Energy Report

Former MSD Site, Breakspear Road, Ickenham

Report Prepared for:

Issue Date: 29.09.2022

IN2 Project. No.: B2208

Rev.01

Revision History

Date	Revision	Description
15.08.2022	00	Draft issue
29.09.2022	01	Final Planning version
31.01.2022	02	Post GLA comments

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Company Registration No.: NI069190

Contents

1.0 The Application

This Energy Strategy has been prepared in support of a full planning application for the site known at Former MSD site, Breakspear Road, Ickenham.

1.1 The Proposed Site

The proposed site sites adjacent to the Breakspear Road, highlighted in figure 1.1.

Figure 1.1 Existing Site

Figure 1.2 Proposed Site

1.2 Aim

The aim of this Energy Strategy is to detail a robust energy demand reduction and supply strategy to enable the Development to meet the policy targets.

1.3 Approach

This Energy Strategy follows the Mayor of London's energy hierarchy: 'Be Lean, Be Clean, Be Green'.

The strategic approach to the design of the Development has been to reduce demand for energy prior to the consideration of integrating Low or Zero Carbon (LZC) technologies, since controlling demand is the most effective way of reducing energy requirements and CO2 emissions.

Calculations demonstrating the energy requirements and associated CO2 have been carried out using Building Regulations approved software.

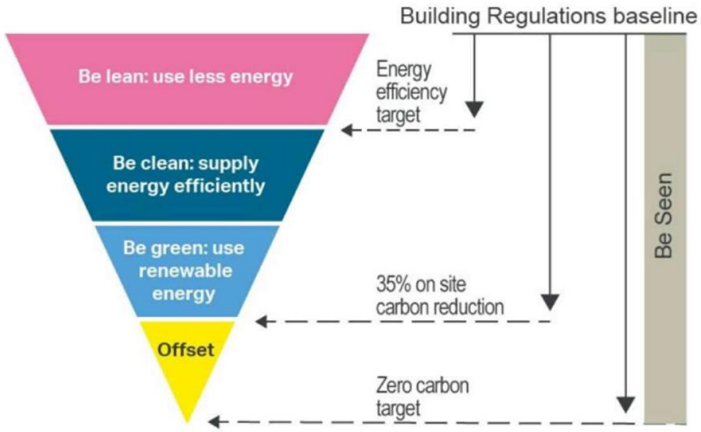


Figure 1.3 Energy Hierarchy

2.0 Approach to carbon reduction

2.1 Energy Strategy

This strategy summarises the relevant planning policies and requirements applicable to the Development in relation to energy and carbon emissions. Of these, the main target is to achieve a reduction in regulated CO2 emissions of 35% or greater beyond the requirements of the Building Regulations Part L on site and 'Zero Carbon' (100% reduction in regulated CO2 emissions with carbon offsetting) as set out in the GLA guidance on preparing energy assessments and the GLA Sustainable Design and Construction SPG.

2.2 Appraisals

The Development has been assessed to determine the estimated regulated energy requirements and associated carbon emissions.

2.3 Be Lean

A range of passive design and energy efficiency measures have been incorporated into the Development to optimise the balance between beneficial winter solar gains and summer comfort, while maximising internal daylight levels. These include:

- Suitable glazing ratio and glass g-value to balance heat losses, heat gains and daylight ingress.
- Fabric insulation levels achieving improvements over Building Regulations Part L (2021) minimum standards.
- Fabric air permeability improvement upon Building Regulations Part L (2021) minimum standards.
- Insulated pipework and ductwork (and air sealing to ductwork) to minimise losses and gains.
- Variable speed pumps and fans to minimise energy consumption of services distribution.

It is anticipated that these measures will achieve a 18% reduction in site-wide regulated CO2 emissions beyond the requirements of the Building Regulations Part L (2021) 'baseline'.

Therefore, the Development is anticipated to achieve carbon emissions below the Building Regulations Part L (2021) baseline, through passive design and energy efficiency measures, i.e. before the inclusion of any Low or Zero Carbon (LZC) technologies.

2.4 Be Clean

No existing heat network is available for consideration. Therefore, the reduction remains the same as seen in "Be Lean". Communication has been initiated with the London Borough of Hillingdon to confirm the lack of existing networks as can be seen in Appendix D.

2.5 Be Green

An all-electric heat pump solution is being implemented in line with the decarbonisation of the grid and provides a 7% reduction in carbon emissions.

The use of all electric heat pump plant will mean there is no onsite combustion of fossil fuels meaning there will be no air quality impact from the heating systems and as a result the site will meet GLA energy assessment guidance on NOx emissions.

The potential for incorporating further renewable energy systems has been reviewed and photovoltaic (PV) panels are expected to be able to achieve significant additional CO2 savings. PV achieves a further 130% in CO2 emissions reductions due to the significant amount of roof area available.

In order to follow the mayor's energy hierarchy, priority will be given to systems that would not displace loads from heat pump systems.

Beyond Part L compliance and regulated emissions, opportunities will be sought to encourage a reduction of non-regulated emissions in practice through measures such as metering, displays and controls.

Combining the lean and green savings gives rise to an overall reduction in regulated carbon emissions of 154% for the site. This impressive reduction is thanks to the significant amount of roof area available for PV in addition to provisions of heat pump systems. The scheme is also low rise and as such performs much better than high-rise, high-density schemes with much larger energy requirements.

2.6 Be seen

Metering provisions are confirmed in this report. Data will be gathered at PC and annually in operation for at least 5 years. The operator will either seek permission to gather aggregated metered data on a yearly basis or; The operator will gather data from an upstream meter, with the permission and assistance of the DNO. The operator will provide data as required and upload to the GLA's portal at appropriate stages.

Full GLA Be Seen spreadsheet can be seen in Appendix C and is also submitted alongside this report.

