	-	100	-	23
12047_Bed N	-	100	-	43
12048_Bath N	-	100	-	23
12048_Bed N	-	100	-	41
12052_Bath N	-	100	-	24
12052_Bed N	-	100	-	44
12053_Bath N	-	100	-	24
12053_Bed N	-	100	-	44
12054_Bath N	-	100	-	27
12054_Bed N	-	100	-	42
12055_Bath N	-	100	-	24
12055_Bed N	-	100	-	43
12056_Bath N	-	100	-	24
12056_Bed N	-	100	-	44
1213_Bath N	-	100	-	18
1213_Bed N	-	100	-	40

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
1214_Bath N	-	100	-	18
1214_Bed N	-	100	-	44
2001_Bed N	-	100	-	57
2001_Bath N	-	100	-	19
2002_Bed N	-	100	-	54
2002_Bath N	-	100	-	19
2003_Bed N	-	100	-	56
2003_Bath N	-	100	-	19
2004_Bed N	-	100	-	63
2004_Bath N	-	100	-	19
2005_Bed N	-	100	-	62
2005_Bath N	-	100	-	19
2006_Bed N	-	100	-	67
2006_Bath N	-	100	-	19
2008_Bed N	-	100	-	58
2008_Bath N	-	100	-	19
2009_Bed N	-	100	-	54
2009_Bath N	-	100	-	19
2010_Bed N	-	100	-	59
2010_Bath N	-	100	-	19
2012_Bed N	-	100	-	69
2012_Bath N	-	100	-	19
2013_Bed N	-	100	-	65
2013_Bath N	-	100	-	19
2015_Bed N	-	100	-	67
2015_Bath N	-	100	-	19
2016_Bed N	-	100	-	55
2016_Bath N	-	100	-	13
2017_Bed N	-	100	-	62
2017_Bath N	-	100	-	19
2018_Bed N	-	100	-	62
2018_Bath N	-	100	-	19
2020_Bed N	-	100	-	62
2020_Bath N	-	100	-	19
2021_Bed N	-	100	-	62
2021_Bath N	-	100	-	19
2022_Bed N	-	100	-	62
2022_Bath N	-	100	-	19
2023_Bed N	-	100	-	70
2023_Bath N	-	100	-	19
2024_Bed N	-	100	-	66
2024_Bath N	-	100	-	19
2025_Bed N	-	100	-	63

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
2025_Bath N	-	100	-	19
2026_Bed N	-	100	-	67
2026_Bath N	-	100	-	19
2027_Bath N	-	100	-	19
2027_Bed N	-	100	-	67
2028_Bed N	-	100	-	61
2028_Bath N	-	100	-	19
2029_Bed N	-	100	-	61
2029_Bath N	-	100	-	19
2030_Bed N	-	100	-	51
2030_Bath N	-	100	-	19
2031_Bed N	-	100	-	70
2031_Bath N	-	100	-	19
2031_Bath N	-	100	-	19
2031_Bath N	-	100	-	19
2032_Bed N	-	100	-	65
2032_Bath N	-	100	-	19
2033_Bed N	-	100	-	67
2033_Bath N	-	100	-	19
2034_Bed N	-	100	-	65
2034_Bath N	-	100	-	19
2035_Bed N	-	100	-	66
2035_Bath N	-	100	-	19
2036_Bed N	-	100	-	65
2036_Bath N	-	100	-	19
2037_Bed N	-	100	-	66
2037_Bath N	-	100	-	19
2038_Bed N	-	100	-	45
2038_Bath N	-	100	-	18
3001_Bed N	-	100	-	57
3001_Bath N	-	100	-	19
3002_Bed N	-	100	-	54
3002_Bath N	-	100	-	19
3003_Bed N	-	100	-	56
3003_Bath N	-	100	-	19
3004_Bed N	-	100	-	63
3004_Bath N	-	100	-	19
3005_Bed N	-	100	-	62
3005_Bath N	-	100	-	19
3006_Bed N	-	100	-	67
3006_Bath N	-	100	-	19
3008_Bed N	-	100	-	58
3008_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3009_Bed N	-	100	-	54
3009_Bath N	-	100	-	19
3010_Bed N	-	100	-	59
3010_Bath N	-	100	-	19
3012_Bed N	-	100	-	69
3012_Bath N	-	100	-	19
3013_Bed N	-	100	-	65
3013_Bath N	-	100	-	19
3015_Bed N	-	100	-	67
3015_Bath N	-	100	-	19
3016_Bed N	-	100	-	55
3016_Bath N	-	100	-	13
3017_Bed N	-	100	-	62
3017_Bath N	-	100	-	19
3018_Bed N	-	100	-	62
3018_Bath N	-	100	-	19
3019_Bed N	-	100	-	62
3019_Bath N	-	100	-	19
3020_Bed N	-	100	-	62
3020_Bath N	-	100	-	19
3021_Bed N	-	100	-	62
3021_Bath N	-	100	-	19
3022_Bed N	-	100	-	70
3022_Bath N	-	100	-	19
3023_Bed N	-	100	-	66
3023_Bath N	-	100	-	19
3024_Bed N	-	100	-	63
3024_Bath N	-	100	-	19
3025_Bed N	-	100	-	67
3025_Bath N	-	100	-	19
3026_Bath N	-	100	-	19
3026_Bed N	-	100	-	67
3027_Bed N	-	100	-	61
3027_Bath N	-	100	-	19
3028_Bed N	-	100	-	61
3028_Bath N	-	100	-	19
3029_Bed N	-	100	-	51
3029_Bath N	-	100	-	19
3030_Bed N	-	100	-	70
3031_Bed N	-	100	-	65
3031_Bath N	-	100	-	19
3032_Bath N	-	100	-	19
3032_Bed N	-	100	-	67

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3033_Bed N	-	100	-	65
3033_Bath N	-	100	-	19
3034_Bed N	-	100	-	66
3034_Bath N	-	100	-	19
3035_Bed N	-	100	-	65
3035_Bath N	-	100	-	19
3036_Bed N	-	100	-	66
3036_Bath N	-	100	-	19
3037_Bed N	-	100	-	45
3037_Bath N	-	100	-	18
4001_Bed N	-	100	-	57
4001_Bath N	-	100	-	19
4002_Bed N	-	100	-	54
4002_Bath N	-	100	-	19
4003_Bed N	-	100	-	56
4003_Bath N	-	100	-	19
4004_Bed N	-	100	-	63
4004_Bath N	-	100	-	19
4005_Bed N	-	100	-	62
4005_Bath N	-	100	-	19
4006_Bed N	-	100	-	67
4006_Bath N	-	100	-	19
4008_Bed N	-	100	-	58
4008_Bath N	-	100	-	19
4009_Bed N	-	100	-	54
4009_Bath N	-	100	-	19
4010_Bed N	-	100	-	59
4010_Bath N	-	100	-	19
4012_Bed N	-	100	-	69
4012_Bath N	-	100	-	19
4013_Bed N	-	100	-	65
4013_Bath N	-	100	-	19
4015_Bed N	-	100	-	67
4015_Bath N	-	100	-	19
4015_Bed N	-	100	-	55
4015_Bath N	-	100	-	13
4016_Bed N	-	100	-	62
4016_Bath N	-	100	-	19
4017_Bed N	-	100	-	62
4017_Bath N	-	100	-	19
4018_Bed N	-	100	-	62
4018_Bath N	-	100	-	19
4019_Bed N	-	100	-	62

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
4019_Bath N	-	100	-	19
4020_Bed N	-	100	-	62
4020_Bath N	-	100	-	19
4021_Bed N	-	100	-	70
4021_Bath N	-	100	-	19
4022_Bed N	-	100	-	66
4022_Bath N	-	100	-	19
4023_Bed N	-	100	-	63
4023_Bath N	-	100	-	19
4024_Bed N	-	100	-	67
4024_Bath N	-	100	-	19
4025_Bath N	-	100	-	19
4025_Bed N	-	100	-	67
4026_Bed N	-	100	-	61
4026_Bath N	-	100	-	19
4027_Bed N	-	100	-	61
4027_Bath N	-	100	-	19
4028_Bed N	-	100	-	51
4028_Bath N	-	100	-	19
4029_Bed N	-	100	-	70
4029_Bath N	-	100	-	19
4030_Bed N	-	100	-	65
4030_Bath N	-	100	-	19
4031_Bath N	-	100	-	19
4031_Bed N	-	100	-	67
4032_Bed N	-	100	-	65
4032_Bath N	-	100	-	19
4033_Bed N	-	100	-	66
4033_Bath N	-	100	-	19
4034_Bed N	-	100	-	65
4034_Bath N	-	100	-	19
4035_Bed N	-	100	-	66
4035_Bath N	-	100	-	19
4036_Bed N	-	100	-	45
4036_Bath N	-	100	-	18
5001_Bed N	-	100	-	57
5001_Bath N	-	100	-	19
5002_Bed N	-	100	-	54
5002_Bath N	-	100	-	19
5003_Bed N	-	100	-	56
5003_Bath N	-	100	-	19
5004_Bed N	-	100	-	63
5004_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
5005_Bed N	-	100	-	62
5005_Bath N	-	100	-	19
5006_Bed N	-	100	-	67
5006_Bath N	-	100	-	19
5008_Bed N	-	100	-	58
5008_Bath N	-	100	-	19
5009_Bed N	-	100	-	54
5009_Bath N	-	100	-	19
5010_Bed N	-	100	-	59
5010_Bath N	-	100	-	19
5012_Bed N	-	100	-	69
5012_Bath N	-	100	-	19
5013_Bed N	-	100	-	65
5013_Bath N	-	100	-	19
5015_Bed N	-	100	-	67
5015_Bath N	-	100	-	19
5016_Bed N	-	100	-	55
5016_Bath N	-	100	-	13
5017_Bed N	-	100	-	62
5017_Bath N	-	100	-	19
5018_Bed N	-	100	-	62
5018_Bath N	-	100	-	19
5019_Bed N	-	100	-	62
5019_Bath N	-	100	-	19
5020_Bed N	-	100	-	62
5020_Bath N	-	100	-	19
5021_Bed N	-	100	-	62
5021_Bath N	-	100	-	19
5022_Bed N	-	100	-	70
5022_Bath N	-	100	-	19
5023_Bed N	-	100	-	66
5023_Bath N	-	100	-	19
5024_Bed N	-	100	-	63
5024_Bath N	-	100	-	19
5025_Bed N	-	100	-	67
5025_Bath N	-	100	-	19
5026_Bath N	-	100	-	19
5026_Bed N	-	100	-	67
5027_Bed N	-	100	-	61
5027_Bath N	-	100	-	19
5028_Bed N	-	100	-	61
5028_Bath N	-	100	-	19
5029_Bed N	-	100	-	51

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
5029_Bath N	-	100	-	19
5030_Bed N	-	100	-	70
5031_Bed N	-	100	-	65
5031_Bath N	-	100	-	19
5032_Bath N	-	100	-	19
5032_Bed N	-	100	-	67
5033_Bed N	-	100	-	65
5033_Bath N	-	100	-	19
5034_Bed N	-	100	-	66
5034_Bath N	-	100	-	19
5035_Bed N	-	100	-	65
5035_Bath N	-	100	-	19
5036_Bed N	-	100	-	66
5036_Bath N	-	100	-	19
5037_Bed N	-	100	-	45
5037_Bath N	-	100	-	18
6001_Bed N	-	100	-	57
6001_Bath N	-	100	-	19
6002_Bed N	-	100	-	54
6002_Bath N	-	100	-	19
6003_Bed N	-	100	-	56
6003_Bath N	-	100	-	19
6004_Bed N	-	100	-	63
6004_Bath N	-	100	-	19
6005_Bed N	-	100	-	62
6005_Bath N	-	100	-	19
6006_Bed N	-	100	-	67
6006_Bath N	-	100	-	19
6008_Bed N	-	100	-	58
6008_Bath N	-	100	-	19
6009_Bed N	-	100	-	54
6009_Bath N	-	100	-	19
6010_Bed N	-	100	-	59
6010_Bath N	-	100	-	19
6012_Bed N	-	100	-	69
6012_Bath N	-	100	-	19
6013_Bed N	-	100	-	65
6013_Bath N	-	100	-	19
6015_Bed N	-	100	-	67
6015_Bath N	-	100	-	19
6016_Bed N	-	100	-	55
6016_Bath N	-	100	-	13
6017_Bed N	-	100	-	62

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
6017_Bath N	-	100	-	19
6018_Bed N	-	100	-	62
6018_Bath N	-	100	-	19
6019_Bed N	-	100	-	62
6019_Bath N	-	100	-	19
6020_Bed N	-	100	-	62
6020_Bath N	-	100	-	19
6021_Bed N	-	100	-	62
6021_Bath N	-	100	-	19
6022_Bed N	-	100	-	70
6022_Bath N	-	100	-	19
6029_Bed N	-	100	-	70
6029_Bath N	-	100	-	19
6030_Bed N	-	100	-	65
6030_Bath N	-	100	-	19
6031_Bath N	-	100	-	19
6031_Bed N	-	100	-	67
6032_Bed N	-	100	-	65
6032_Bath N	-	100	-	19
6033_Bed N	-	100	-	66
6033_Bath N	-	100	-	19
6034_Bed N	-	100	-	65
6034_Bath N	-	100	-	19
6035_Bed N	-	100	-	66
6035_Bath N	-	100	-	19
6036_Bed N	-	100	-	45
6036_Bath N	-	100	-	18
7001_Bed N	-	100	-	57
7001_Bath N	-	100	-	19
7002_Bed N	-	100	-	54
7002_Bath N	-	100	-	19
7003_Bed N	-	100	-	56
7003_Bath N	-	100	-	19
7004_Bed N	-	100	-	63
7004_Bath N	-	100	-	19
7005_Bed N	-	100	-	62
7005_Bath N	-	100	-	19
7006_Bed N	-	100	-	67
7006_Bath N	-	100	-	19
7008_Bed N	-	100	-	58
7008_Bed N	-	100	-	69
7008_Bath N	-	100	-	19
7009_Bed N	-	100	-	65

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
7009_Bath N	-	100	-	19
7011_Bed N	-	100	-	67
7011_Bath N	-	100	-	19
7012_Bed N	-	100	-	55
7012_Bath N	-	100	-	13
7013_Bed N	-	100	-	62
7013_Bath N	-	100	-	19
7014_Bed N	-	100	-	62
7014_Bath N	-	100	-	19
7015_Bed N	-	100	-	62
7015_Bath N	-	100	-	19
7016_Bed N	-	100	-	62
7016_Bath N	-	100	-	19
7017_Bed N	-	100	-	62
7017_Bath N	-	100	-	19
7018_Bed N	-	100	-	70
7018_Bath N	-	100	-	19
7032_Bed N	-	100	-	65
7032_Bath N	-	100	-	19
7033_Bed N	-	100	-	66
7033_Bath N	-	100	-	19
7034_Bed N	-	100	-	65
7034_Bath N	-	100	-	19
7035_Bed N	-	100	-	66
7035_Bath N	-	100	-	19
7036_Bed N	-	100	-	45
7036_Bath N	-	100	-	18
7080_Bath N	-	100	-	19
7081_Bed N	-	100	-	54
7081_Bath N	-	100	-	19
7082_Bed N	-	100	-	59
7082_Bath N	-	100	-	19
8008_Bed N	-	100	-	58
8080_Bath N	-	100	-	19
8081_Bed N	-	100	-	54
8081_Bath N	-	100	-	19
8082_Bed N	-	100	-	59
8082_Bath N	-	100	-	19
9008_Bed N	-	100	-	58
9081_Bed N	-	100	-	54
9081_Bath N	-	100	-	19
9082_Bed N	-	100	-	59
9082_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
9090_Bath N	-	100	-	19
B005_Corr	-	100	-	117
B006_Corr	-	100	-	27
B007_Corr	-	100	-	44
B013_Bath N	-	100	-	18
B013_Bed N	-	100	-	65
B015_Bed N	-	100	-	62
B015_Bath N	-	100	-	18
B017_Bath N	-	100	-	18
B017_Bed N	-	100	-	66
B018_Bed N	-	100	-	62
B018_Bath N	-	100	-	18
B019_Bed N	-	100	-	62
B019_Bath N	-	100	-	18
B020_Bath N	-	100	-	18
B020_Bed N	-	100	-	62
B021_Bed N	-	100	-	65
B021_Bath N	-	100	-	18
B022_Bath N	-	100	-	18
B022_Bed N	-	100	-	63
B023_Bath N	-	100	-	18
B023_Bed N	-	100	-	60
B024_Bed N	-	100	-	63
B024_Bath N	-	100	-	18
B026_Bed N	-	100	-	60
B026_Bath N	-	100	-	18
B028_Bath N	-	100	-	18
B028_Bed N	-	100	-	61
B029_Bath N	-	100	-	18
B029_Bed N	-	100	-	60
B030_Bath N	-	100	-	18
B030_Bed N	-	100	-	46
B027_Bed N	-	100	-	72
B027_Bath N	-	100	-	18
0007_Lift	-	100	-	29
10_Lift	-	100	-	23
0028_Storage	100	-	-	97
0118_Stairs	-	18	-	635
12037_Stairs	-	100	-	40
12043_Bath N	-	100	-	23
12043_Bed N	-	100	-	43
12044_Bath N	-	100	-	23
12044_Bed N	-	100	-	42