3.0 Policies, Guides and Regulations

3.1 Current Policy Framework

The policies considered when preparing this strategy are contained in the London Plan (Greater London Authorities (GLA)) and the Local Plan documents of the London Borough of Hillingdon.

3.2 Building Regulations Part L 2021

The assessment of the Development against policy targets has been carried out using Part L 2021 benchmarks.
The Building Regulations Part L (2021) requires that the building as designed is not anticipated to generate CO2 emissions in excess of that set by a Target Emission Rate (TER) calculated in accordance with the approved National Calculation Methodology (NCM).
Upper limits are placed on the efficiency of controlled fittings and services for example, an upper limit to an external wall U-value of 0.26W/m2.K (new non-domestic buildings).
The Building Regulations Part L (2021) also requires that spaces are not subject to excessive solar gains. This is demonstrated using the procedure given in the National Calculation Methodology.

3.3 The London Plan

Summary of London Plan policies for energy and CO2 emissions. Policy S12 Minimising Greenhouse Gas Emissions
– Major development to be Net Zero Carbon (taken to mean a 100% reduction in regulated CO2 emissions from the relevant Building Regulations baseline).
– Minimum 35% on-site emissions reduction.
– Minimum 15% commercial / 10% residential reduction in regulated CO2 through energy efficiency measures (Be Lean stage).
– Demonstrate a pathway to Zero Carbon by 2050

Figure 3.1 Policy Documents

3.4 London Borough of Hillingdon

The London borough of Hillingdon has set required carbon dioxide emission reduction standards, outlined in the below figure 3.2 in line with the GLA plan.

Policy EM1: Climate Change Adaptation and Mitigation

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation(39) as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricty and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

Figure 3.2 -Hillingdon Climate change Mitigation

Hillingdon have also set out requirements to ensure that climate change adaptation is addressed at every stage of the design process.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10. Locating and designing development to minimise the probability and impacts of flooding.
11. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
12. Giving preference to development of previously developed land to avoid the loss of further green areas.

Figure 3.3 -Hillingdon Climate change Adaptation

3.5 Further documents considered

The GLA Guidance on Preparing Energy Assessments
GLA Sustainable Design and Construction SPG (2014)

3.6 Approach and Methodology

The appraisals within this strategy are based on the Building Regulations Part L (2021) calculation methodology and should not be understood as a predictive assessment of likely future energy requirements.
Occupants may operate systems differently or the climate may be different from the assumptions made by Part L calculation methods, leading to differing energy requirements.

3.7 Energy Hierarchy

This strategy outlines how the Development will have a reduced impact on climate change by reducing CO2 emissions associated with energy use in buildings.
The Energy and CO2 appraisal is based on the approach in line with GLA policy.
The strategic approach to the design of the Development has been to reduce demand for energy prior to the consideration of integrating Low or Zero Carbon (LZC) technologies, since controlling demand is the most effective way of reducing energy requirements and CO2 emissions. Further reductions are ensured through the specification of high efficiency building services to limit losses in energy supply, storage and distribution.
After the inclusion of passive design and energy efficiency measures, various options have been investigated to reduce CO2 emissions associated with energy supply.
The feasibility of LZC technologies has been investigated in line with the policy aspirations and as part of the Energy Strategy submitted in support of the application.

3.8 Carbon Factors

The Part L (2021) and current GLA CO2 emission factors have been used to calculate the CO2 emissions for the Development.

Fuel	SAP 10 - Emission Factor (kgCO2 /kWh)
Gas	0.21
Electricity	0.136

Figure 3.4: CO2 Emission Factors

3.9 Regulated and Unregulated Sources

Regulated energy sources are those controlled by the building regulations, as follows:
• Space Heating
• Hot Water
• Space Cooling
• Lighting
• Auxiliary Loads (pumps, fans, and controls).

Unregulated energy includes small power electricity use (computers, plug in devices) and catering energy consumption. Currently, unregulated energy is not included within the Part L assessments but can form a significant part of overall energy consumption and CO2 emissions from developments.

Building users will be encouraged to reduce their equipment energy use, which could be provided in the form of building user guides and tenant's fit-out guides. In general, the Development will aspire to include the use of energy efficient appliances, for example:
•Highly rated white goods (EU Energy Efficiency Labelling Scheme);
• Energy efficient transportation systems
• Voltage optimisation and power factor correction.

3.10 Water Services Infrastructure

The water services infrastructure to the London Borough of Hillingdon area is managed by Affinity Water. The main contractor will apply for a new mains water connection for potable use if required. Potable water supply shall have a water meter accessible on the building perimeter for Affinity Water personnel meter reading with the fire main (if provided) will be an unmetered supply.

3.11 Fire Services Infrastructure

The fire infrastructure and strategy will be advised by the project Fire Consultants, including confirmation if there are any existing fire hydrants within 100metres of the site. Fire hydrant(s) will be required for fire brigade and dry/wet riser inlets.

4.0 Energy Calculations & Inputs

4.1 "Be Lean"

Estimated predicted energy demand and regulated carbon emissions for the development were calculated using EDSL Tas software.

Baseline carbon emissions set out by Part L 2021 of the Building Regulations are expressed as Target Emissions Rate (TER), calculated within the Tas software. This is the baseline figure to which the proposed buildings carbon emissions for Lean, Clean and Green are compared against using the Dwelling Emission Rate (DER) for each stage. The TER from the final proposed building is used as the baseline figure.

4.2 Passive Design Measures

Passive design and energy efficiency measures are prioritised to be designed into the Development to optimise the balance between beneficial winter solar gains and summer comfort, while maximising internal daylight levels. The U-values and air permeability rate have been designed to exceed the minimum requirements of the Building Regulations seen in figure 4.1.

4.3 "Be Clean"

The development is providing an all-electric heat pump solution which achieves the best carbon emission reductions and is future proofed for zero carbon as the grid continues to decarbonise. No existing heat networks are in the immediate vicinity and as such has not been considered for connection. Plant is centralised per building however and enables the development to connect to any future heat networks as required e.g. by adding a heat exchanger in the low level plantrooms.

4.4 "Be Green"

The potential for incorporating further renewable energy systems will be reviewed, however this expected to lead to limited CO2 savings. In order to follow the mayors energy hierarchy, priority will be given to systems that would not displace loads from the selected heat pump systems.

Beyond Part L compliance and regulated emissions, opportunities will be sought to encourage a reduction of non-regulated emissions in practice through measures such as metering, displays and controls.

Element	Part L (2021) limiting factors	Proposed U-values (W/m_2K)
Roof	0.18	0.12
External Wall	0.26	0.12
Rooflights	2.2	2.2
Floor	0.18	0.18

Figure 4.1 Part L and proposed U-values

Parameter	Non- Residential
Space Heating	High Eff Heat Pumps 350%
Hot water	High Eff Heat Pumps 250%
Lighting	Efficacy 140 lm/W
Ventilation	MVHR with HR efficiency 70% In office areas. Natural Ventilation in warehouse areas.
Pipework & Ductwork Insulation	Yes
Variable Speed Pumping	Yes
Fabric Air Permeability (m3/(m2.h) at 50Pa)	3 (Office)/ 4(warehouse with roller shutters)

Figure 4.2 Assumed service inputs

5.0 LZC Selection

	Annual Regulated CO2 Emission Reduction	Notes	Suitable?
	% Beyond Part L "Baseline"		
CHP	-	The decarbonisation of the grid has made heat pumps a more suitable option over CHP	✗
CCHP	-	As above, CHP is no longer suitable for carbon savings	✗
District Energy Network	-	There is no nearby district energy network	✗
Photovoltaic (PV) Panels	130%	PV panels be included in the design. The area will be maximised with consideration of shading, plant etc. currently 270 kWp / 1490 sqm of PV is shown in the design pending information on export availability and final peak demand.	✓
Solar Thermal Heating	-	not considered appropriate as DHW demand is not significant, solar thermal would displace loads from the heat pumps and would generate excessive unused energy at the weekends etc.	✗
Wood Pellets Boiler	-	Due to local air quality issues as well as fuel delivery and storage, biomass is not considered appropriate.	✗
Ground Source Heat Pump	-	GSHPs are not considered appropriate as an imbalance could occur in the ground when this is not carefully managed. The loads for the building would require expensive, numerous energy piles.	✗
Air Source Heat Pump	7%	ASHPs are the recommended solution and align with industry best practice design standards.	✓
Horizontal axis wind turbine	-	A specialist has been contacted to determine if a turbine would be suitable for the site	?

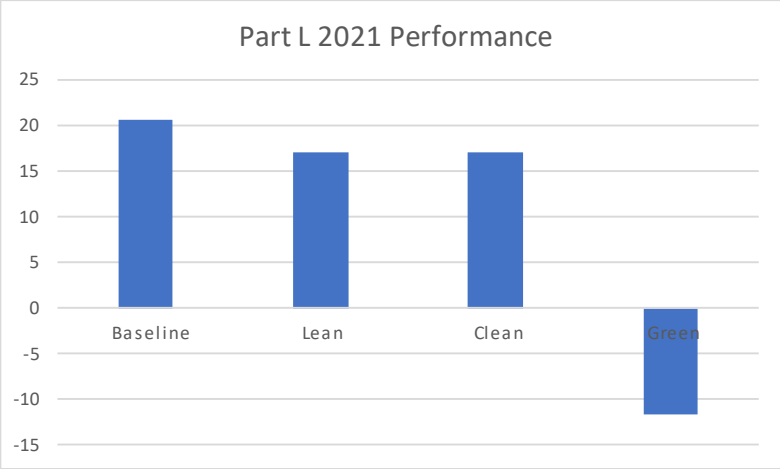
Figure 5.1 Suitable green technologies

6.0 Results

6.1 Overall CO2 Emissions Reduction

A summary of the anticipated CO2 emissions reduction at each step of the energy hierarchy is shown below.

An overall reduction in regulated CO2 emissions of 154% is expected to be achieved when accounting for the benefits of passive design and energy efficiency and clean heat generation from heat pumps this satisfies the criteria of the London plan 2021.



	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	3.7	18%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	28.4	137%
Total Cumulative Savings	**32.0**	**154%**

Energy Demand following energy efficiency measures (MWh/year)						
	Space Heating	Hot Water	Lighting	Auxiliary	Cooling	PV generated
Non-Domestic	43	14	27	17.44	7.9	213

7.0 Overheating

Overheating assessment has been carried for block 1 office areas using TM52 criteria. Warehouse spaces are not intended to be occupied for extended periods. Warehouse welfare facilities and the office development have had overheating analysis carried out.

7.1 Summary

The analysis concluded that Breakspear road development could achieve compliance with TM52 when cooling is applied with a set point of 24 degrees. Ultimately cooling is provided to all spaces due to market expectations and intended use / density and as such comfortable conditions will always be achieved.

7.2 Passive Design Measure to reduce Energy Demand, Overheating Risk and Cooling Demand.

Passive design measures are those which reduce the energy demand within buildings without consuming energy. These are the most effective and long-lasting measures for reducing CO2 emissions as the performance of the solutions (e.g. insulation), is unlikely to deteriorate or be subject to change.

7.2.1 Glazing Ratio

The Development has taken a 'fabric first' approach to reducing energy demand and CO2 emissions. Glazing ratio has been optimised to achieve a balance between providing natural daylighting to reduce the use of artificial lighting, the provision of passive solar heating to limit the need for space heating in winter and limiting summertime solar gains to reduce space cooling demands and limit the likelihood of high internal temperatures. Glazing on the south, east and west facing facades can lead to beneficial solar gains in winter months, whilst glazing on northerly orientations will typically loose heat.