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
12045_Bath N	-	100	-	23
12045_Bed N	-	100	-	43
12046_Bath N	-	100	-	23
12046_Bed N	-	100	-	43
12047_Bath N	-	100	-	23
12047_Bed N	-	100	-	43
12048_Bath N	-	100	-	23
12048_Bed N	-	100	-	41
12049_Stairs	-	100	-	40
12052_Bath N	-	100	-	24
12052_Bed N	-	100	-	44
12053_Bath N	-	100	-	24
12053_Bed N	-	100	-	44
12054_Bath N	-	100	-	27
12054_Bed N	-	100	-	42
12055_Bath N	-	100	-	24
12055_Bed N	-	100	-	43
12056_Bath N	-	100	-	24
12056_Bed N	-	100	-	44
1213_Bath N	-	100	-	18
1213_Bed N	-	100	-	40
1214_Bath N	-	100	-	18
1214_Bed N	-	100	-	44
1267_Corr	-	100	-	179
12095_Bath N	-	100	-	17
12095_Bed N	-	100	-	57
12095_Bath N	-	100	-	18
12095_Bed N	-	100	-	52
12095_Bath N	-	100	-	18
12095_Bed N	-	100	-	57
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	43
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	42
1204_Bed N	-	100	-	47
1204_Bath N	-	100	-	18
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	46
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	47
1319_Bath N	-	100	-	19
1319_Bed N	-	100	-	51
B014_Bed N	-	100	-	66

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
0034_Corr	-	100	-	71

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?
0002_Storage	NO (-59.6%)	NO
0003_Storage	N/A	N/A
0004_Storage	N/A	N/A
0005_Storage	N/A	N/A
0006_Corr	YES (+1123%)	NO
0011_Incub	N/A	N/A
0012_Incub	N/A	N/A
0013_Incub	N/A	N/A
0014_Incub	N/A	N/A
0015_Incub	N/A	N/A
0016_Incub	N/A	N/A
0017_Incub	N/A	N/A
0018_Incub	N/A	N/A
0019_Incub	N/A	N/A
0020_Incub	N/A	N/A
0021_Incub	N/A	N/A
0023_Incub	NO (-66.8%)	NO
0024_Stairs	N/A	N/A
0026_Plant	N/A	N/A
0027_Plant	N/A	N/A
0033_Storage	NO (-78.2%)	NO
0052_Bath I	N/A	N/A
10039	N/A	N/A
10048	N/A	N/A
1041_Incub	N/A	N/A
1042_Incub	N/A	N/A
1043_Incub	N/A	N/A
1044_Events	N/A	N/A
1045_Events	N/A	N/A
1053_Corr	N/A	N/A
1204_Plant	NO (-25.4%)	NO
12095_Amenity	NO (-69.1%)	NO
2063_Amenity	N/A	N/A
8039_Corr	N/A	N/A
B000_Lift	N/A	N/A
B003_Plant	N/A	N/A
B004_Plant	N/A	N/A
B008_Plant	N/A	N/A
B009_Plant	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B010_Plant	N/A	N/A
B011_Plant	N/A	N/A
B012_Plant	N/A	N/A
0010_Incub	YES (+6.6%)	NO
0009_Incub	YES (+8.4%)	NO
0008_Incub	NO (-25.2%)	NO
1016_BOH	N/A	N/A
0007_Corr	YES (+1.6%)	NO
0001_Corr	YES (+7%)	NO
0024_Incub	N/A	N/A
0025_Plant	N/A	N/A
0022_Incub	N/A	N/A
0033_Storage	N/A	N/A
1045_Corr	N/A	N/A
1006_Amenity	N/A	N/A
10_Sauna	N/A	N/A
1006_changing	N/A	N/A
1022_gym	N/A	N/A
7017_Amenity	N/A	N/A
1015_Kitchen	N/A	N/A
1012_Bar	YES (+99.2%)	NO
1013_Bath	YES (+8.2%)	NO
1017_Lounge	NO (-65.7%)	NO
1001_Incub	NO (-51.4%)	NO
1002_Incub	NO (-50.2%)	NO
1004_Incub	NO (-53.2%)	NO
1006_changing	N/A	N/A
1006_Amenity	N/A	N/A
10_Corr	N/A	N/A
0119_Restaurant	N/A	N/A
1319_Plant	NO (-48.3%)	NO
1319_Plant	NO (-12%)	NO
10_Corr	N/A	N/A
10008_Bed N	NO (-57.7%)	NO
100100_Bath N	N/A	N/A
10081_Bath N	N/A	N/A
10081_Bed N	NO (-57.5%)	NO
10082_Bath N	N/A	N/A
10082_Bed N	NO (-51.9%)	NO
11008_Bed N	NO (-57.7%)	NO
110110_Bath N	N/A	N/A
11081_Bath N	N/A	N/A
11081_Bed N	NO (-57.5%)	NO
11082_Bath N	N/A	N/A
11082_Bed N	NO (-51.9%)	NO
12043_Bath N	N/A	N/A
12043_Bed N	NO (-2%)	NO
12044_Bath N	N/A	N/A
12044_Bed N	YES (+2.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
12045_Bath N	N/A	N/A
12045_Bed N	YES (+0.3%)	NO
12046_Bath N	N/A	N/A
12046_Bed N	YES (+0.3%)	NO
12047_Bath N	N/A	N/A
12047_Bed N	YES (+0.3%)	NO
12048_Bath N	N/A	N/A
12048_Bed N	YES (+5.2%)	NO
12052_Bath N	N/A	N/A
12052_Bed N	NO (-5.9%)	NO
12053_Bath N	N/A	N/A
12053_Bed N	NO (-5.9%)	NO
12054_Bath N	N/A	N/A
12054_Bed N	NO (-5.9%)	NO
12055_Bath N	N/A	N/A
12055_Bed N	NO (-3.7%)	NO
12056_Bath N	N/A	N/A
12056_Bed N	NO (-5.9%)	NO
1213_Bath N	N/A	N/A
1213_Bed N	YES (+15.6%)	NO
1214_Bath N	N/A	N/A
1214_Bed N	NO (-70.4%)	NO
2001_Bed N	NO (-53.4%)	NO
2001_Bath N	N/A	N/A
2002_Bed N	NO (-57.5%)	NO
2002_Bath N	N/A	N/A
2003_Bed N	NO (-68.8%)	NO
2003_Bath N	N/A	N/A
2004_Bed N	NO (-64.4%)	NO
2004_Bath N	N/A	N/A
2005_Bed N	NO (-57.5%)	NO
2005_Bath N	N/A	N/A
2006_Bed N	NO (-76.6%)	NO
2006_Bath N	N/A	N/A
2008_Bed N	NO (-57.7%)	NO
2008_Bath N	N/A	N/A
2009_Bed N	NO (-57.5%)	NO
2009_Bath N	N/A	N/A
2010_Bed N	NO (-51.9%)	NO
2010_Bath N	N/A	N/A
2012_Bed N	NO (-76.9%)	NO
2012_Bath N	N/A	N/A
2013_Bed N	NO (-57.9%)	NO
2013_Bath N	N/A	N/A
2015_Bed N	NO (-40.2%)	NO
2015_Bath N	N/A	N/A
2016_Bed N	NO (-73.6%)	NO
2016_Bath N	N/A	N/A
2017_Bed N	NO (-31.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
2017_Bath N	N/A	N/A
2018_Bed N	NO (-31.6%)	NO
2018_Bath N	N/A	N/A
2020_Bed N	NO (-32.3%)	NO
2020_Bath N	N/A	N/A
2021_Bed N	NO (-31.6%)	NO
2021_Bath N	N/A	N/A
2022_Bed N	NO (-31.6%)	NO
2022_Bath N	N/A	N/A
2023_Bed N	NO (-59.7%)	NO
2023_Bath N	N/A	N/A
2024_Bed N	NO (-66.9%)	NO
2024_Bath N	N/A	N/A
2025_Bed N	NO (-48.1%)	NO
2025_Bath N	N/A	N/A
2026_Bed N	NO (-67.3%)	NO
2026_Bath N	N/A	N/A
2027_Bath N	N/A	N/A
2027_Bed N	NO (-64.7%)	NO
2028_Bed N	NO (-41.1%)	NO
2028_Bath N	N/A	N/A
2029_Bed N	NO (-40%)	NO
2029_Bath N	N/A	N/A
2030_Bed N	NO (-59.6%)	NO
2030_Bath N	N/A	N/A
2031_Bed N	NO (-69%)	NO
2031_Bath N	N/A	N/A
2031_Bath N	N/A	N/A
2031_Bath N	N/A	N/A
2032_Bed N	NO (-42.5%)	NO
2032_Bath N	N/A	N/A
2033_Bed N	NO (-44.7%)	NO
2033_Bath N	N/A	N/A
2034_Bed N	NO (-53.4%)	NO
2034_Bath N	N/A	N/A
2035_Bed N	NO (-43.8%)	NO
2035_Bath N	N/A	N/A
2036_Bed N	NO (-42.2%)	NO
2036_Bath N	N/A	N/A
2037_Bed N	NO (-43.2%)	NO
2037_Bath N	N/A	N/A
2038_Bed N	NO (-79.2%)	NO
2038_Bath N	N/A	N/A
3001_Bed N	NO (-53.4%)	NO
3001_Bath N	N/A	N/A
3002_Bed N	NO (-57.5%)	NO
3002_Bath N	N/A	N/A
3003_Bed N	NO (-68.8%)	NO
3003_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
3004_Bed N	NO (-64.4%)	NO
3004_Bath N	N/A	N/A
3005_Bed N	NO (-57.5%)	NO
3005_Bath N	N/A	N/A
3006_Bed N	NO (-76.6%)	NO
3006_Bath N	N/A	N/A
3008_Bed N	NO (-57.7%)	NO
3008_Bath N	N/A	N/A
3009_Bed N	NO (-57.5%)	NO
3009_Bath N	N/A	N/A
3010_Bed N	NO (-51.9%)	NO
3010_Bath N	N/A	N/A
3012_Bed N	NO (-76.9%)	NO
3012_Bath N	N/A	N/A
3013_Bed N	NO (-57.9%)	NO
3013_Bath N	N/A	N/A
3015_Bed N	NO (-40.2%)	NO
3015_Bath N	N/A	N/A
3016_Bed N	NO (-73.6%)	NO
3016_Bath N	N/A	N/A
3017_Bed N	NO (-31.6%)	NO
3017_Bath N	N/A	N/A
3018_Bed N	NO (-31.6%)	NO
3018_Bath N	N/A	N/A
3019_Bed N	NO (-32.3%)	NO
3019_Bath N	N/A	N/A
3020_Bed N	NO (-31.6%)	NO
3020_Bath N	N/A	N/A
3021_Bed N	NO (-31.6%)	NO
3021_Bath N	N/A	N/A
3022_Bed N	NO (-59.7%)	NO
3022_Bath N	N/A	N/A
3023_Bed N	NO (-66.9%)	NO
3023_Bath N	N/A	N/A
3024_Bed N	NO (-48.1%)	NO
3024_Bath N	N/A	N/A
3025_Bed N	NO (-67.3%)	NO
3025_Bath N	N/A	N/A
3026_Bath N	N/A	N/A
3026_Bed N	NO (-64.7%)	NO
3027_Bed N	NO (-40%)	NO
3027_Bath N	N/A	N/A
3028_Bed N	NO (-40%)	NO
3028_Bath N	N/A	N/A
3029_Bed N	NO (-59.6%)	NO
3029_Bath N	N/A	N/A
3030_Bed N	NO (-69%)	NO
3031_Bed N	NO (-42.5%)	NO
3031_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
3032_Bath N	N/A	N/A
3032_Bed N	NO (-44.7%)	NO
3033_Bed N	NO (-53.4%)	NO
3033_Bath N	N/A	N/A
3034_Bed N	NO (-43.8%)	NO
3034_Bath N	N/A	N/A
3035_Bed N	NO (-42.2%)	NO
3035_Bath N	N/A	N/A
3036_Bed N	NO (-43.2%)	NO
3036_Bath N	N/A	N/A
3037_Bed N	NO (-79.2%)	NO
3037_Bath N	N/A	N/A
4001_Bed N	NO (-53.4%)	NO
4001_Bath N	N/A	N/A
4002_Bed N	NO (-57.5%)	NO
4002_Bath N	N/A	N/A
4003_Bed N	NO (-58.2%)	NO
4003_Bath N	N/A	N/A
4004_Bed N	NO (-64.4%)	NO
4004_Bath N	N/A	N/A
4005_Bed N	NO (-57.5%)	NO
4005_Bath N	N/A	N/A
4006_Bed N	NO (-76.6%)	NO
4006_Bath N	N/A	N/A
4008_Bed N	NO (-57.7%)	NO
4008_Bath N	N/A	N/A
4009_Bed N	NO (-57.5%)	NO
4009_Bath N	N/A	N/A
4010_Bed N	NO (-51.9%)	NO
4010_Bath N	N/A	N/A
4012_Bed N	NO (-76.9%)	NO
4012_Bath N	N/A	N/A
4013_Bed N	NO (-57.9%)	NO
4013_Bath N	N/A	N/A
4015_Bed N	NO (-40.2%)	NO
4015_Bath N	N/A	N/A
4015_Bed N	NO (-73.6%)	NO
4015_Bath N	N/A	N/A
4016_Bed N	NO (-31.6%)	NO
4016_Bath N	N/A	N/A
4017_Bed N	NO (-31.6%)	NO
4017_Bath N	N/A	N/A
4018_Bed N	NO (-32.3%)	NO
4018_Bath N	N/A	N/A
4019_Bed N	NO (-31.6%)	NO
4019_Bath N	N/A	N/A
4020_Bed N	NO (-31.6%)	NO
4020_Bath N	N/A	N/A
4021_Bed N	NO (-59.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
4021_Bath N	N/A	N/A
4022_Bed N	NO (-66.9%)	NO
4022_Bath N	N/A	N/A
4023_Bed N	NO (-48.1%)	NO
4023_Bath N	N/A	N/A
4024_Bed N	NO (-67.3%)	NO
4024_Bath N	N/A	N/A
4025_Bath N	N/A	N/A
4025_Bed N	NO (-64.7%)	NO
4026_Bed N	NO (-40%)	NO
4026_Bath N	N/A	N/A
4027_Bed N	NO (-40%)	NO
4027_Bath N	N/A	N/A
4028_Bed N	NO (-60.3%)	NO
4028_Bath N	N/A	N/A
4029_Bed N	NO (-69%)	NO
4029_Bath N	N/A	N/A
4030_Bed N	NO (-42.5%)	NO
4030_Bath N	N/A	N/A
4031_Bath N	N/A	N/A
4031_Bed N	NO (-44.7%)	NO
4032_Bed N	NO (-53.4%)	NO
4032_Bath N	N/A	N/A
4033_Bed N	NO (-43.8%)	NO
4033_Bath N	N/A	N/A
4034_Bed N	NO (-42.2%)	NO
4034_Bath N	N/A	N/A
4035_Bed N	NO (-43.2%)	NO
4035_Bath N	N/A	N/A
4036_Bed N	NO (-79.2%)	NO
4036_Bath N	N/A	N/A
5001_Bed N	NO (-53.4%)	NO
5001_Bath N	N/A	N/A
5002_Bed N	NO (-57.5%)	NO
5002_Bath N	N/A	N/A
5003_Bed N	NO (-58.2%)	NO
5003_Bath N	N/A	N/A
5004_Bed N	NO (-64.4%)	NO
5004_Bath N	N/A	N/A
5005_Bed N	NO (-57.5%)	NO
5005_Bath N	N/A	N/A
5006_Bed N	NO (-76.6%)	NO
5006_Bath N	N/A	N/A
5008_Bed N	NO (-57.7%)	NO
5008_Bath N	N/A	N/A
5009_Bed N	NO (-57.5%)	NO
5009_Bath N	N/A	N/A
5010_Bed N	NO (-51.9%)	NO
5010_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
5012_Bed N	NO (-76.9%)	NO
5012_Bath N	N/A	N/A
5013_Bed N	NO (-57.9%)	NO
5013_Bath N	N/A	N/A
5015_Bed N	NO (-40.2%)	NO
5015_Bath N	N/A	N/A
5016_Bed N	NO (-73.6%)	NO
5016_Bath N	N/A	N/A
5017_Bed N	NO (-31.6%)	NO
5017_Bath N	N/A	N/A
5018_Bed N	NO (-31.6%)	NO
5018_Bath N	N/A	N/A
5019_Bed N	NO (-32.3%)	NO
5019_Bath N	N/A	N/A
5020_Bed N	NO (-31.6%)	NO
5020_Bath N	N/A	N/A
5021_Bed N	NO (-31.6%)	NO
5021_Bath N	N/A	N/A
5022_Bed N	NO (-59.7%)	NO
5022_Bath N	N/A	N/A
5023_Bed N	NO (-66.9%)	NO
5023_Bath N	N/A	N/A
5024_Bed N	NO (-48.1%)	NO
5024_Bath N	N/A	N/A
5025_Bed N	NO (-67.3%)	NO
5025_Bath N	N/A	N/A
5026_Bath N	N/A	N/A
5026_Bed N	NO (-64.7%)	NO
5027_Bed N	NO (-42.2%)	NO
5027_Bath N	N/A	N/A
5028_Bed N	NO (-41.1%)	NO
5028_Bath N	N/A	N/A
5029_Bed N	NO (-60.9%)	NO
5029_Bath N	N/A	N/A
5030_Bed N	NO (-69%)	NO
5031_Bed N	NO (-42.5%)	NO
5031_Bath N	N/A	N/A
5032_Bath N	N/A	N/A
5032_Bed N	NO (-44.7%)	NO
5033_Bed N	NO (-53.4%)	NO
5033_Bath N	N/A	N/A
5034_Bed N	NO (-43.8%)	NO
5034_Bath N	N/A	N/A
5035_Bed N	NO (-42.2%)	NO
5035_Bath N	N/A	N/A
5036_Bed N	NO (-43.2%)	NO
5036_Bath N	N/A	N/A
5037_Bed N	NO (-79.2%)	NO
5037_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
6001_Bed N	NO (-53.4%)	NO
6001_Bath N	N/A	N/A
6002_Bed N	NO (-57.5%)	NO
6002_Bath N	N/A	N/A
6003_Bed N	NO (-68.8%)	NO
6003_Bath N	N/A	N/A
6004_Bed N	NO (-64.4%)	NO
6004_Bath N	N/A	N/A
6005_Bed N	NO (-57.5%)	NO
6005_Bath N	N/A	N/A
6006_Bed N	NO (-76.6%)	NO
6006_Bath N	N/A	N/A
6008_Bed N	NO (-57.7%)	NO
6008_Bath N	N/A	N/A
6009_Bed N	NO (-57.5%)	NO
6009_Bath N	N/A	N/A
6010_Bed N	NO (-51.9%)	NO
6010_Bath N	N/A	N/A
6012_Bed N	NO (-76.9%)	NO
6012_Bath N	N/A	N/A
6013_Bed N	NO (-57.9%)	NO
6013_Bath N	N/A	N/A
6015_Bed N	NO (-40.2%)	NO
6015_Bath N	N/A	N/A
6016_Bed N	NO (-73.6%)	NO
6016_Bath N	N/A	N/A
6017_Bed N	NO (-31.6%)	NO
6017_Bath N	N/A	N/A
6018_Bed N	NO (-31.6%)	NO
6018_Bath N	N/A	N/A
6019_Bed N	NO (-32.3%)	NO
6019_Bath N	N/A	N/A
6020_Bed N	NO (-31.6%)	NO
6020_Bath N	N/A	N/A
6021_Bed N	NO (-31.6%)	NO
6021_Bath N	N/A	N/A
6022_Bed N	NO (-59.7%)	NO
6022_Bath N	N/A	N/A
6029_Bed N	NO (-69%)	NO
6029_Bath N	N/A	N/A
6030_Bed N	NO (-42.5%)	NO
6030_Bath N	N/A	N/A
6031_Bath N	N/A	N/A
6031_Bed N	NO (-44.7%)	NO
6032_Bed N	NO (-53.4%)	NO
6032_Bath N	N/A	N/A
6033_Bed N	NO (-43.8%)	NO
6033_Bath N	N/A	N/A
6034_Bed N	NO (-42.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
6034_Bath N	N/A	N/A
6035_Bed N	NO (-43.2%)	NO
6035_Bath N	N/A	N/A
6036_Bed N	NO (-79.2%)	NO
6036_Bath N	N/A	N/A
7001_Bed N	NO (-53.4%)	NO
7001_Bath N	N/A	N/A
7002_Bed N	NO (-57.5%)	NO
7002_Bath N	N/A	N/A
7003_Bed N	NO (-68.8%)	NO
7003_Bath N	N/A	N/A
7004_Bed N	NO (-64.4%)	NO
7004_Bath N	N/A	N/A
7005_Bed N	NO (-57.5%)	NO
7005_Bath N	N/A	N/A
7006_Bed N	NO (-76.6%)	NO
7006_Bath N	N/A	N/A
7008_Bed N	NO (-57.7%)	NO
7008_Bed N	NO (-76.9%)	NO
7008_Bath N	N/A	N/A
7009_Bed N	NO (-57.9%)	NO
7009_Bath N	N/A	N/A
7011_Bed N	NO (-40.2%)	NO
7011_Bath N	N/A	N/A
7012_Bed N	NO (-73.6%)	NO
7012_Bath N	N/A	N/A
7013_Bed N	NO (-31.6%)	NO
7013_Bath N	N/A	N/A
7014_Bed N	NO (-31.6%)	NO
7014_Bath N	N/A	N/A
7015_Bed N	NO (-32.3%)	NO
7015_Bath N	N/A	N/A
7016_Bed N	NO (-31.6%)	NO
7016_Bath N	N/A	N/A
7017_Bed N	NO (-31.6%)	NO
7017_Bath N	N/A	N/A
7018_Bed N	NO (-59.7%)	NO
7018_Bath N	N/A	N/A
7032_Bed N	NO (-67.2%)	NO
7032_Bath N	N/A	N/A
7033_Bed N	NO (-43.8%)	NO
7033_Bath N	N/A	N/A
7034_Bed N	NO (-42.2%)	NO
7034_Bath N	N/A	N/A
7035_Bed N	NO (-43.2%)	NO
7035_Bath N	N/A	N/A
7036_Bed N	NO (-79.2%)	NO
7036_Bath N	N/A	N/A
7080_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
7081_Bed N	NO (-57.5%)	NO
7081_Bath N	N/A	N/A
7082_Bed N	NO (-51.9%)	NO
7082_Bath N	N/A	N/A
8008_Bed N	NO (-57.7%)	NO
8080_Bath N	N/A	N/A
8081_Bed N	NO (-57.5%)	NO
8081_Bath N	N/A	N/A
8082_Bed N	NO (-51.9%)	NO
8082_Bath N	N/A	N/A
9008_Bed N	NO (-57.7%)	NO
9081_Bed N	NO (-57.5%)	NO
9081_Bath N	N/A	N/A
9082_Bed N	NO (-51.9%)	NO
9082_Bath N	N/A	N/A
9090_Bath N	N/A	N/A
B005_Corr	N/A	N/A
B006_Corr	N/A	N/A
B007_Corr	N/A	N/A
B013_Bath N	N/A	N/A
B013_Bed N	NO (-64.3%)	NO
B015_Bed N	NO (-63%)	NO
B015_Bath N	N/A	N/A
B017_Bath N	N/A	N/A
B017_Bed N	NO (-52.8%)	NO
B018_Bed N	NO (-31.6%)	NO
B018_Bath N	N/A	N/A
B019_Bed N	NO (-31.6%)	NO
B019_Bath N	N/A	N/A
B020_Bath N	N/A	N/A
B020_Bed N	NO (-31.6%)	NO
B021_Bed N	YES (+13.5%)	NO
B021_Bath N	N/A	N/A
B022_Bath N	N/A	N/A
B022_Bed N	NO (-48.2%)	NO
B023_Bath N	N/A	N/A
B023_Bed N	NO (-14.3%)	NO
B024_Bed N	NO (-31%)	NO
B024_Bath N	N/A	N/A
B026_Bed N	NO (-54.2%)	NO
B026_Bath N	N/A	N/A
B028_Bath N	N/A	N/A
B028_Bed N	NO (-27.4%)	NO
B029_Bath N	N/A	N/A
B029_Bed N	NO (-9.3%)	NO
B030_Bath N	N/A	N/A
B030_Bed N	NO (-35.2%)	NO
B027_Bed N	NO (-58%)	NO
B027_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0007_Lift	N/A	N/A
10_Lift	N/A	N/A
0028_Storage	N/A	N/A
0118_Stairs	N/A	N/A
12037_Stairs	NO (-44.9%)	NO
12043_Bath N	N/A	N/A
12043_Bed N	NO (-2%)	NO
12044_Bath N	N/A	N/A
12044_Bed N	YES (+2.7%)	NO
12045_Bath N	N/A	N/A
12045_Bed N	YES (+0.3%)	NO
12046_Bath N	N/A	N/A
12046_Bed N	YES (+0.3%)	NO
12047_Bath N	N/A	N/A
12047_Bed N	YES (+0.3%)	NO
12048_Bath N	N/A	N/A
12048_Bed N	YES (+5.2%)	NO
12049_Stairs	NO (-39.2%)	NO
12052_Bath N	N/A	N/A
12052_Bed N	NO (-5.9%)	NO
12053_Bath N	N/A	N/A
12053_Bed N	NO (-5.9%)	NO
12054_Bath N	N/A	N/A
12054_Bed N	NO (-5.9%)	NO
12055_Bath N	N/A	N/A
12055_Bed N	NO (-3.7%)	NO
12056_Bath N	N/A	N/A
12056_Bed N	NO (-5.9%)	NO
1213_Bath N	N/A	N/A
1213_Bed N	YES (+15.6%)	NO
1214_Bath N	N/A	N/A
1214_Bed N	NO (-62.5%)	NO
1267_Corr	N/A	N/A
12095_Bath N	N/A	N/A
12095_Bed N	NO (-51.8%)	NO
12095_Bath N	N/A	N/A
12095_Bed N	NO (-49.8%)	NO
12095_Bath N	N/A	N/A
12095_Bed N	NO (-56.4%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	NO (-35.6%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	YES (+49.6%)	NO
1204_Bed N	YES (+28.7%)	NO
1204_Bath N	N/A	N/A
1204_Bath N	N/A	N/A
1204_Bed N	YES (+31.8%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	YES (+28.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1319_Bath N	YES (+105.4%)	NO
1319_Bed N	NO (-12%)	NO
B014_Bed N	NO (-49.5%)	NO
0034_Corr	NO (-31.5%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	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 [m²]	14162.5	14162.5
External area [m²]	18555.8	18555.8
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	4	3
Average conductance [W/K]	6292.71	10727
Average U-value [W/m²K]	0.34	0.58
Alpha value* [%]	26.28	17.79