7.2.2 Glazing Energy and Light Transmittance

In designing the elevations with an appropriate approach to fenestration, the design team has also been mindful to balance the solar energy transmittance and light transmittance values of the glass, to control solar gains and to maximise daylight respectively. Solar gains can be beneficial in winter months as a means of avoiding the need for active heating to maintain comfortable internal temperatures. However, in summer months excessive solar gains can lead to the potential for uncomfortably high internal temperatures. In tandem with the glazing ratio targets, the solar energy transmittance (g-value) of the glass has been targeted to allow solar gains in winter but control solar gains in summer. An initial value of 0.3 is targeted i.e. transmitting 30% of the incident solar heating gains into internal spaces respectively. As such, the g-value and the glazing ratio currently being considered are not anticipated to have a significant detrimental effect on daylight ingress, allowing natural light to penetrate the building to limit the demand for lighting.

7.2.3 Lighting

Energy efficient lighting will be provided throughout where possible.

External lighting will also be energy efficient and will be linked to daylight sensors and presence detectors to prevent unnecessary use (where appropriate).

As well as reduced energy requirement that would be achieved by implementing these lighting measures, the contribution to the ventilation requirements may also be reduced by limiting heat gains. This would further reduce the total energy requirements and CO2 emissions of the building.

7.2.4 Ventilation

Ventilation will be provided by mechanical ventilation with heat recovery. Purge ventilation is also achieved by openable windows.

Ventilation is important to maintain good indoor air quality by providing fresh air and extracting stale air. Ductwork will be rigid type, circular wherever possible, with minimal flexible ductwork (for connections only).

7.2.5 Metering and Controls

It is the intention that meters will be provided to each block so that occupants can monitor and manage their energy use for heating, cooling and hot water as applicable. Metering provisions will enable whole building data to be logged and reviewed (this would enable monitored data to be provided to the Local Authority as required). Logging provisions should be able to store at least 5 years' worth of data.

7.3 Modelling Inputs

Software	EDSL Tas	Occupancy	Monday to Friday
Weather Data	Design Summer Year (DSY1)	Max Occupancy Density	From NCM data
Assessment Criteria	CIBSE TM52	Occupancy Heat Gains	7 W/m^2 (Sensible) 5 W/m^2 (Latent)
Assessment Season	Non-heating season (1st May-30th September	Window opening type (where applicable)	50% opening.
Wall U-Value	As per assumptions within this report	Lighting Gains	8 W/m^2
Window Averaged U-value	-	-	-
Window g-value	0.3	-	-
Roof U-value	As per assumptions within this report	Heat Interface Unit and primary pipework	HIUs designed out
Floor U-value	As per assumptions within this report	-	-
Window Covering (SF=Shading Factor)	N/A	Internal door undercut	-
Infiltration	0.15 ACH	Thermal Bridging Coefficient (W/m^{2}K)	Included in U-values
Wall thickness and window positioning	500mm and positioned 150mm from the inner wall i.e windowsill depth of 350mm	Window frame dimensions	50mm to each window pane

Figure 7.1 Modelling inputs

7.4 Results

Below results show that with cooling provided to block 1 office areas and block 2-5 welfare areas, TM52 criteria is satisfied. Cooling plant has been sized in order to have sufficient capacity in order to deal with future weather scenarios. Figure 7.2 shows results for DSY1 2020s, high emissions, 50% percentile scenario, results for DSY2 and DSY3 can be found in Appendix G.

28.6.2022-breakspear-Updated-Cooling 24.tsd

Adaptive Overheating Report (CIBSE TM52)

Results

Zone Name	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Block 1 00 Office 1	1530	45	0	0.0	0	Pass
Block 1 00 Office 2	1530	45	0	0.0	0	Pass
Block 1 00 Office 3	1530	45	0	0.0	0	Pass
Block 1 00 Office 4	1530	45	0	0.0	0	Pass
Block 1 00 Office 5	1530	45	0	0.0	0	Pass
Block 1 00 Office 6	1530	45	0	0.0	0	Pass
Block 1 00 Office 7	1530	45	0	0.0	0	Pass
Block 1 00 Office 8	1530	45	0	0.0	0	Pass
Block 1 00 Office 9	1530	45	0	0.0	0	Pass
Block 1 00 Office 10	1530	45	0	0.0	0	Pass
Block 1 00 Office 11	1530	45	0	0.0	0	Pass
Block 1 00 Office 12	1530	45	0	0.0	0	Pass
Block 1 00 Office 13	1530	45	0	0.0	0	Pass
Block 1 00 Office 14	1530	45	0	0.0	0	Pass
Block 1 00 Office 15	1530	45	0	0.0	0	Pass
Block 1 01 Office 1	1530	45	0	0.0	0	Pass
Block 1 01 Office 2	1530	45	0	0.0	0	Pass
Block 1 01 Office 3	1530	45	0	0.0	0	Pass
Block 1 01 Office 4	1530	45	0	0.0	0	Pass
Block 1 01 Office 5	1530	45	0	0.0	0	Pass
Block 1 01 Office 6	1530	45	0	0.0	0	Pass
Block 1 01 Office 7	1530	45	0	0.0	0	Pass
Block 1 01 Office 8	1530	45	0	0.0	0	Pass
Block 1 01 Office 9	1530	45	0	0.0	0	Pass
Block 1 01 Office 10	1530	45	0	0.0	0	Pass
Block 1 01 Office 11	1530	45	0	0.0	0	Pass
Block 1 01 Office 12	1530	45	0	0.0	0	Pass
Block 1 01 Office 13	1530	45	0	0.0	0	Pass
Block 1 01 Office 14	1530	45	0	0.0	0	Pass
Block 1 01 Office 15	1530	45	0	0.0	0	Pass
Block 2 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 3 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass

Figure 7.2 TM52 Results

8.0 Flexibility and peak energy demand

	Electrical	Heat	Enabled through…
Estimated peak demand (MW)	0.6MW	N/A	Realistic estimates of demand profiles and peak demand
Available capacity (MW)	0.6MW	N/A	Early engagement with DNO or IDNO to establish available capacity
Flexibility potential (MW)	N/A	N/A	Modelling of flexibility using demand profiles
Revised peak demand (MW)	N/A	N/A	Revision to peak demand considering available capacity, engagement with third parties and flexibility potential
Percentage flexibility predicted (%)	0	N/A	Calculations from flexibility potential as a proportion of peak demand

Figure 8.1 Summary of site-wide peak demand, capacity, and flexibility potential

Flexibility achieved through:	Yes/No	Details
Electrical energy storage (kWh) capacity	No	N/A however will be further reviewed at stage 3
Heat energy storage (kWh) capacity	No	N/A
Renewable energy generation (load matching)	Yes	ASHP and PV as detailed in this energy strategy.
Gateway to enable automated demand response	No	N/A
Smart systems integration (e.g. smart charge points for EV, gateway etc)	Yes	Expected for EV charging facilities
Other initiative	No	N/A

Figure 8.2 Summary of interventions for achieving flexibility

Appendix A

Lean BRUKL

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

As designed

Date: Thu Jan 19 14:25:06 2023

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 6096.79

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

Target CO_2 emission rate (TER), kgCO_2/m².annum	3.4	
Building CO_2 emission rate (BER), kgCO_2/m².annum	2.8	
Target primary energy rate (TPER), kWh/m².annum	35.85	
Building primary energy rate (BPER), kWh/m².annum	29.56	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{b\text{-}Limit}$	$U_{b\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.12	0.12	External Wall
Floors	0.18	0.18	0.18	Ground Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	0.12	0.12	Roof
Windows** and roof windows	1.6	1.77	1.84	0.6*2.2
Rooflights***	2.2	2.23	2.23	Rooflight
Personnel doors^	1.6	1.85	1.85	Door solid
Vehicle access & similar large doors	1.3	1.31	1.32	Vechicle door mezzanine
High usage entrance doors	3	-	-	No high usage entrance doors in project

$U_{b\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]
$U_{b\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
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	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3.83

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	6097	6097
External area [m²]	12148	12148
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	4	5
Average conductance [W/K]	3286	4148
Average U-value [W/m²K]	0.27	0.34
Alpha value* [%]	19.57	4.57

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.78	12.89
Cooling	1.32	1.55
Auxiliary	2.87	2.17
Lighting	4.31	5.24
Hot water	1.91	2
Equipment*	30.61	30.61
TOTAL**	**19.19**	**23.86**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	104.72	154.87
Primary energy [kWh/m²]	29.56	35.85
Total emissions [kg/m²]	2.8	3.4

Green BRUKL

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

As designed

Date: Thu Feb 02 15:17:53 2023

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 6096.79

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

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	3.4	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	-1.85	
Target primary energy rate (TPER), kWh/m²annum	35.85	
Building primary energy rate (BPER), kWh/m²annum	-23.79	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{i\text{-Limit}}$	$U_{i\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.12	0.12	External Wall
Floors	0.18	0.18	0.18	Ground Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	0.12	0.12	Roof
Windows** and roof windows	1.6	1.77	1.85	Door
Rooflights***	2.2	2.23	2.23	Rooflight
Personnel doors^	1.6	1.85	1.85	Door solid
Vehicle access & similar large doors	1.3	1.31	1.32	Vechicle door mezzanine
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

$U_{i\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

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

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

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

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	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3.83

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	6097	6097
External area [m²]	12148	12148
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	5
Average conductance [W/K]	3266	4148
Average U-value [W/m^2K]	0.27	0.34
Alpha value* [%]	19.57	4.57

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

Building Use

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

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

	Actual	Notional
Heating	7.09	12.89
Cooling	1.31	1.55
Auxiliary	2.86	2.17
Lighting	4.44	5.24
Hot water	2.31	2
Equipment*	30.61	30.61
TOTAL**	**18.01**	**23.86**

* 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	35.1	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*35.1*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	105.91	154.87
Primary energy [kWh/m^2]	-23.79	35.85
Total emissions [kg/m^2]	-1.85	3.4

Appendix B

Site Plans

Appendix C- Be Seen

MAYOR OF LONDON

OVERALL PROGRESS	97%	
CURRENT REPORTING STAGE ---------- >>		Planning

CONTEXTUAL DATA — *Progress: 94%*

ORGANISATION & CONTACT DETAILS

ORGANISATION DETAILS	
Organisation Name	Keltbray
Organisation Address	38-40 Bank Street, Belfast, BT1 1HL

CONTACT DETAILS	
Contact Name	Andrew Burnside
Email	andrew.burnside@keltbray.com
Additional Email(s)	
Telephone No.	7590860952
Mobile No.	