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
7	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
93	**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	19.25	40.65
Cooling	7.89	8.21
Auxiliary	9.68	6.54
Lighting	9.68	12.9
Hot water	156.76	208.87
Equipment*	46.72	46.72
TOTAL**	**203.27**	**277.17**

* 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 & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	188.54	226.3
Primary energy* [kWh/m²]	298.4	387.19
Total emissions [kg/m²]	52.2	67.9

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	18.2	204.6	5.7	12.7	9	0.88	4.48	0.9	6
	Notional	26.6	147.3	9	11.4	4.8	0.82	3.6	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	79.7	94.1	25.1	5.8	10	0.88	4.48	0.9	6
	Notional	160	88.9	54.3	6.9	7.3	0.82	3.6	----	----

Key to terms

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

Key Features

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

Building fabric

Element	**U_{i-Typ}**	**U_{i-Min}**	**Surface where the minimum value occurs***
Wall	0.23	0.15	"00000001_W1"
Floor	0.2	0.12	"00000001_F"
Roof	0.15	0.12	"00000025_C"
Windows, roof windows, and rooflights	1.5	1.31	"00000001_W2_O0"
Personnel doors	1.5	1.2	"0000001A_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

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**
$m^3/(h.m^2)$ at 50 Pa	5	3.8

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

461_Uxbridge Road Model_220615

As designed

Date: Fri Aug 12 15:20:40 2022

Administrative information

Building Details

Address: 27 Uxbridge Road, Hayes, London, UB4 0JN

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	56.6
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	56.6
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	31.9
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	0.15	0.15	"00000001_W1"
Floor	0.25	0.12	0.12	"00000001_F"
Roof	0.25	0.12	0.12	"00000025_C"
Windows***, roof windows, and rooflights	2.2	1.31	1.8	"00000025_C_O0"
Personnel doors	2.2	1.2	1.2	"0000001A_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a-Limit}$ = 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	3.8

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	<0.9

1- Be Green Strategy 2 INCUBATOR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	6	4	-	-	-
Standard value	2.5*	2.6	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 all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- Be Green Strategy 2 HOTEL

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	6	4	-	-	-
Standard value	2.5*	2.6	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 all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

3- Be Green DHW

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	3	-	1.6	0.65
Standard value	2.5*	3.2	N/A	1.6^	0.5
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.

1- SYST0002-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	0
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
0002_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
0003_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0004_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0005_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0006_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0011_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0012_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0013_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0014_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0015_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0016_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0017_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0018_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0019_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0020_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0021_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0023_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0026_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0027_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0033_Storage	-	1.1	-	-	-	-	-	-	-	-	N/A
0052_Bath I	0.3	-	-	1.6	-	-	-	-	-	0.8	0.5
10039	-	-	-	1.6	-	-	-	-	-	0.8	0.5
10048	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1041_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1042_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1043_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1044_Events	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1045_Events	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1053_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
12095_Amenity	-	-	-	1.6	-	-	-	-	-	0.8	0.5
2063_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8039_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B000_Lift	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B003_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B004_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B008_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B009_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B010_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B011_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
B012_Plant	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0010_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0009_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0008_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5

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**
1016_BOH	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0007_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0001_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0024_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0025_Plant	-	0.3	-	-	-	-	-	-	-	-	N/A
0022_Incub	-	-	-	1.6	-	-	-	-	-	0.8	0.5
0033_Storage	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1045_Corr	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1006_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Sauna	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_changing	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1022_gym	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1015_Kitchen	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1012_Bar	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1013_Bath	-	-	-	1.6	-	-	-	-	-	0.8	0.5
1017_Lounge	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1001_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1002_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1004_Incub	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_changing	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1006_Amenity	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0119_Restaurant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Plant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Plant	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
100100_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
10082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
110110_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
11082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
12045_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
2013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
2036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2038_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
2038_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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**
3022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
3037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
4008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
4031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
4036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
5019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5025_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5025_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5037_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
5037_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
6004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6010_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6010_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6031_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6031_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
6035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
6036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7001_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7001_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7002_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7002_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7003_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7003_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7004_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7004_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7005_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7005_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7006_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7006_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7008_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7009_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7009_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7011_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7011_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7012_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7012_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7014_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7014_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7016_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7016_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7032_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7032_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7033_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7033_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7034_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7034_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
7035_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7035_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7036_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7036_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7080_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
7082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8080_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
8082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9008_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9081_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9081_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9082_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9082_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
9090_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B005_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B006_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B007_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B013_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B013_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B015_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B015_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B017_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B017_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B018_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B018_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B019_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B019_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B020_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B020_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B021_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B021_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B022_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B022_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B023_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B023_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B024_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
B024_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B026_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B026_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B028_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B028_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B029_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B029_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B030_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B030_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B027_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B027_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0007_Lift	-	1.1	-	-	-	-	-	-	-	-	N/A
10_Lift	-	-	-	1.1	-	-	-	-	-	0.8	0.5
0028_Storage	-	0.3	-	-	-	-	-	-	-	-	N/A
12043_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12043_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12044_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12045_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12046_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12047_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12048_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12052_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12053_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12054_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12055_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12056_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1213_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1214_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1267_Corr	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

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
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
12095_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1204_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Bath N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
1319_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5
B014_Bed N	-	-	-	1.1	-	-	-	-	-	0.8	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
0002_Storage	100	-	-	62
0003_Storage	100	-	-	10
0004_Storage	100	-	-	10
0005_Storage	100	-	-	10
0006_Corr	-	100	-	190
0011_Incub	100	-	-	133
0012_Incub	100	-	-	135
0013_Incub	100	-	-	133
0014_Incub	100	-	-	135
0015_Incub	100	-	-	133
0016_Incub	100	-	-	135
0017_Incub	100	-	-	131
0018_Incub	100	-	-	133
0019_Incub	100	-	-	131
0020_Incub	100	-	-	133
0021_Incub	100	-	-	192
0023_Incub	100	-	-	720
0024_Stairs	-	100	-	74
0026_Plant	100	-	-	100
0027_Plant	100	-	-	158
0033_Storage	100	-	-	83
0052_Bath I	-	100	-	151

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
10039	-	100	-	185
10048	-	100	-	15
1041_Incub	100	-	-	194
1042_Incub	100	-	-	118
1043_Incub	100	-	-	117
1044_Events	100	-	-	208
1045_Events	100	-	-	472
1053_Corr	-	100	-	95
1204_Plant	100	-	-	420
12095_Amenity	-	100	-	163
2063_Amenity	-	100	15	202
8039_Corr	-	100	-	185
B000_Lift	-	100	-	19
B003_Plant	100	-	-	614
B004_Plant	100	-	-	67
B008_Plant	100	-	-	278
B009_Plant	100	-	-	177
B010_Plant	100	-	-	138
B011_Plant	100	-	-	296
B012_Plant	100	-	-	486
0010_Incub	100	-	-	498
0009_Incub	100	-	-	476
0008_Incub	100	-	-	539
1016_BOH	-	100	-	17
0007_Corr	-	100	-	105
0001_Corr	-	100	-	514
0024_Incub	-	100	-	66
0025_Plant	25	-	-	296
0022_Incub	100	-	-	230
0033_Storage	100	-	-	40
1045_Corr	-	100	-	141
1006_Amenity	-	100	15	43
10_Sauna	-	100	-	109
1006_changing	-	100	-	15
1022_gym	-	100	-	197
7017_Amenity	-	100	-	127
1015_Kitchen	-	100	-	901
1012_Bar	-	100	15	334
1013_Bath	-	100	-	128
1017_Lounge	-	100	15	696
1001_Incub	100	-	-	166
1002_Incub	100	-	-	166
1004_Incub	100	-	-	177

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1006_changing	-	100	-	22
1006_Amenity	-	100	-	98
10_Corr	-	100	-	44
0119_Restaurant	-	100	15	562
1319_Plant	100	-	-	261
1319_Plant	100	-	-	139
10_Corr	-	100	-	193
10008_Bed N	-	100	-	58
100100_Bath N	-	100	-	19
10081_Bath N	-	100	-	19
10081_Bed N	-	100	-	54
10082_Bath N	-	100	-	19
10082_Bed N	-	100	-	59
11008_Bed N	-	100	-	58
110110_Bath N	-	100	-	19
11081_Bath N	-	100	-	19
11081_Bed N	-	100	-	54
11082_Bath N	-	100	-	19
11082_Bed N	-	100	-	59
12043_Bath N	-	100	-	23
12043_Bed N	-	100	-	43
12044_Bath N	-	100	-	23
12044_Bed N	-	100	-	42
12045_Bath N	-	100	-	23
12045_Bed N	-	100	-	43
12046_Bath N	-	100	-	23
12046_Bed N	-	100	-	43
12047_Bath N	-	100	-	23
12047_Bed N	-	100	-	43
12048_Bath N	-	100	-	23
12048_Bed N	-	100	-	41
12052_Bath N	-	100	-	24
12052_Bed N	-	100	-	44
12053_Bath N	-	100	-	24
12053_Bed N	-	100	-	44
12054_Bath N	-	100	-	27
12054_Bed N	-	100	-	42
12055_Bath N	-	100	-	24
12055_Bed N	-	100	-	43
12056_Bath N	-	100	-	24
12056_Bed N	-	100	-	44
1213_Bath N	-	100	-	18
1213_Bed N	-	100	-	40

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
1214_Bath N	-	100	-	18
1214_Bed N	-	100	-	44
2001_Bed N	-	100	-	57
2001_Bath N	-	100	-	19
2002_Bed N	-	100	-	54
2002_Bath N	-	100	-	19
2003_Bed N	-	100	-	56
2003_Bath N	-	100	-	19
2004_Bed N	-	100	-	63
2004_Bath N	-	100	-	19
2005_Bed N	-	100	-	62
2005_Bath N	-	100	-	19
2006_Bed N	-	100	-	67
2006_Bath N	-	100	-	19
2008_Bed N	-	100	-	58
2008_Bath N	-	100	-	19
2009_Bed N	-	100	-	54
2009_Bath N	-	100	-	19
2010_Bed N	-	100	-	59
2010_Bath N	-	100	-	19
2012_Bed N	-	100	-	69
2012_Bath N	-	100	-	19
2013_Bed N	-	100	-	65
2013_Bath N	-	100	-	19
2015_Bed N	-	100	-	67
2015_Bath N	-	100	-	19
2016_Bed N	-	100	-	55
2016_Bath N	-	100	-	13
2017_Bed N	-	100	-	62
2017_Bath N	-	100	-	19
2018_Bed N	-	100	-	62
2018_Bath N	-	100	-	19
2020_Bed N	-	100	-	62
2020_Bath N	-	100	-	19
2021_Bed N	-	100	-	62
2021_Bath N	-	100	-	19
2022_Bed N	-	100	-	62
2022_Bath N	-	100	-	19
2023_Bed N	-	100	-	70
2023_Bath N	-	100	-	19
2024_Bed N	-	100	-	66
2024_Bath N	-	100	-	19
2025_Bed N	-	100	-	63

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
2025_Bath N	-	100	-	19
2026_Bed N	-	100	-	67
2026_Bath N	-	100	-	19
2027_Bath N	-	100	-	19
2027_Bed N	-	100	-	67
2028_Bed N	-	100	-	61
2028_Bath N	-	100	-	19
2029_Bed N	-	100	-	61
2029_Bath N	-	100	-	19
2030_Bed N	-	100	-	51
2030_Bath N	-	100	-	19
2031_Bed N	-	100	-	70
2031_Bath N	-	100	-	19
2031_Bath N	-	100	-	19
2031_Bath N	-	100	-	19
2032_Bed N	-	100	-	65
2032_Bath N	-	100	-	19
2033_Bed N	-	100	-	67
2033_Bath N	-	100	-	19
2034_Bed N	-	100	-	65
2034_Bath N	-	100	-	19
2035_Bed N	-	100	-	66
2035_Bath N	-	100	-	19
2036_Bed N	-	100	-	65
2036_Bath N	-	100	-	19
2037_Bed N	-	100	-	66
2037_Bath N	-	100	-	19
2038_Bed N	-	100	-	45
2038_Bath N	-	100	-	18
3001_Bed N	-	100	-	57
3001_Bath N	-	100	-	19
3002_Bed N	-	100	-	54
3002_Bath N	-	100	-	19
3003_Bed N	-	100	-	56
3003_Bath N	-	100	-	19
3004_Bed N	-	100	-	63
3004_Bath N	-	100	-	19
3005_Bed N	-	100	-	62
3005_Bath N	-	100	-	19
3006_Bed N	-	100	-	67
3006_Bath N	-	100	-	19
3008_Bed N	-	100	-	58
3008_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3009_Bed N	-	100	-	54
3009_Bath N	-	100	-	19
3010_Bed N	-	100	-	59
3010_Bath N	-	100	-	19
3012_Bed N	-	100	-	69
3012_Bath N	-	100	-	19
3013_Bed N	-	100	-	65
3013_Bath N	-	100	-	19
3015_Bed N	-	100	-	67
3015_Bath N	-	100	-	19
3016_Bed N	-	100	-	55
3016_Bath N	-	100	-	13
3017_Bed N	-	100	-	62
3017_Bath N	-	100	-	19
3018_Bed N	-	100	-	62
3018_Bath N	-	100	-	19
3019_Bed N	-	100	-	62
3019_Bath N	-	100	-	19
3020_Bed N	-	100	-	62
3020_Bath N	-	100	-	19
3021_Bed N	-	100	-	62
3021_Bath N	-	100	-	19
3022_Bed N	-	100	-	70
3022_Bath N	-	100	-	19
3023_Bed N	-	100	-	66
3023_Bath N	-	100	-	19
3024_Bed N	-	100	-	63
3024_Bath N	-	100	-	19
3025_Bed N	-	100	-	67
3025_Bath N	-	100	-	19
3026_Bath N	-	100	-	19
3026_Bed N	-	100	-	67
3027_Bed N	-	100	-	61
3027_Bath N	-	100	-	19
3028_Bed N	-	100	-	61
3028_Bath N	-	100	-	19
3029_Bed N	-	100	-	51
3029_Bath N	-	100	-	19
3030_Bed N	-	100	-	70
3031_Bed N	-	100	-	65
3031_Bath N	-	100	-	19
3032_Bath N	-	100	-	19
3032_Bed N	-	100	-	67

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3033_Bed N	-	100	-	65
3033_Bath N	-	100	-	19
3034_Bed N	-	100	-	66
3034_Bath N	-	100	-	19
3035_Bed N	-	100	-	65
3035_Bath N	-	100	-	19
3036_Bed N	-	100	-	66
3036_Bath N	-	100	-	19
3037_Bed N	-	100	-	45
3037_Bath N	-	100	-	18
4001_Bed N	-	100	-	57
4001_Bath N	-	100	-	19
4002_Bed N	-	100	-	54
4002_Bath N	-	100	-	19
4003_Bed N	-	100	-	56
4003_Bath N	-	100	-	19
4004_Bed N	-	100	-	63
4004_Bath N	-	100	-	19
4005_Bed N	-	100	-	62
4005_Bath N	-	100	-	19
4006_Bed N	-	100	-	67
4006_Bath N	-	100	-	19
4008_Bed N	-	100	-	58
4008_Bath N	-	100	-	19
4009_Bed N	-	100	-	54
4009_Bath N	-	100	-	19
4010_Bed N	-	100	-	59
4010_Bath N	-	100	-	19
4012_Bed N	-	100	-	69
4012_Bath N	-	100	-	19
4013_Bed N	-	100	-	65
4013_Bath N	-	100	-	19
4015_Bed N	-	100	-	67
4015_Bath N	-	100	-	19
4015_Bed N	-	100	-	55
4015_Bath N	-	100	-	13
4016_Bed N	-	100	-	62
4016_Bath N	-	100	-	19
4017_Bed N	-	100	-	62
4017_Bath N	-	100	-	19
4018_Bed N	-	100	-	62
4018_Bath N	-	100	-	19
4019_Bed N	-	100	-	62

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
4019_Bath N	-	100	-	19
4020_Bed N	-	100	-	62
4020_Bath N	-	100	-	19
4021_Bed N	-	100	-	70
4021_Bath N	-	100	-	19
4022_Bed N	-	100	-	66
4022_Bath N	-	100	-	19
4023_Bed N	-	100	-	63
4023_Bath N	-	100	-	19
4024_Bed N	-	100	-	67
4024_Bath N	-	100	-	19
4025_Bath N	-	100	-	19
4025_Bed N	-	100	-	67
4026_Bed N	-	100	-	61
4026_Bath N	-	100	-	19
4027_Bed N	-	100	-	61
4027_Bath N	-	100	-	19
4028_Bed N	-	100	-	51
4028_Bath N	-	100	-	19
4029_Bed N	-	100	-	70
4029_Bath N	-	100	-	19
4030_Bed N	-	100	-	65
4030_Bath N	-	100	-	19
4031_Bath N	-	100	-	19
4031_Bed N	-	100	-	67
4032_Bed N	-	100	-	65
4032_Bath N	-	100	-	19
4033_Bed N	-	100	-	66
4033_Bath N	-	100	-	19
4034_Bed N	-	100	-	65
4034_Bath N	-	100	-	19
4035_Bed N	-	100	-	66
4035_Bath N	-	100	-	19
4036_Bed N	-	100	-	45
4036_Bath N	-	100	-	18
5001_Bed N	-	100	-	57
5001_Bath N	-	100	-	19
5002_Bed N	-	100	-	54
5002_Bath N	-	100	-	19
5003_Bed N	-	100	-	56
5003_Bath N	-	100	-	19
5004_Bed N	-	100	-	63
5004_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
5005_Bed N	-	100	-	62
5005_Bath N	-	100	-	19
5006_Bed N	-	100	-	67
5006_Bath N	-	100	-	19
5008_Bed N	-	100	-	58
5008_Bath N	-	100	-	19
5009_Bed N	-	100	-	54
5009_Bath N	-	100	-	19
5010_Bed N	-	100	-	59
5010_Bath N	-	100	-	19
5012_Bed N	-	100	-	69
5012_Bath N	-	100	-	19
5013_Bed N	-	100	-	65
5013_Bath N	-	100	-	19
5015_Bed N	-	100	-	67
5015_Bath N	-	100	-	19
5016_Bed N	-	100	-	55
5016_Bath N	-	100	-	13
5017_Bed N	-	100	-	62
5017_Bath N	-	100	-	19
5018_Bed N	-	100	-	62
5018_Bath N	-	100	-	19
5019_Bed N	-	100	-	62
5019_Bath N	-	100	-	19
5020_Bed N	-	100	-	62
5020_Bath N	-	100	-	19
5021_Bed N	-	100	-	62
5021_Bath N	-	100	-	19
5022_Bed N	-	100	-	70
5022_Bath N	-	100	-	19
5023_Bed N	-	100	-	66
5023_Bath N	-	100	-	19
5024_Bed N	-	100	-	63
5024_Bath N	-	100	-	19
5025_Bed N	-	100	-	67
5025_Bath N	-	100	-	19
5026_Bath N	-	100	-	19
5026_Bed N	-	100	-	67
5027_Bed N	-	100	-	61
5027_Bath N	-	100	-	19
5028_Bed N	-	100	-	61
5028_Bath N	-	100	-	19
5029_Bed N	-	100	-	51

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
5029_Bath N	-	100	-	19
5030_Bed N	-	100	-	70
5031_Bed N	-	100	-	65
5031_Bath N	-	100	-	19
5032_Bath N	-	100	-	19
5032_Bed N	-	100	-	67
5033_Bed N	-	100	-	65
5033_Bath N	-	100	-	19
5034_Bed N	-	100	-	66
5034_Bath N	-	100	-	19
5035_Bed N	-	100	-	65
5035_Bath N	-	100	-	19
5036_Bed N	-	100	-	66
5036_Bath N	-	100	-	19
5037_Bed N	-	100	-	45
5037_Bath N	-	100	-	18
6001_Bed N	-	100	-	57
6001_Bath N	-	100	-	19
6002_Bed N	-	100	-	54
6002_Bath N	-	100	-	19
6003_Bed N	-	100	-	56
6003_Bath N	-	100	-	19
6004_Bed N	-	100	-	63
6004_Bath N	-	100	-	19
6005_Bed N	-	100	-	62
6005_Bath N	-	100	-	19
6006_Bed N	-	100	-	67
6006_Bath N	-	100	-	19
6008_Bed N	-	100	-	58
6008_Bath N	-	100	-	19
6009_Bed N	-	100	-	54
6009_Bath N	-	100	-	19
6010_Bed N	-	100	-	59
6010_Bath N	-	100	-	19
6012_Bed N	-	100	-	69
6012_Bath N	-	100	-	19
6013_Bed N	-	100	-	65
6013_Bath N	-	100	-	19
6015_Bed N	-	100	-	67
6015_Bath N	-	100	-	19
6016_Bed N	-	100	-	55
6016_Bath N	-	100	-	13
6017_Bed N	-	100	-	62

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
6017_Bath N	-	100	-	19
6018_Bed N	-	100	-	62
6018_Bath N	-	100	-	19
6019_Bed N	-	100	-	62
6019_Bath N	-	100	-	19
6020_Bed N	-	100	-	62
6020_Bath N	-	100	-	19
6021_Bed N	-	100	-	62
6021_Bath N	-	100	-	19
6022_Bed N	-	100	-	70
6022_Bath N	-	100	-	19
6029_Bed N	-	100	-	70
6029_Bath N	-	100	-	19
6030_Bed N	-	100	-	65
6030_Bath N	-	100	-	19
6031_Bath N	-	100	-	19
6031_Bed N	-	100	-	67
6032_Bed N	-	100	-	65
6032_Bath N	-	100	-	19
6033_Bed N	-	100	-	66
6033_Bath N	-	100	-	19
6034_Bed N	-	100	-	65
6034_Bath N	-	100	-	19
6035_Bed N	-	100	-	66
6035_Bath N	-	100	-	19
6036_Bed N	-	100	-	45
6036_Bath N	-	100	-	18
7001_Bed N	-	100	-	57
7001_Bath N	-	100	-	19
7002_Bed N	-	100	-	54
7002_Bath N	-	100	-	19
7003_Bed N	-	100	-	56
7003_Bath N	-	100	-	19
7004_Bed N	-	100	-	63
7004_Bath N	-	100	-	19
7005_Bed N	-	100	-	62
7005_Bath N	-	100	-	19
7006_Bed N	-	100	-	67
7006_Bath N	-	100	-	19
7008_Bed N	-	100	-	58
7008_Bed N	-	100	-	69
7008_Bath N	-	100	-	19
7009_Bed N	-	100	-	65