DEVELOPMENT INFORMATION

OVERALL DEVELOPMENT DETAILS		
Planning Reference Number	*Must complete ->*	
Name of Whole Development		Former MSD Facility, Breakspear Road South

DEVELOPMENT LOCATION		
Development Address		
Address Line 1		Breakspear Rd S, Ickenham,
Address Line 2		Newyears Green, Uxbridge
Address Line 3		
Address Line 4		
London Borough		Hillingdon
Postcode		UB9 6LS
Ordnance Survey Reference		
Development UPRN (if available)	*Please add if available ->*	
Geo-Location Coordinates		
Latitude (to 6 decimal places)		51.575
Longitude (to 6 decimal places, +ve or -ve)		-0.458

DEVELOPMENT TOTAL AREA BREAKDOWN

Residential		
Total Residential Floor Area	GIA m2	0
Dwelling Counts		
Flats	number	
House	number	
Non-Residential		
Non-Residential Floor Area Breakdown		*Please include complete non-resi details below*
Landlord Circulation (in Residential Blocks)	GIA m2	
General office (A2, B1, B8, D1 planning classes)	GIA m2	1,290
High street agency (A2 planning classes)	GIA m2	
General retail (A1, SG planning classes)	GIA m2	
Large non-food shop (A1 planning classes)	GIA m2	
Small food store	GIA m2	
Large food store	GIA m2	
Restaurant (A3, A5 planning classes)	GIA m2	
Bar, pub or licensed club (A4 planning classes)	GIA m2	
Hotel (C1 planning classes)	GIA m2	
Cultural Activities	GIA m2	
Entertainment halls (D2 planning classes)	GIA m2	
Swimming pool centre	GIA m2	
Fitness and health centre	GIA m2	
Dry sports and leisure facility (D2 planning classes)	GIA m2	
Covered car park	GIA m2	
Public buildings with light usage (D1, SG planning classes)	GIA m2	
Schools and seasonal public buildings (D1, D2 planning cla:	GIA m2	
University campus	GIA m2	
Clinic (D1 planning classes)	GIA m2	
Hospital (clinical and research)	GIA m2	
Long term residential (C1, C2, C2A planning classes)	GIA m2	
General accommodation (C1, C2, C3 planning classes)	GIA m2	
Emergency services (SG planning classes)	GIA m2	
Laboratory or operating theatre	GIA m2	
Public waiting or circulation (SG planning classes)	GIA m2	
Terminal (B8 planning classes)	GIA m2	
Workshop (B1, B2 planning classes)	GIA m2	
Storage Facility (B8 planning classes)	GIA m2	5,880
Cold Storage (B8 planning classes)	GIA m2	
Overall Development Summary		
Total Development Floor Area		
Residential	GIA m2	0
Non-Residential	GIA m2	7,170
Total	GIA m2	7,170
Total Non-Residential Uses		General office; Storage Facility

SUPPLEMENTARY FILES AND UPCOMING REPORTING STAGES

SUPPLEMENTARY FILES	
Site Plan	
Does the development have a site plan?	Yes
What is the site plan filename?	Appendix B of energy strategy
Best Practice Documents	
Does the development have a predicted DEC?	No
Is there a base building energy rating (in line with DFP)?	No

ANTICIPATED DATES FOR UPCOMING REPORTING STAGES	
As-Built Stage	1 Jan 2024
Operational Year 1 End	1 Jan 2025

DEVELOPMENT PERFORMANCE AND EMISSIONS

Progress: 100%

+ DEVELOPMENT PERFORMANCE

DEVELOPMENT OVERALL PREDICTED PERFORMANCE

Predicted Performance Calculation Details		
Fuel Carbon Intensity Source (aligned with planning energy statement)		SAP 10.0
Residential Elements of the development		
Predicted Annual Energy Use		*Fill in all applicable fuels below*
Annual Electricity Use	kWh/yr	0
Annual Gas Use	kWh/yr	0
Annual Oil Use (if applicable)	kWh/yr	0
Annual Biomass Use (if applicable)	kWh/yr	0
Annual District Htg Use (if applicable)	kWh/yr	0
Annual District Clg Use (if applicable)	kWh/yr	0
Elec Generation, Gross (if applicable)	kWh/yr	0
Solar Thermal Generation (if applicable)	kWh/yr	0
Predicted Annual Carbon Emissions	tCO2/yr	0
Non-Residential Elements of the development (Part L Calculation)		
Predicted Annual Energy Use		*Fill in all applicable fuels below*
Annual Electricity Use	kWh/yr	109,803
Annual Gas Use	kWh/yr	0
Annual Oil Use (if applicable)	kWh/yr	0
Annual Biomass Use (if applicable)	kWh/yr	0
Annual District Htg Use (if applicable)	kWh/yr	0
Annual District Clg Use (if applicable)	kWh/yr	0
Elec Generation, Gross (if applicable)	kWh/yr	0
Solar Thermal Generation (if applicable)	kWh/yr	0
Predicted Annual Carbon Emissions	tCO2/yr	15
Non-Residential Elements of the development (TM54 Calculation)		
Predicted Annual Energy Use		*Fill in all applicable fuels below*
Annual Electricity Use	kWh/yr	186,623
Annual Gas Use	kWh/yr	0
Annual Oil Use (if applicable)	kWh/yr	0
Annual Biomass Use (if applicable)	kWh/yr	0
Annual District Htg Use (if applicable)	kWh/yr	0
Annual District Clg Use (if applicable)	kWh/yr	0
Elec Generation, Gross (if applicable)	kWh/yr	0
Solar Thermal Generation (if applicable)	kWh/yr	0
Predicted Annual Carbon Emissions	tCO2/yr	25

CARBON OFFSETTING

Predicted Carbon Shortfall (aligned with planning energy stater	tCO2	0
Total Committed Carbon Offset	£	0