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
7009_Bath N	-	100	-	19
7011_Bed N	-	100	-	67
7011_Bath N	-	100	-	19
7012_Bed N	-	100	-	55
7012_Bath N	-	100	-	13
7013_Bed N	-	100	-	62
7013_Bath N	-	100	-	19
7014_Bed N	-	100	-	62
7014_Bath N	-	100	-	19
7015_Bed N	-	100	-	62
7015_Bath N	-	100	-	19
7016_Bed N	-	100	-	62
7016_Bath N	-	100	-	19
7017_Bed N	-	100	-	62
7017_Bath N	-	100	-	19
7018_Bed N	-	100	-	70
7018_Bath N	-	100	-	19
7032_Bed N	-	100	-	65
7032_Bath N	-	100	-	19
7033_Bed N	-	100	-	66
7033_Bath N	-	100	-	19
7034_Bed N	-	100	-	65
7034_Bath N	-	100	-	19
7035_Bed N	-	100	-	66
7035_Bath N	-	100	-	19
7036_Bed N	-	100	-	45
7036_Bath N	-	100	-	18
7080_Bath N	-	100	-	19
7081_Bed N	-	100	-	54
7081_Bath N	-	100	-	19
7082_Bed N	-	100	-	59
7082_Bath N	-	100	-	19
8008_Bed N	-	100	-	58
8080_Bath N	-	100	-	19
8081_Bed N	-	100	-	54
8081_Bath N	-	100	-	19
8082_Bed N	-	100	-	59
8082_Bath N	-	100	-	19
9008_Bed N	-	100	-	58
9081_Bed N	-	100	-	54
9081_Bath N	-	100	-	19
9082_Bed N	-	100	-	59
9082_Bath N	-	100	-	19

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
9090_Bath N	-	100	-	19
B005_Corr	-	100	-	117
B006_Corr	-	100	-	27
B007_Corr	-	100	-	44
B013_Bath N	-	100	-	18
B013_Bed N	-	100	-	65
B015_Bed N	-	100	-	62
B015_Bath N	-	100	-	18
B017_Bath N	-	100	-	18
B017_Bed N	-	100	-	66
B018_Bed N	-	100	-	62
B018_Bath N	-	100	-	18
B019_Bed N	-	100	-	62
B019_Bath N	-	100	-	18
B020_Bath N	-	100	-	18
B020_Bed N	-	100	-	62
B021_Bed N	-	100	-	65
B021_Bath N	-	100	-	18
B022_Bath N	-	100	-	18
B022_Bed N	-	100	-	63
B023_Bath N	-	100	-	18
B023_Bed N	-	100	-	60
B024_Bed N	-	100	-	63
B024_Bath N	-	100	-	18
B026_Bed N	-	100	-	60
B026_Bath N	-	100	-	18
B028_Bath N	-	100	-	18
B028_Bed N	-	100	-	61
B029_Bath N	-	100	-	18
B029_Bed N	-	100	-	60
B030_Bath N	-	100	-	18
B030_Bed N	-	100	-	46
B027_Bed N	-	100	-	72
B027_Bath N	-	100	-	18
0007_Lift	-	100	-	29
10_Lift	-	100	-	23
0028_Storage	100	-	-	97
0118_Stairs	-	18	-	635
12037_Stairs	-	100	-	40
12043_Bath N	-	100	-	23
12043_Bed N	-	100	-	43
12044_Bath N	-	100	-	23
12044_Bed N	-	100	-	42

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
12045_Bath N	-	100	-	23
12045_Bed N	-	100	-	43
12046_Bath N	-	100	-	23
12046_Bed N	-	100	-	43
12047_Bath N	-	100	-	23
12047_Bed N	-	100	-	43
12048_Bath N	-	100	-	23
12048_Bed N	-	100	-	41
12049_Stairs	-	100	-	40
12052_Bath N	-	100	-	24
12052_Bed N	-	100	-	44
12053_Bath N	-	100	-	24
12053_Bed N	-	100	-	44
12054_Bath N	-	100	-	27
12054_Bed N	-	100	-	42
12055_Bath N	-	100	-	24
12055_Bed N	-	100	-	43
12056_Bath N	-	100	-	24
12056_Bed N	-	100	-	44
1213_Bath N	-	100	-	18
1213_Bed N	-	100	-	40
1214_Bath N	-	100	-	18
1214_Bed N	-	100	-	44
1267_Corr	-	100	-	179
12095_Bath N	-	100	-	17
12095_Bed N	-	100	-	57
12095_Bath N	-	100	-	18
12095_Bed N	-	100	-	52
12095_Bath N	-	100	-	18
12095_Bed N	-	100	-	57
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	43
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	42
1204_Bed N	-	100	-	47
1204_Bath N	-	100	-	18
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	46
1204_Bath N	-	100	-	18
1204_Bed N	-	100	-	47
1319_Bath N	-	100	-	19
1319_Bed N	-	100	-	51
B014_Bed N	-	100	-	66

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
0034_Corr	-	100	-	71

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?
0002_Storage	NO (-59.6%)	NO
0003_Storage	N/A	N/A
0004_Storage	N/A	N/A
0005_Storage	N/A	N/A
0006_Corr	YES (+1123%)	NO
0011_Incub	N/A	N/A
0012_Incub	N/A	N/A
0013_Incub	N/A	N/A
0014_Incub	N/A	N/A
0015_Incub	N/A	N/A
0016_Incub	N/A	N/A
0017_Incub	N/A	N/A
0018_Incub	N/A	N/A
0019_Incub	N/A	N/A
0020_Incub	N/A	N/A
0021_Incub	N/A	N/A
0023_Incub	NO (-66.8%)	NO
0024_Stairs	N/A	N/A
0026_Plant	N/A	N/A
0027_Plant	N/A	N/A
0033_Storage	NO (-78.2%)	NO
0052_Bath I	N/A	N/A
10039	N/A	N/A
10048	N/A	N/A
1041_Incub	N/A	N/A
1042_Incub	N/A	N/A
1043_Incub	N/A	N/A
1044_Events	N/A	N/A
1045_Events	N/A	N/A
1053_Corr	N/A	N/A
1204_Plant	NO (-25.4%)	NO
12095_Amenity	NO (-69.1%)	NO
2063_Amenity	N/A	N/A
8039_Corr	N/A	N/A
B000_Lift	N/A	N/A
B003_Plant	N/A	N/A
B004_Plant	N/A	N/A
B008_Plant	N/A	N/A
B009_Plant	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B010_Plant	N/A	N/A
B011_Plant	N/A	N/A
B012_Plant	N/A	N/A
0010_Incub	YES (+6.6%)	NO
0009_Incub	YES (+8.4%)	NO
0008_Incub	NO (-25.2%)	NO
1016_BOH	N/A	N/A
0007_Corr	YES (+1.6%)	NO
0001_Corr	YES (+7%)	NO
0024_Incub	N/A	N/A
0025_Plant	N/A	N/A
0022_Incub	N/A	N/A
0033_Storage	N/A	N/A
1045_Corr	N/A	N/A
1006_Amenity	N/A	N/A
10_Sauna	N/A	N/A
1006_changing	N/A	N/A
1022_gym	N/A	N/A
7017_Amenity	N/A	N/A
1015_Kitchen	N/A	N/A
1012_Bar	YES (+99.2%)	NO
1013_Bath	YES (+8.2%)	NO
1017_Lounge	NO (-65.7%)	NO
1001_Incub	NO (-51.4%)	NO
1002_Incub	NO (-50.2%)	NO
1004_Incub	NO (-53.2%)	NO
1006_changing	N/A	N/A
1006_Amenity	N/A	N/A
10_Corr	N/A	N/A
0119_Restaurant	N/A	N/A
1319_Plant	NO (-48.3%)	NO
1319_Plant	NO (-12%)	NO
10_Corr	N/A	N/A
10008_Bed N	NO (-57.7%)	NO
100100_Bath N	N/A	N/A
10081_Bath N	N/A	N/A
10081_Bed N	NO (-57.5%)	NO
10082_Bath N	N/A	N/A
10082_Bed N	NO (-51.9%)	NO
11008_Bed N	NO (-57.7%)	NO
110110_Bath N	N/A	N/A
11081_Bath N	N/A	N/A
11081_Bed N	NO (-57.5%)	NO
11082_Bath N	N/A	N/A
11082_Bed N	NO (-51.9%)	NO
12043_Bath N	N/A	N/A
12043_Bed N	NO (-2%)	NO
12044_Bath N	N/A	N/A
12044_Bed N	YES (+2.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
12045_Bath N	N/A	N/A
12045_Bed N	YES (+0.3%)	NO
12046_Bath N	N/A	N/A
12046_Bed N	YES (+0.3%)	NO
12047_Bath N	N/A	N/A
12047_Bed N	YES (+0.3%)	NO
12048_Bath N	N/A	N/A
12048_Bed N	YES (+5.2%)	NO
12052_Bath N	N/A	N/A
12052_Bed N	NO (-5.9%)	NO
12053_Bath N	N/A	N/A
12053_Bed N	NO (-5.9%)	NO
12054_Bath N	N/A	N/A
12054_Bed N	NO (-5.9%)	NO
12055_Bath N	N/A	N/A
12055_Bed N	NO (-3.7%)	NO
12056_Bath N	N/A	N/A
12056_Bed N	NO (-5.9%)	NO
1213_Bath N	N/A	N/A
1213_Bed N	YES (+15.6%)	NO
1214_Bath N	N/A	N/A
1214_Bed N	NO (-70.4%)	NO
2001_Bed N	NO (-53.4%)	NO
2001_Bath N	N/A	N/A
2002_Bed N	NO (-57.5%)	NO
2002_Bath N	N/A	N/A
2003_Bed N	NO (-68.8%)	NO
2003_Bath N	N/A	N/A
2004_Bed N	NO (-64.4%)	NO
2004_Bath N	N/A	N/A
2005_Bed N	NO (-57.5%)	NO
2005_Bath N	N/A	N/A
2006_Bed N	NO (-76.6%)	NO
2006_Bath N	N/A	N/A
2008_Bed N	NO (-57.7%)	NO
2008_Bath N	N/A	N/A
2009_Bed N	NO (-57.5%)	NO
2009_Bath N	N/A	N/A
2010_Bed N	NO (-51.9%)	NO
2010_Bath N	N/A	N/A
2012_Bed N	NO (-76.9%)	NO
2012_Bath N	N/A	N/A
2013_Bed N	NO (-57.9%)	NO
2013_Bath N	N/A	N/A
2015_Bed N	NO (-40.2%)	NO
2015_Bath N	N/A	N/A
2016_Bed N	NO (-73.6%)	NO
2016_Bath N	N/A	N/A
2017_Bed N	NO (-31.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
2017_Bath N	N/A	N/A
2018_Bed N	NO (-31.6%)	NO
2018_Bath N	N/A	N/A
2020_Bed N	NO (-32.3%)	NO
2020_Bath N	N/A	N/A
2021_Bed N	NO (-31.6%)	NO
2021_Bath N	N/A	N/A
2022_Bed N	NO (-31.6%)	NO
2022_Bath N	N/A	N/A
2023_Bed N	NO (-59.7%)	NO
2023_Bath N	N/A	N/A
2024_Bed N	NO (-66.9%)	NO
2024_Bath N	N/A	N/A
2025_Bed N	NO (-48.1%)	NO
2025_Bath N	N/A	N/A
2026_Bed N	NO (-67.3%)	NO
2026_Bath N	N/A	N/A
2027_Bath N	N/A	N/A
2027_Bed N	NO (-64.7%)	NO
2028_Bed N	NO (-41.1%)	NO
2028_Bath N	N/A	N/A
2029_Bed N	NO (-40%)	NO
2029_Bath N	N/A	N/A
2030_Bed N	NO (-59.6%)	NO
2030_Bath N	N/A	N/A
2031_Bed N	NO (-69%)	NO
2031_Bath N	N/A	N/A
2031_Bath N	N/A	N/A
2031_Bath N	N/A	N/A
2032_Bed N	NO (-42.5%)	NO
2032_Bath N	N/A	N/A
2033_Bed N	NO (-44.7%)	NO
2033_Bath N	N/A	N/A
2034_Bed N	NO (-53.4%)	NO
2034_Bath N	N/A	N/A
2035_Bed N	NO (-43.8%)	NO
2035_Bath N	N/A	N/A
2036_Bed N	NO (-42.2%)	NO
2036_Bath N	N/A	N/A
2037_Bed N	NO (-43.2%)	NO
2037_Bath N	N/A	N/A
2038_Bed N	NO (-79.2%)	NO
2038_Bath N	N/A	N/A
3001_Bed N	NO (-53.4%)	NO
3001_Bath N	N/A	N/A
3002_Bed N	NO (-57.5%)	NO
3002_Bath N	N/A	N/A
3003_Bed N	NO (-68.8%)	NO
3003_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
3004_Bed N	NO (-64.4%)	NO
3004_Bath N	N/A	N/A
3005_Bed N	NO (-57.5%)	NO
3005_Bath N	N/A	N/A
3006_Bed N	NO (-76.6%)	NO
3006_Bath N	N/A	N/A
3008_Bed N	NO (-57.7%)	NO
3008_Bath N	N/A	N/A
3009_Bed N	NO (-57.5%)	NO
3009_Bath N	N/A	N/A
3010_Bed N	NO (-51.9%)	NO
3010_Bath N	N/A	N/A
3012_Bed N	NO (-76.9%)	NO
3012_Bath N	N/A	N/A
3013_Bed N	NO (-57.9%)	NO
3013_Bath N	N/A	N/A
3015_Bed N	NO (-40.2%)	NO
3015_Bath N	N/A	N/A
3016_Bed N	NO (-73.6%)	NO
3016_Bath N	N/A	N/A
3017_Bed N	NO (-31.6%)	NO
3017_Bath N	N/A	N/A
3018_Bed N	NO (-31.6%)	NO
3018_Bath N	N/A	N/A
3019_Bed N	NO (-32.3%)	NO
3019_Bath N	N/A	N/A
3020_Bed N	NO (-31.6%)	NO
3020_Bath N	N/A	N/A
3021_Bed N	NO (-31.6%)	NO
3021_Bath N	N/A	N/A
3022_Bed N	NO (-59.7%)	NO
3022_Bath N	N/A	N/A
3023_Bed N	NO (-66.9%)	NO
3023_Bath N	N/A	N/A
3024_Bed N	NO (-48.1%)	NO
3024_Bath N	N/A	N/A
3025_Bed N	NO (-67.3%)	NO
3025_Bath N	N/A	N/A
3026_Bath N	N/A	N/A
3026_Bed N	NO (-64.7%)	NO
3027_Bed N	NO (-40%)	NO
3027_Bath N	N/A	N/A
3028_Bed N	NO (-40%)	NO
3028_Bath N	N/A	N/A
3029_Bed N	NO (-59.6%)	NO
3029_Bath N	N/A	N/A
3030_Bed N	NO (-69%)	NO
3031_Bed N	NO (-42.5%)	NO
3031_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
3032_Bath N	N/A	N/A
3032_Bed N	NO (-44.7%)	NO
3033_Bed N	NO (-53.4%)	NO
3033_Bath N	N/A	N/A
3034_Bed N	NO (-43.8%)	NO
3034_Bath N	N/A	N/A
3035_Bed N	NO (-42.2%)	NO
3035_Bath N	N/A	N/A
3036_Bed N	NO (-43.2%)	NO
3036_Bath N	N/A	N/A
3037_Bed N	NO (-79.2%)	NO
3037_Bath N	N/A	N/A
4001_Bed N	NO (-53.4%)	NO
4001_Bath N	N/A	N/A
4002_Bed N	NO (-57.5%)	NO
4002_Bath N	N/A	N/A
4003_Bed N	NO (-58.2%)	NO
4003_Bath N	N/A	N/A
4004_Bed N	NO (-64.4%)	NO
4004_Bath N	N/A	N/A
4005_Bed N	NO (-57.5%)	NO
4005_Bath N	N/A	N/A
4006_Bed N	NO (-76.6%)	NO
4006_Bath N	N/A	N/A
4008_Bed N	NO (-57.7%)	NO
4008_Bath N	N/A	N/A
4009_Bed N	NO (-57.5%)	NO
4009_Bath N	N/A	N/A
4010_Bed N	NO (-51.9%)	NO
4010_Bath N	N/A	N/A
4012_Bed N	NO (-76.9%)	NO
4012_Bath N	N/A	N/A
4013_Bed N	NO (-57.9%)	NO
4013_Bath N	N/A	N/A
4015_Bed N	NO (-40.2%)	NO
4015_Bath N	N/A	N/A
4015_Bed N	NO (-73.6%)	NO
4015_Bath N	N/A	N/A
4016_Bed N	NO (-31.6%)	NO
4016_Bath N	N/A	N/A
4017_Bed N	NO (-31.6%)	NO
4017_Bath N	N/A	N/A
4018_Bed N	NO (-32.3%)	NO
4018_Bath N	N/A	N/A
4019_Bed N	NO (-31.6%)	NO
4019_Bath N	N/A	N/A
4020_Bed N	NO (-31.6%)	NO
4020_Bath N	N/A	N/A
4021_Bed N	NO (-59.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
4021_Bath N	N/A	N/A
4022_Bed N	NO (-66.9%)	NO
4022_Bath N	N/A	N/A
4023_Bed N	NO (-48.1%)	NO
4023_Bath N	N/A	N/A
4024_Bed N	NO (-67.3%)	NO
4024_Bath N	N/A	N/A
4025_Bath N	N/A	N/A
4025_Bed N	NO (-64.7%)	NO
4026_Bed N	NO (-40%)	NO
4026_Bath N	N/A	N/A
4027_Bed N	NO (-40%)	NO
4027_Bath N	N/A	N/A
4028_Bed N	NO (-60.3%)	NO
4028_Bath N	N/A	N/A
4029_Bed N	NO (-69%)	NO
4029_Bath N	N/A	N/A
4030_Bed N	NO (-42.5%)	NO
4030_Bath N	N/A	N/A
4031_Bath N	N/A	N/A
4031_Bed N	NO (-44.7%)	NO
4032_Bed N	NO (-53.4%)	NO
4032_Bath N	N/A	N/A
4033_Bed N	NO (-43.8%)	NO
4033_Bath N	N/A	N/A
4034_Bed N	NO (-42.2%)	NO
4034_Bath N	N/A	N/A
4035_Bed N	NO (-43.2%)	NO
4035_Bath N	N/A	N/A
4036_Bed N	NO (-79.2%)	NO
4036_Bath N	N/A	N/A
5001_Bed N	NO (-53.4%)	NO
5001_Bath N	N/A	N/A
5002_Bed N	NO (-57.5%)	NO
5002_Bath N	N/A	N/A
5003_Bed N	NO (-58.2%)	NO
5003_Bath N	N/A	N/A
5004_Bed N	NO (-64.4%)	NO
5004_Bath N	N/A	N/A
5005_Bed N	NO (-57.5%)	NO
5005_Bath N	N/A	N/A
5006_Bed N	NO (-76.6%)	NO
5006_Bath N	N/A	N/A
5008_Bed N	NO (-57.7%)	NO
5008_Bath N	N/A	N/A
5009_Bed N	NO (-57.5%)	NO
5009_Bath N	N/A	N/A
5010_Bed N	NO (-51.9%)	NO
5010_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
5012_Bed N	NO (-76.9%)	NO
5012_Bath N	N/A	N/A
5013_Bed N	NO (-57.9%)	NO
5013_Bath N	N/A	N/A
5015_Bed N	NO (-40.2%)	NO
5015_Bath N	N/A	N/A
5016_Bed N	NO (-73.6%)	NO
5016_Bath N	N/A	N/A
5017_Bed N	NO (-31.6%)	NO
5017_Bath N	N/A	N/A
5018_Bed N	NO (-31.6%)	NO
5018_Bath N	N/A	N/A
5019_Bed N	NO (-32.3%)	NO
5019_Bath N	N/A	N/A
5020_Bed N	NO (-31.6%)	NO
5020_Bath N	N/A	N/A
5021_Bed N	NO (-31.6%)	NO
5021_Bath N	N/A	N/A
5022_Bed N	NO (-59.7%)	NO
5022_Bath N	N/A	N/A
5023_Bed N	NO (-66.9%)	NO
5023_Bath N	N/A	N/A
5024_Bed N	NO (-48.1%)	NO
5024_Bath N	N/A	N/A
5025_Bed N	NO (-67.3%)	NO
5025_Bath N	N/A	N/A
5026_Bath N	N/A	N/A
5026_Bed N	NO (-64.7%)	NO
5027_Bed N	NO (-42.2%)	NO
5027_Bath N	N/A	N/A
5028_Bed N	NO (-41.1%)	NO
5028_Bath N	N/A	N/A
5029_Bed N	NO (-60.9%)	NO
5029_Bath N	N/A	N/A
5030_Bed N	NO (-69%)	NO
5031_Bed N	NO (-42.5%)	NO
5031_Bath N	N/A	N/A
5032_Bath N	N/A	N/A
5032_Bed N	NO (-44.7%)	NO
5033_Bed N	NO (-53.4%)	NO
5033_Bath N	N/A	N/A
5034_Bed N	NO (-43.8%)	NO
5034_Bath N	N/A	N/A
5035_Bed N	NO (-42.2%)	NO
5035_Bath N	N/A	N/A
5036_Bed N	NO (-43.2%)	NO
5036_Bath N	N/A	N/A
5037_Bed N	NO (-79.2%)	NO
5037_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
6001_Bed N	NO (-53.4%)	NO
6001_Bath N	N/A	N/A
6002_Bed N	NO (-57.5%)	NO
6002_Bath N	N/A	N/A
6003_Bed N	NO (-68.8%)	NO
6003_Bath N	N/A	N/A
6004_Bed N	NO (-64.4%)	NO
6004_Bath N	N/A	N/A
6005_Bed N	NO (-57.5%)	NO
6005_Bath N	N/A	N/A
6006_Bed N	NO (-76.6%)	NO
6006_Bath N	N/A	N/A
6008_Bed N	NO (-57.7%)	NO
6008_Bath N	N/A	N/A
6009_Bed N	NO (-57.5%)	NO
6009_Bath N	N/A	N/A
6010_Bed N	NO (-51.9%)	NO
6010_Bath N	N/A	N/A
6012_Bed N	NO (-76.9%)	NO
6012_Bath N	N/A	N/A
6013_Bed N	NO (-57.9%)	NO
6013_Bath N	N/A	N/A
6015_Bed N	NO (-40.2%)	NO
6015_Bath N	N/A	N/A
6016_Bed N	NO (-73.6%)	NO
6016_Bath N	N/A	N/A
6017_Bed N	NO (-31.6%)	NO
6017_Bath N	N/A	N/A
6018_Bed N	NO (-31.6%)	NO
6018_Bath N	N/A	N/A
6019_Bed N	NO (-32.3%)	NO
6019_Bath N	N/A	N/A
6020_Bed N	NO (-31.6%)	NO
6020_Bath N	N/A	N/A
6021_Bed N	NO (-31.6%)	NO
6021_Bath N	N/A	N/A
6022_Bed N	NO (-59.7%)	NO
6022_Bath N	N/A	N/A
6029_Bed N	NO (-69%)	NO
6029_Bath N	N/A	N/A
6030_Bed N	NO (-42.5%)	NO
6030_Bath N	N/A	N/A
6031_Bath N	N/A	N/A
6031_Bed N	NO (-44.7%)	NO
6032_Bed N	NO (-53.4%)	NO
6032_Bath N	N/A	N/A
6033_Bed N	NO (-43.8%)	NO
6033_Bath N	N/A	N/A
6034_Bed N	NO (-42.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
6034_Bath N	N/A	N/A
6035_Bed N	NO (-43.2%)	NO
6035_Bath N	N/A	N/A
6036_Bed N	NO (-79.2%)	NO
6036_Bath N	N/A	N/A
7001_Bed N	NO (-53.4%)	NO
7001_Bath N	N/A	N/A
7002_Bed N	NO (-57.5%)	NO
7002_Bath N	N/A	N/A
7003_Bed N	NO (-68.8%)	NO
7003_Bath N	N/A	N/A
7004_Bed N	NO (-64.4%)	NO
7004_Bath N	N/A	N/A
7005_Bed N	NO (-57.5%)	NO
7005_Bath N	N/A	N/A
7006_Bed N	NO (-76.6%)	NO
7006_Bath N	N/A	N/A
7008_Bed N	NO (-57.7%)	NO
7008_Bed N	NO (-76.9%)	NO
7008_Bath N	N/A	N/A
7009_Bed N	NO (-57.9%)	NO
7009_Bath N	N/A	N/A
7011_Bed N	NO (-40.2%)	NO
7011_Bath N	N/A	N/A
7012_Bed N	NO (-73.6%)	NO
7012_Bath N	N/A	N/A
7013_Bed N	NO (-31.6%)	NO
7013_Bath N	N/A	N/A
7014_Bed N	NO (-31.6%)	NO
7014_Bath N	N/A	N/A
7015_Bed N	NO (-32.3%)	NO
7015_Bath N	N/A	N/A
7016_Bed N	NO (-31.6%)	NO
7016_Bath N	N/A	N/A
7017_Bed N	NO (-31.6%)	NO
7017_Bath N	N/A	N/A
7018_Bed N	NO (-59.7%)	NO
7018_Bath N	N/A	N/A
7032_Bed N	NO (-67.2%)	NO
7032_Bath N	N/A	N/A
7033_Bed N	NO (-43.8%)	NO
7033_Bath N	N/A	N/A
7034_Bed N	NO (-42.2%)	NO
7034_Bath N	N/A	N/A
7035_Bed N	NO (-43.2%)	NO
7035_Bath N	N/A	N/A
7036_Bed N	NO (-79.2%)	NO
7036_Bath N	N/A	N/A
7080_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
7081_Bed N	NO (-57.5%)	NO
7081_Bath N	N/A	N/A
7082_Bed N	NO (-51.9%)	NO
7082_Bath N	N/A	N/A
8008_Bed N	NO (-57.7%)	NO
8080_Bath N	N/A	N/A
8081_Bed N	NO (-57.5%)	NO
8081_Bath N	N/A	N/A
8082_Bed N	NO (-51.9%)	NO
8082_Bath N	N/A	N/A
9008_Bed N	NO (-57.7%)	NO
9081_Bed N	NO (-57.5%)	NO
9081_Bath N	N/A	N/A
9082_Bed N	NO (-51.9%)	NO
9082_Bath N	N/A	N/A
9090_Bath N	N/A	N/A
B005_Corr	N/A	N/A
B006_Corr	N/A	N/A
B007_Corr	N/A	N/A
B013_Bath N	N/A	N/A
B013_Bed N	NO (-64.3%)	NO
B015_Bed N	NO (-63%)	NO
B015_Bath N	N/A	N/A
B017_Bath N	N/A	N/A
B017_Bed N	NO (-52.8%)	NO
B018_Bed N	NO (-31.6%)	NO
B018_Bath N	N/A	N/A
B019_Bed N	NO (-31.6%)	NO
B019_Bath N	N/A	N/A
B020_Bath N	N/A	N/A
B020_Bed N	NO (-31.6%)	NO
B021_Bed N	YES (+13.5%)	NO
B021_Bath N	N/A	N/A
B022_Bath N	N/A	N/A
B022_Bed N	NO (-48.2%)	NO
B023_Bath N	N/A	N/A
B023_Bed N	NO (-14.3%)	NO
B024_Bed N	NO (-31%)	NO
B024_Bath N	N/A	N/A
B026_Bed N	NO (-54.2%)	NO
B026_Bath N	N/A	N/A
B028_Bath N	N/A	N/A
B028_Bed N	NO (-27.4%)	NO
B029_Bath N	N/A	N/A
B029_Bed N	NO (-9.3%)	NO
B030_Bath N	N/A	N/A
B030_Bed N	NO (-35.2%)	NO
B027_Bed N	NO (-58%)	NO
B027_Bath N	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0007_Lift	N/A	N/A
10_Lift	N/A	N/A
0028_Storage	N/A	N/A
0118_Stairs	N/A	N/A
12037_Stairs	NO (-44.9%)	NO
12043_Bath N	N/A	N/A
12043_Bed N	NO (-2%)	NO
12044_Bath N	N/A	N/A
12044_Bed N	YES (+2.7%)	NO
12045_Bath N	N/A	N/A
12045_Bed N	YES (+0.3%)	NO
12046_Bath N	N/A	N/A
12046_Bed N	YES (+0.3%)	NO
12047_Bath N	N/A	N/A
12047_Bed N	YES (+0.3%)	NO
12048_Bath N	N/A	N/A
12048_Bed N	YES (+5.2%)	NO
12049_Stairs	NO (-39.2%)	NO
12052_Bath N	N/A	N/A
12052_Bed N	NO (-5.9%)	NO
12053_Bath N	N/A	N/A
12053_Bed N	NO (-5.9%)	NO
12054_Bath N	N/A	N/A
12054_Bed N	NO (-5.9%)	NO
12055_Bath N	N/A	N/A
12055_Bed N	NO (-3.7%)	NO
12056_Bath N	N/A	N/A
12056_Bed N	NO (-5.9%)	NO
1213_Bath N	N/A	N/A
1213_Bed N	YES (+15.6%)	NO
1214_Bath N	N/A	N/A
1214_Bed N	NO (-62.5%)	NO
1267_Corr	N/A	N/A
12095_Bath N	N/A	N/A
12095_Bed N	NO (-51.8%)	NO
12095_Bath N	N/A	N/A
12095_Bed N	NO (-49.8%)	NO
12095_Bath N	N/A	N/A
12095_Bed N	NO (-56.4%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	NO (-35.6%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	YES (+49.6%)	NO
1204_Bed N	YES (+28.7%)	NO
1204_Bath N	N/A	N/A
1204_Bath N	N/A	N/A
1204_Bed N	YES (+31.8%)	NO
1204_Bath N	N/A	N/A
1204_Bed N	YES (+28.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1319_Bath N	YES (+105.4%)	NO
1319_Bed N	NO (-12%)	NO
B014_Bed N	NO (-49.5%)	NO
0034_Corr	NO (-31.5%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	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]	14162.5	14162.5
External area [m^2]	18555.8	18555.8
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	6292.71	10727
Average U-value [W/m^{2}K]	0.34	0.58
Alpha value* [%]	26.28	17.79

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
7	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
93	**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/m^2]

	Actual	Notional
Heating	2.89	13.7
Cooling	5.92	8.21
Auxiliary	9.68	6.54
Lighting	9.68	12.9
Hot water	35.27	70.4
Equipment*	46.72	46.72
TOTAL**	**63.44**	**111.75**

* 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	1.94	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	188.54	226.3
Primary energy* [kWh/m^2]	194.76	334.51
Total emissions [kg/m^2]	31.9	56.6

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	18.2	204.6	0.9	9.5	9	5.89	5.98	6	8
	Notional	26.6	147.3	3	11.4	4.8	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	79.7	94.1	3.8	4.4	10	5.89	5.98	6	8
	Notional	160	88.9	18.3	6.9	7.3	2.43	3.6	----	----

Key to terms

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

Key Features

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

Building fabric

Element	U_{i-Typ}	U_{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	"00000001_W1"
Floor	0.2	0.12	"00000001_F"
Roof	0.15	0.12	"00000025_C"
Windows, roof windows, and rooflights	1.5	1.31	"00000001_W2_O0"
Personnel doors	1.5	1.2	"0000001A_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

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	3.8

Appendix F - Overheating Assessment

LOVE DESIGN STUDIO

September 2022

Uxbridge Road
Overheating Assessment

Introduction

Love Design Studio have prepared this overheating assessment on behalf of Infinite Partners (the applicant) as part of a planning application to the London Borough of Hillingdon (the Local Planning Authority).

The proposal is for the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping.

The purpose of this overheating assessment is to analyse the internal conditions of the proposed scheme design to understand whether there is potential risk of overheating. Should there be an overheating risk then reasonable mitigation measures are considered until comfort levels within the spaces are acceptable.

Climate scenarios were considered based on different weather files to ensure the scheme is 'future-proof'.

This assessment utilises the CIBSE TM52, a Technical Memorandum (TM) about predicting overheating in non-domestic buildings.

Site Overview

Scheme

Illustrated to the right is the proposed 1.40 acres site area for 27 Uxbridge Road. The site is bounded by Uxbridge Road to the north and Springfield Road to the west. The sites surrounding the proposal is a mixture of light industrial, residential and open spaces.

The site lies within the jurisdiction of the London Borough of Hillingdon. The scheme is considered an application of Potential Strategic Importance (PSI). It will therefore be referred to the GLA Planning Authority.

Within the site currently stands a 60's 12 storey hotel building comprising 170 keys, meeting rooms and gym.

The proposal scheme entails the demolition of ground floor entrance, parking structure, and north-east and south-west wings of the existing building, and refurbishment and extension of existing hotel to include additional accommodation at roof level and full height extension on the north elevation, together with walkways connecting to new buildings of between 6 and 8 storeys, to create additional hotel floor space and light industrial floorspace, along with ancillary facilities, parking and landscaping.

The total proposed site will consist of 435 hotel keys and 23,946m2 gross external area.

Policy and Guidance

Regional Policy

The London Plan (2021)

Regional Policy is governed by the London Plan (March 2021), which is the overall strategic plan for London which sets out an integrated economic, environmental, and social framework for the development of London over the next 20-25 years. The key policy detailing overheating mitigation is detailed below:

Policy SI 4 Managing Heat Risk

Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems

All major development proposals to undertake dynamic overheating modelling in line with the relevant Chartered Institution of Building Services Engineers (CIBSE) guidance (TM52 for non-domestic developments)

Local Policy

The Hillingdon Local Plan (2012)

The Hillingdon Local Plan (2012) is the key planning policy document for Hillingdon. The Local Plan is broken into two parts, with Part 1 focused on Strategic Policies and Part 2 comprising the Development Management Policies.