Appendix D – Contact with Hillingdon Council

Breakspear Road South

TN

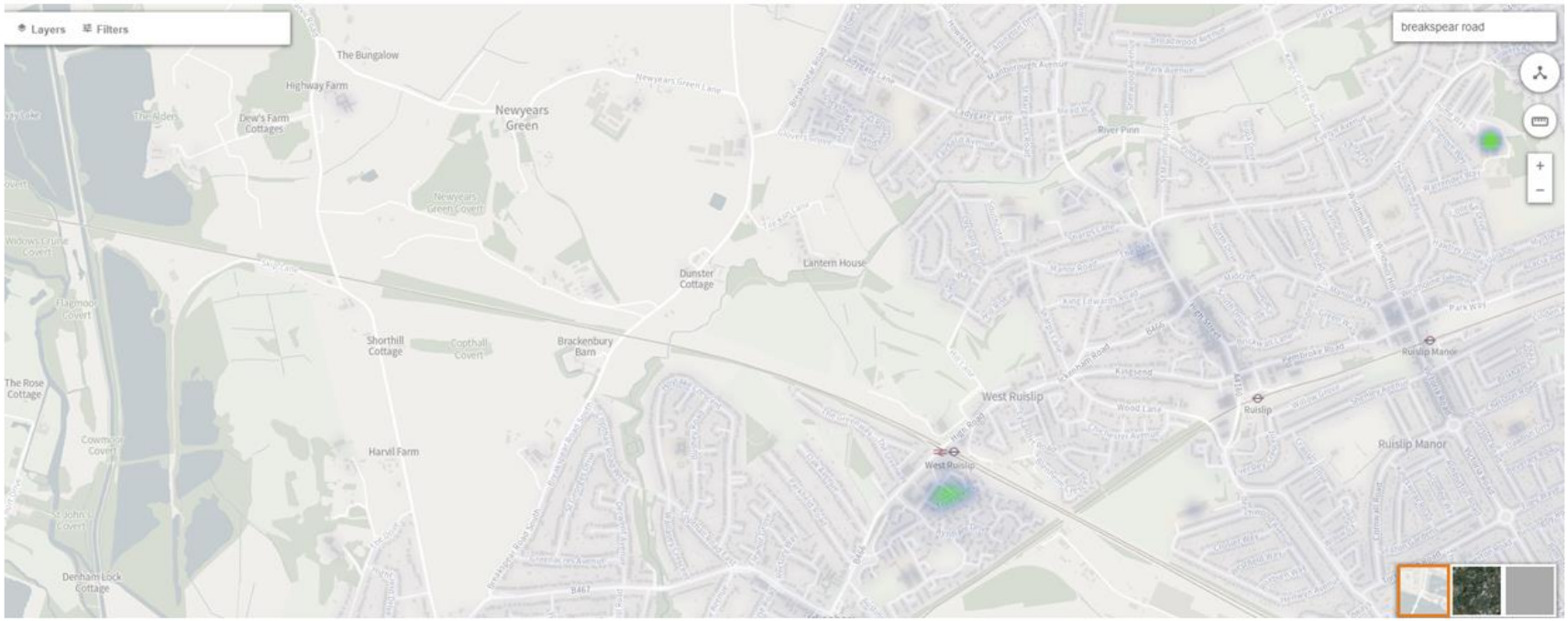
Tom Nugent | IN2
To planning@hillingdon.gov.uk
Cc William White | IN2

Reply | Reply All | Forward

Mon 08/08/2022 11:15

Good morning,

We are working on a private project on Breakspear road south and have been using the London heat map to investigate the potential of connecting to a district heat network. From the map we have been unable to identify any appropriate networks. Could you confirm if there are any networks in the area?



Thanks

District Heating in Hillingdon

IT

Ian Thynne <IThynne@Hillingdon.Gov.UK>
To Tom Nugent | IN2

Reply | Reply All | Forward

Mon 08/08/2022 18:26

Tom,

Firstly, no, there are no known heat networks.

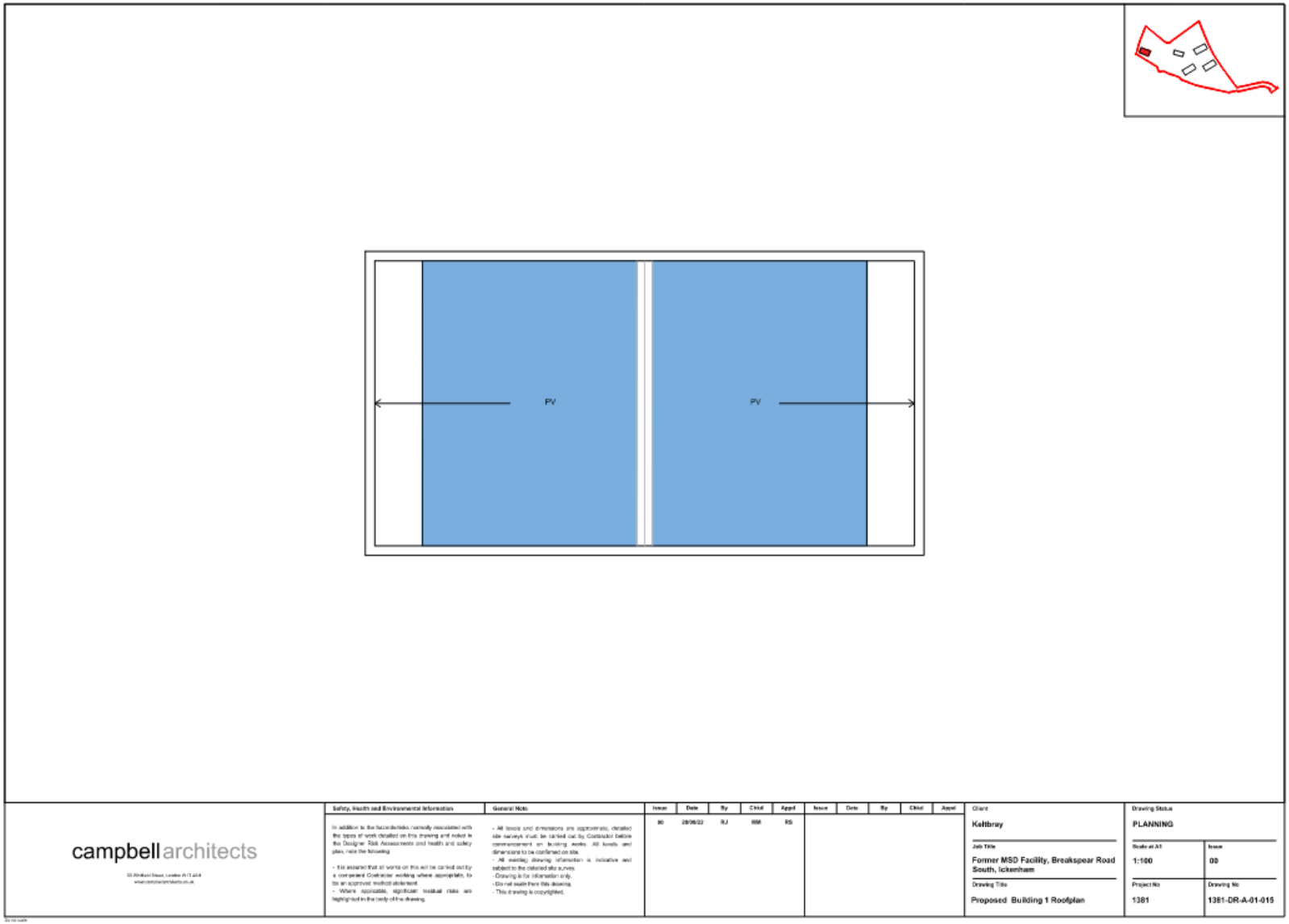
Secondly, could you please provide me with details of who at the GLA has asked the question? They ask every developer to ask us and the answer has remained 'none' for over a decade. It seems like unnecessary work.