Policy EM1 'Climate Change Adaptation and Mitigation' states the following regarding overheating mitigation:

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by...promoting the inclusion of passive design measures to reduce the impacts of urban heat effects.

Assessment Guidance

TM52

The CIBSE TM52 is a Technical Memorandum (TM) is about predicting overheating in buildings. It is intended to inform designers, developers and others responsible for defining the indoor environment in buildings.

Compliance is based on passing at least two out of the following three criteria:

- **Criterion 1 - Hours of Exceedance** (the number of hours for which an adaptive thermal comfort threshold temperature is exceeded)
- **Criterion 2 - Daily Weighted Exceedance** (the degree to which the operative temperature exceeds the adaptive thermal comfort threshold temperature)
- **Criterion 3 - Upper Limit Temperature** (the maximum temperature experienced at any occupied time)

If any two or more of the criteria fail, the room is classed as overheating.

GLA Energy Assessment Guidance

The guidance for the methodology of overheating assessment is also set out in the Greater London Authority's Energy Assessment Guidance (June 2022). This document sets out the required scope of a GLA compliant assessment. Therefore, this overheating assessment complies with the requirements of the Energy Assessment Guidance (June 2022)

Methodology

Modelling

A 3D model of the proposed scheme was developed using IES VE software based on the planning architectural drawings (received 20/07/2022).

Sun path analysis was used to assess the exposure hours of the building's surfaces to direct sunlight on 21st June. The analysis highlights where the surfaces are particularly exposed and was used to deduce what rooms to assess for the overheating assessment.

A total of 58 rooms were assessed for overheating including 27 hotel bedrooms. North, east, south, and west facing rooms from the lower, middle, and upper floors were considered in order to provide a representative sample of the proposed scheme. Although adjoining bathrooms were modelled, they were not considered for the overheating assessment.

The majority of the commercial spaces and hotel amenity spaces on the ground and 1st floor were also assessed.

Following GLA Energy Assessment Guidance, based on the CIBSE TM49 Design Summer Years for London (2014), the weather files were selected to represent current and future weather conditions for the overheating assessment:

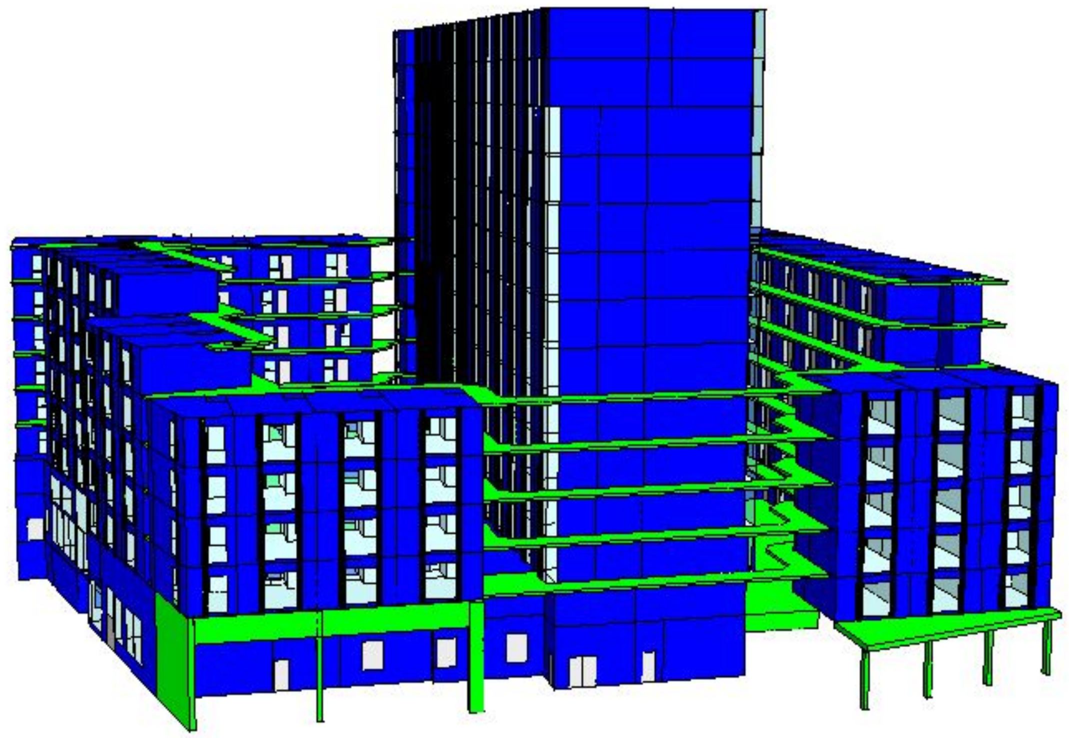
- DSY1 for the 2020s, high emissions, 50% percentile scenario
- DSY2 (2003) for the 2020s, high emissions, 50% percentile scenario
- DSY3 (1976) for the 2020s, high emissions, 50% percentile scenario

Assessment

This assessment looks to show compliance to TM52 by passing at least two out of the following three criteria:

- **Criterion 1: Hours of Exceedance (He)** - The number of hours for which an adaptive thermal comfort threshold temperature is exceeded. He must be less than 3% of occupied hours.
- **Criterion 2: Daily Weighted Exceedance (We)** - The degree to which the operative temperature exceeds the adaptive thermal comfort threshold temperature. We must be less than 6.
- **Criterion 3: Upper Limit Temperature** - the maximum temperature experienced at any occupied time.

Where the scheme does not meet the requirements of TM52 then it is typically argued that mechanical cooling is required.



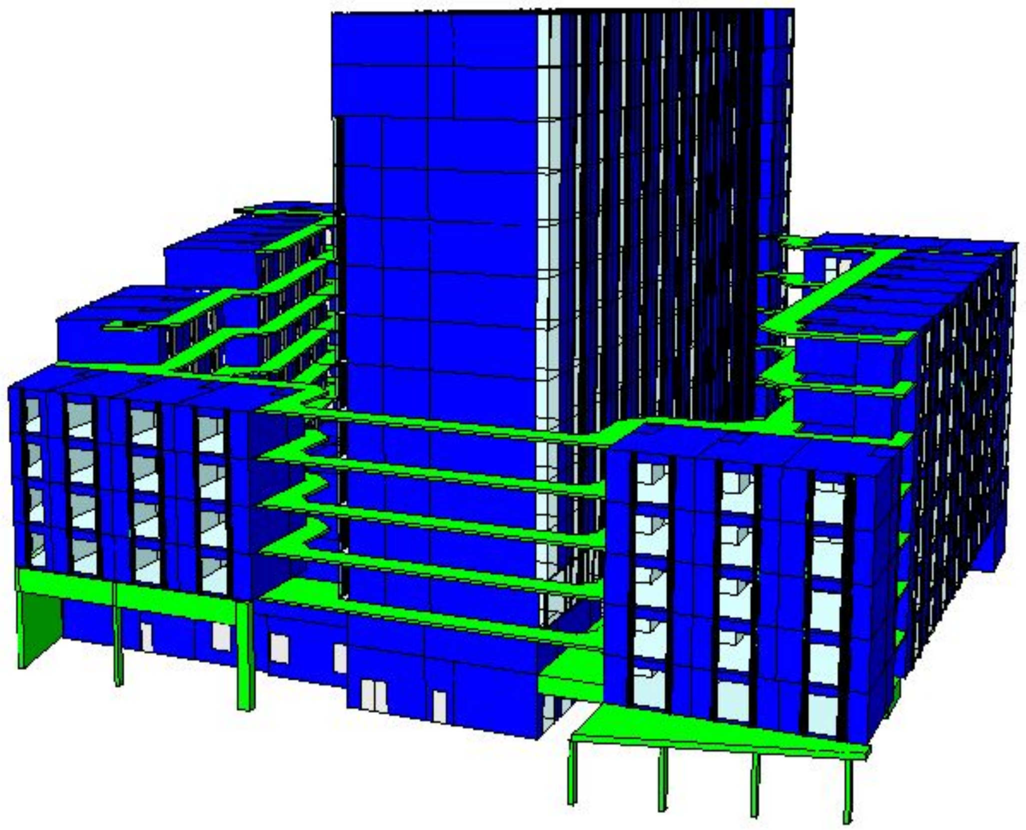


Figure 1: Axonometric view of the 3d model of the proposed scheme developed using IES VE software; southwest view (top), southeast view (bottom)

Assumptions

Building Fabric

As outlined in the energy statement, the proposed scheme building fabric is summarised to the right.

Occupancy

Occupancy refers to the hours a particular room is occupied. The occupancy profiles for this overheating assessment have been extracted from the National Calculation Method (NCM) estimates based on the room types assessed i.e., hotel bedroom, hotel lounge, office etc.

Internal Heat Gains

Internal Heat Gains consider various conditions within the room, namely the people, lighting, and electrical equipment.

The internal gains profiles for people and equipment for this overheating assessment have been extracted from the National Calculation Method (NCM) estimates based on the room types assessed i.e., hotel bedroom, hotel lounge, office.

The internal gains for the baseline model lighting are based on 5.2 w/m2/(100 lux).

Weather Files

The weather location used for the assessment is from London Heathrow Airport based on the scheme being considered 'suburban' in nature.

The scheme's mitigation measures were tested using the following weather file:

- DSY1 for the 2020s, high emissions, 50% percentile scenario

Once all mitigation measures were exhausted further assessment of the internal conditions were tested using the following weather files:

- DSY2 (2003) for the 2020s, high emissions, 50% percentile scenario
- DSY3 (1976) for the 2020s, high emissions, 50% percentile scenario

Building Fabric	Input	Unit	Comments
New			
External Wall U-Value	0.15	W/m2k	Include unheated areas
Roof U-Value	0.12	W/m2k	-
Ground Floor U-Value	0.12	W/m2k	-
Window U-Value	1.3	W/m2k	-
Doors U-Value	1.2	W/m2k	-
Thermal Bridge Y-Value	<0.1	W/m2k	-
Window G-Value	0.5 (0.72 tested)	-	-
Air Permeability	3	@50Pa (m.h3/m2)	A low air permeability required to improve mech vent efficiency

Table 1: The building fabric inputs for the overheating analysis

Exposure Hours

Sun path analysis was used to assess the exposure hours of the building's surfaces to direct sunlight on 21st June. The analysis highlights where the surfaces are particularly exposed.

From where the scheme was particularly exposed in the sun helped indicate what rooms to assess for overheating, as illustrated below in blue. The top floor and corner rooms were likely to be at risk of overheating. Additionally, it helped determine where external shading may be required.

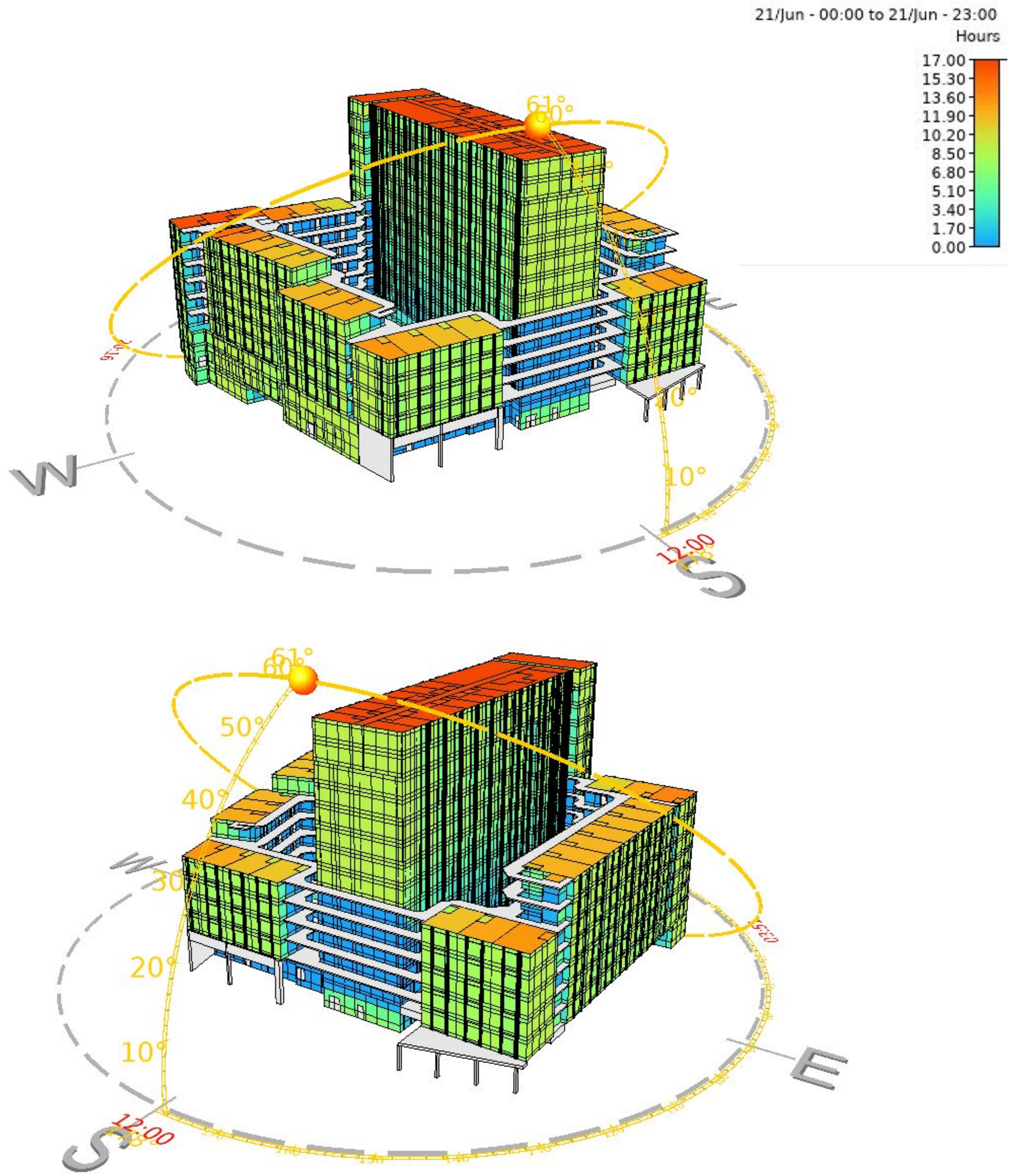


Figure 2: Sun path analysis illustrated on the 3d model of the proposed scheme

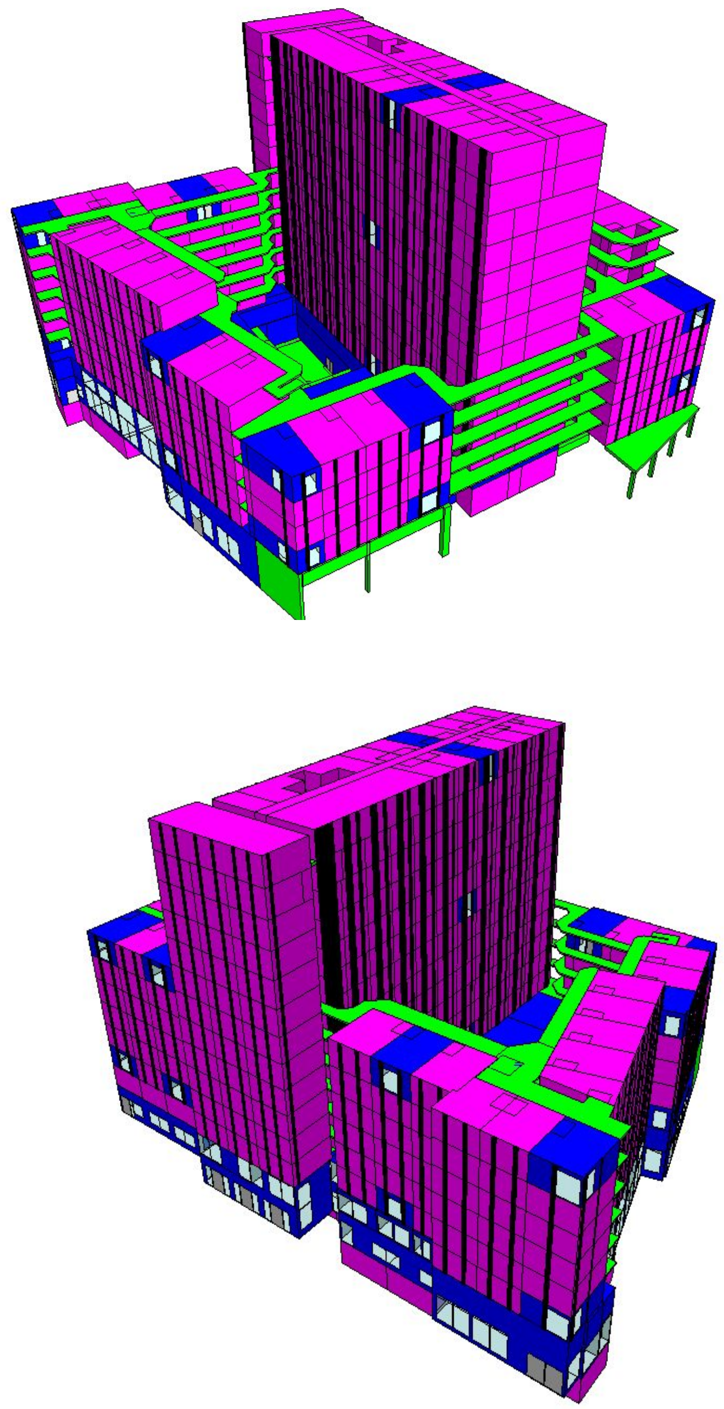


Figure 3: 3d model of the proposed scheme indicating the rooms assessed for overheating (blue)

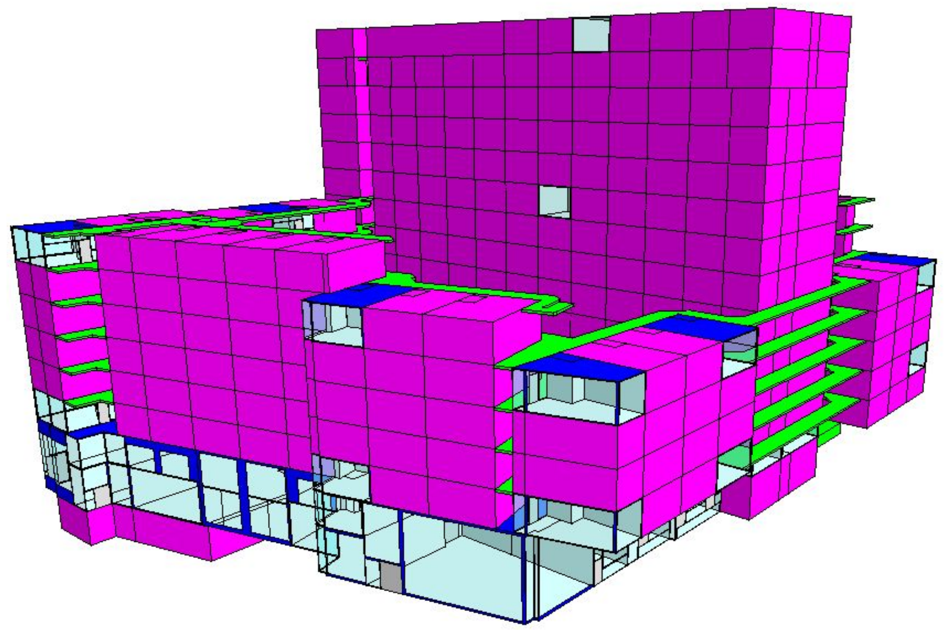
Baseline Model

The first baseline model (iteration 1) used is based on assuming a 90% glazed facade, similar to that of curtain walling.

Windows are assumed non-openable and no external shade is provided.

The benefits of improved window spec, mechanical ventilation or mechanical cooling is not considered at this stage.

An iteration schedule has been developed (see overleaf) that looks at the impact of incremental improvements to the overheating mitigation strategy.



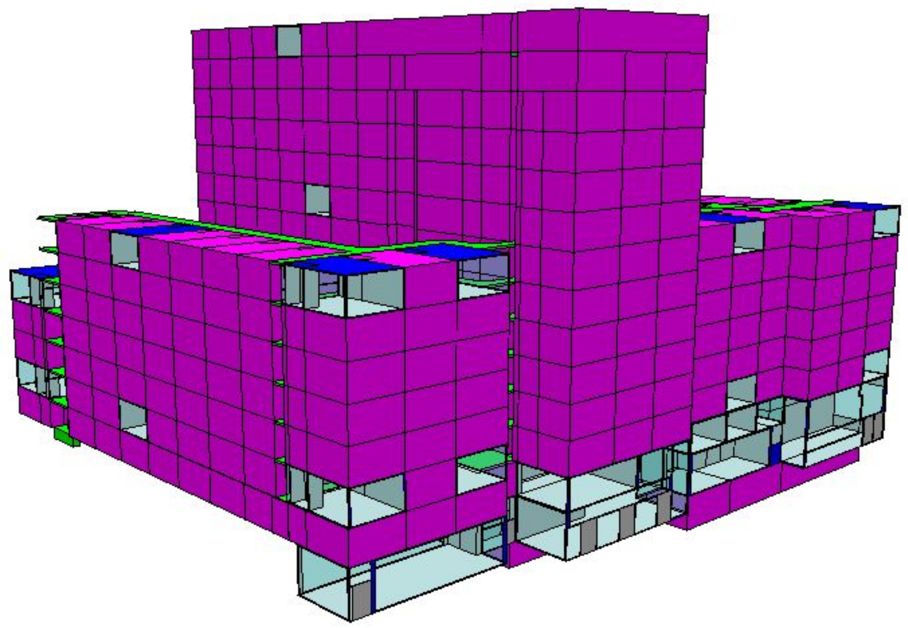


Figure 4: 3d model of the proposed scheme baseline model (blue)

Iteration Schedule

DSY1 for the 2020s, High Emissions, 50% Percentile							
Iteration	**Openings**	**Glazing**	**Lighting Load**	**Solar Shading**	**Glazing G-value**	**Mechanical Ventilation**	**Mechanical Cooling**
1 (Baseline)	0% free area	90% to facade	5.2 W/m2/100lux	-	0.72	-	-
2	0% free area	Reduced glazing	5.2 W/m2/100lux	-	0.72	-	-
3	20% free area	Reduced glazing	5.2 W/m2/100lux	-	0.72	-	-
4	20% free area	Reduced glazing	5 W/m2	-	0.72	-	-
5	20% free area	Reduced glazing	5 W/m2	External shade	0.72	-	-
6	20% free area	Reduced glazing	5 W/m2	External shade	0.5	-	-
7	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	-	-
8	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	-
9	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	Yes

DSY2 for the 2020s, High Emissions, 50% Percentile							
Iteration	**Openings**	**Glazing**	**Lighting Load**	**Solar Shading**	**Glazing G-value**	**Mechanical Ventilation**	**Mechanical Cooling**
8	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	-
9	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	Yes

DSY3 for the 2020s, High Emissions, 50% Percentile							
Iteration	**Openings**	**Glazing**	**Lighting Load**	**Solar Shading**	**Glazing G-value**	**Mechanical Ventilation**	**Mechanical Cooling**
8	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	-
9	20% free area	Reduced glazing	5 W/m2	External shade Internal blinds	0.5	Yes	Yes

Results

DSY1 for the 2020s, High Emissions, 50% Percentile		
Iteration	**Rooms Pass**	**Comments**
1	0/58	This iteration started by assuming fixed glazing with a fully glazed facade. It is clear that the internal temperatures are extremely high under these conditions.
2	0/58	The glazing % was decreased significantly on all facades. External facing Hotel Rooms were provided with a more standardised window size without jeopardising internal daylight distribution.
3	27/58	By simply providing the opportunity for the occupants to open their windows all the hotel rooms meet the TM52 criteria. However, further overheating mitigation measures will be required for all other rooms in the incubator spaces and habitable hotel amenity areas.
4	27/58	As part of the energy strategy, LED lighting was included to help reduce operational energy; this also helps reduce internal lighting gains.
5	27/58	External shade by way of vertical brise soleil has been implemented across the site, including to hotel rooms.
6	27/58	Reducing the solar transmittance from 0.72 to 0.5 helps reduce solar gains in summer.
7	27/58	The option for providing internal blinds to all spaces was considered as a further step.
8	27/58	Mechanical ventilation was considered at this stage with the option for a form of summer bypass mode.
9	58/58	After all passive and mech vent options were exhausted, it is decided that mechanical cooling is required for the non-hotel rooms.

DSY2 for the 2020s, High Emissions, 50% Percentile		
Iteration	**Rooms Pass/Fail**	**Comments**
8	27/58	The scheme still meets the same pass-rate under the more challenging DSY2 weather file.
9	58/58	The scheme still meets the same pass-rate under the more challenging DSY2 weather file.

DSY3 for the 2020s, High Emissions, 50% Percentile		
Iteration	**Rooms Pass/Fail**	**Comments**
8	27/58	The scheme still meets the same pass-rate under the more challenging DSY2 weather file.
9	58/58	The scheme still meets the same pass-rate under the more challenging DSY2 weather file.

Cooling Demand

The overheating results have indicated that it may be possible to reduce the risk of overheating significantly to the hotel rooms through natural ventilation and passive shading methods alone (to meet the TM52 criteria); whereas, the other habitable spaces across the site, including the incubator spaces and hotel amenity spaces will likely require the addition of mechanical cooling to pass the TM52 criteria.

Although it may not be deemed a necessity to include cooling for the hotel rooms, it may be that cooling is utilised to offset peak conditions in case of freak weather events and if there are more people/more equipment in the rooms. It may also be useful to provide cooling in case there are times in which it may not be possible/desirable to open windows.

It is considered more of a necessity to provide some form of cooling to the incubator and hotel amenity habitable spaces.

To the right is a graph indicating the estimated peak cooling loads to each room should cooling be implemented. The cooling demand was calculation after each iteration considered and then averaged across the various building types i.e. the Hotel Rooms (red line) is the averaged peak cooling demand across the 27 hotel rooms assessed.

It is clear that reducing the area of glazing has significantly reduced the peak cooling demand across the site. Reducing the g-value and providing internal blinds also provides a significant reduction to the peak cooling demand.

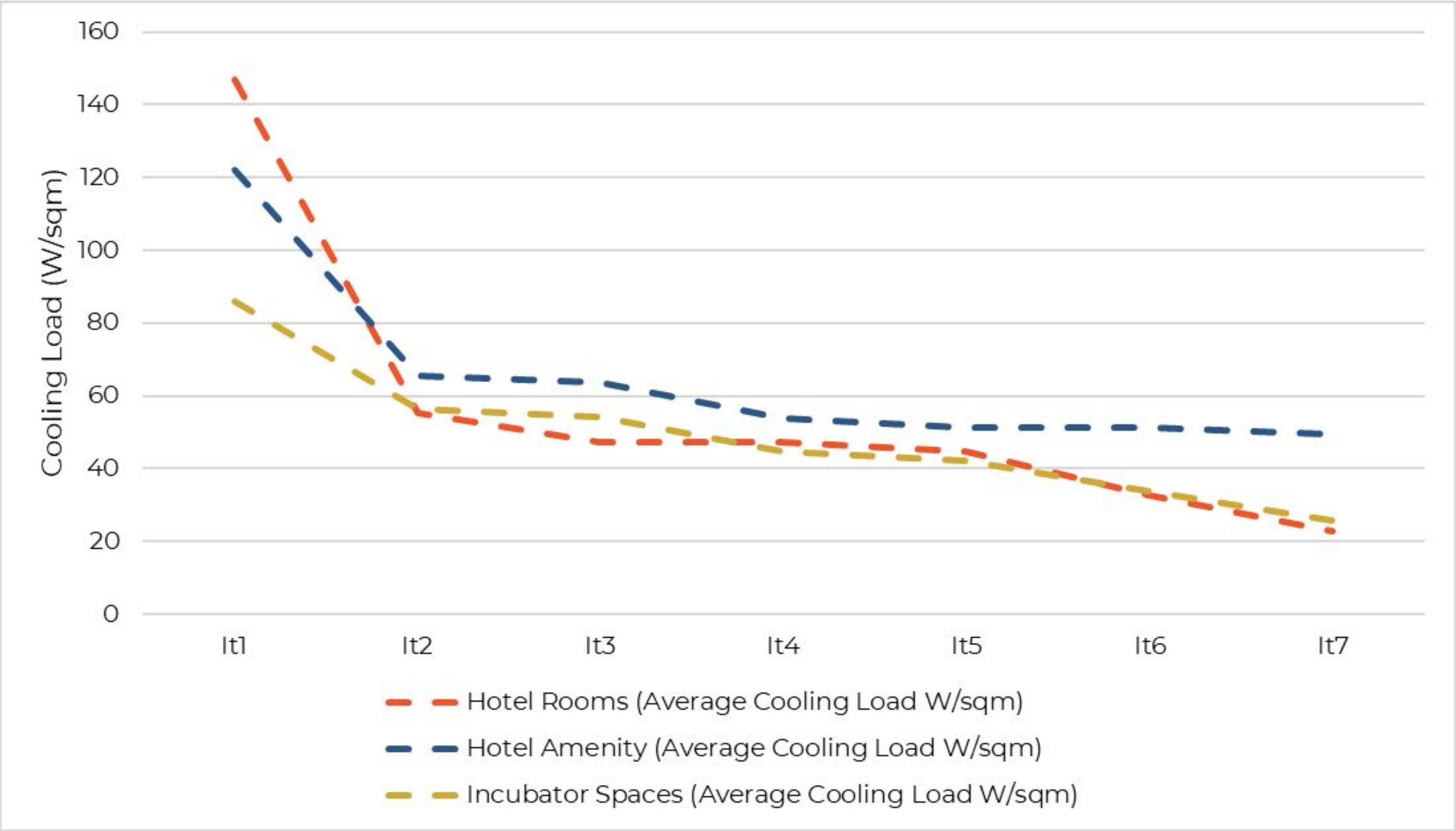


Figure 5: Calculated average peak cooling load for the various habitable spaces tested should cooling be adopted. Tested under each iteration up to including mechanical cooling.

Conclusion

The purpose of this overheating assessment is to analyse the internal conditions of the proposed scheme design to understand whether there is potential risk of overheating. Should there be an overheating risk then reasonable mitigation measures are considered until comfort levels within the spaces are acceptable.

This assessment utilises the CIBSE TM52, a Technical Memorandum (TM) about predicting overheating in non-domestic buildings.

Climate scenarios were considered based on different weather files to ensure the scheme is 'future-proof'.

The overheating results have indicated that it may be possible to reduce the risk of overheating significantly to the hotel rooms through natural ventilation and passive shading methods alone (to meet the TM52 criteria); whereas, the other habitable spaces across the site, including the incubator spaces and hotel amenity spaces will likely require the addition of mechanical cooling to pass the TM52 criteria.

Although it may not be deemed a necessity to include cooling for the hotel rooms, it may be that cooling is utilised to offset peak conditions in case of freak weather events and if there are more people/more equipment in the rooms than modelled. It may also be useful to provide cooling in case there are times in which it may not be possible/desirable to open windows.

It is considered more of a necessity to provide some form of cooling to the incubator and hotel amenity habitable spaces.

This assessment has shown compliance to CIBSE TM52 regarding predicting overheating in non-domestic buildings.

Appendix A - Modelled Rooms

Rooms	Room Type	Rooms	Room Type	Rooms	Room Type
0008_Incub	Incubator	**1002_Incub**	Incubator	**2027_Bed N**	Hotel
0009_Incub	Incubator	**1004_Incub**	Incubator	**2030_Bed N**	Hotel
0010_Incub	Incubator	**1006_Amenity**	Amenity	**2033_Bed N**	Hotel
0011_Incub	Incubator	**1006_Amenity**	Amenity	**2046_Bed X**	Hotel
0012_Incub	Incubator	**1017_Lounge**	Amenity	**2057_Bed X**	Hotel
0013_Incub	Incubator	**1032_Bed X**	Hotel	**2063_Amenity**	Amenity
0014_Incub	Incubator	**1032_Bed X**	Hotel	**5023_Bed N**	Hotel
0015_Incub	Incubator	**1041_Incub**	Incubator	**5026_Bed N**	Hotel
0016_Incub	Incubator	**1042_Incub**	Incubator	**5029_Bed N**	Hotel
0017_Incub	Incubator	**1043_Incub**	Incubator	**6031_Bed N**	Hotel
0018_Incub	Incubator	**1044_Events**	Amenity	**7001_Bed N**	Hotel
0019_Incub	Incubator	**1045_Events**	Amenity	**7005_Bed N**	Hotel
0020_Incub	Incubator	**12045_Bed N**	Hotel	**7008_Bed N**	Hotel
0021_Incub	Incubator	**12054_Bed N**	Hotel	**7011_Bed N**	Hotel
0022_Incub	Incubator	**2001_Bed N**	Hotel	**7016_Bed N**	Hotel
0023_Incub	Incubator	**2005_Bed N**	Hotel	**7017_Bed X**	Hotel
0035_Lounge	Amenity	**2012_Bed N**	Hotel	**8044_Bed X**	Hotel
0039_BOH	Amenity	**2015_Bed N**	Hotel	**8055_Bed X**	Hotel
0119_Restaurant	Amenity	**2021_Bed N**	Hotel		
1001_Incub	Incubator	**2024_Bed N**	Hotel		

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