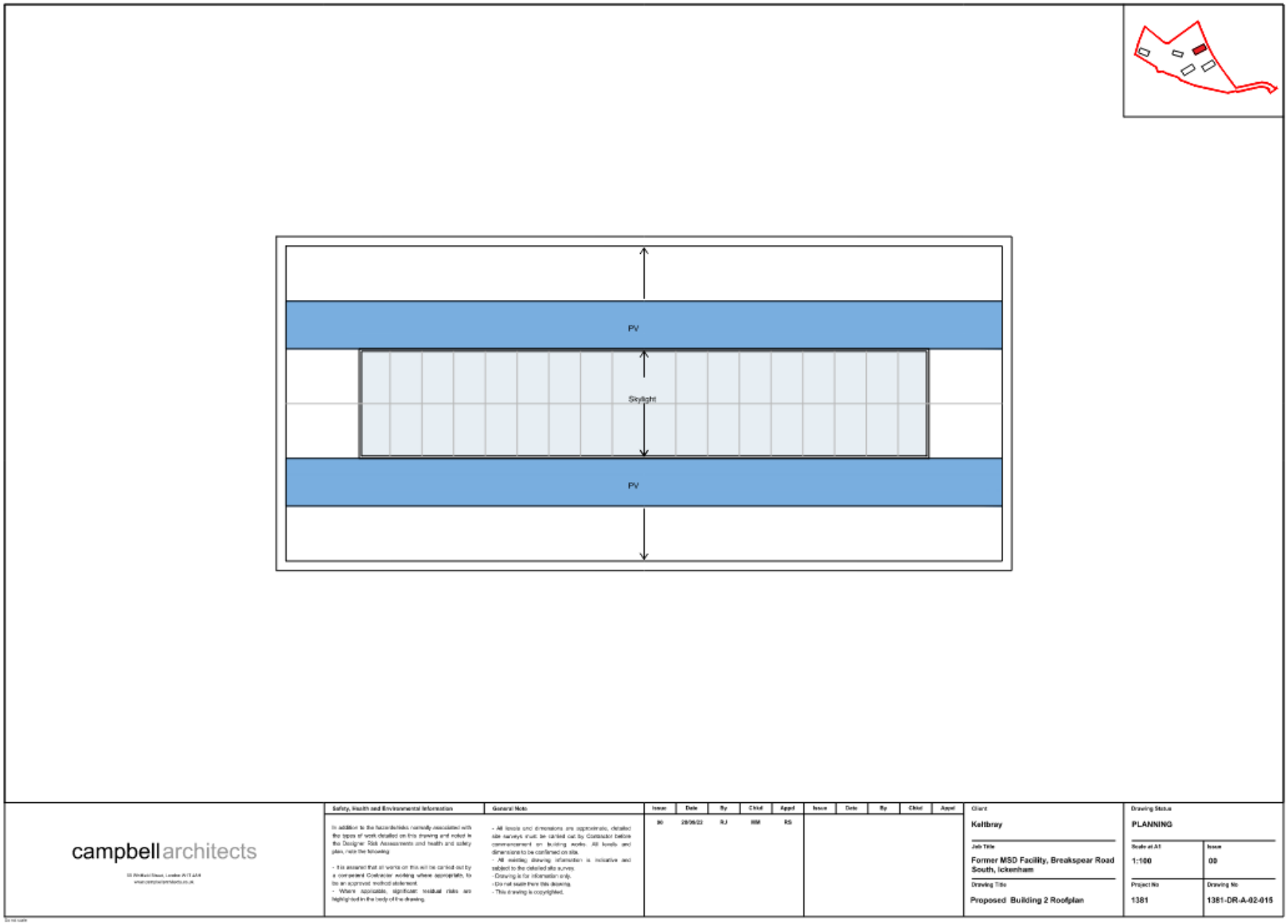
Kind regards

Ian Thynne
Planning Specialists Team Manager

T 01895 55 8326
E ithynne@hillingdon.gov.uk

Appendix E-Roof Layouts




PV
Skylight
PV
campbell architects
Safety, Health and Environmental Information
General Note
Issue
Date
By
Chkd
Appd
Client
Kellbray
Job Title
Former MSD Facility, Breakspear Road South, Ickenham
Drawing Title
Proposed Building 2 Roofplan
Drawing Status
PLANNING
Scale at A1
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Issue
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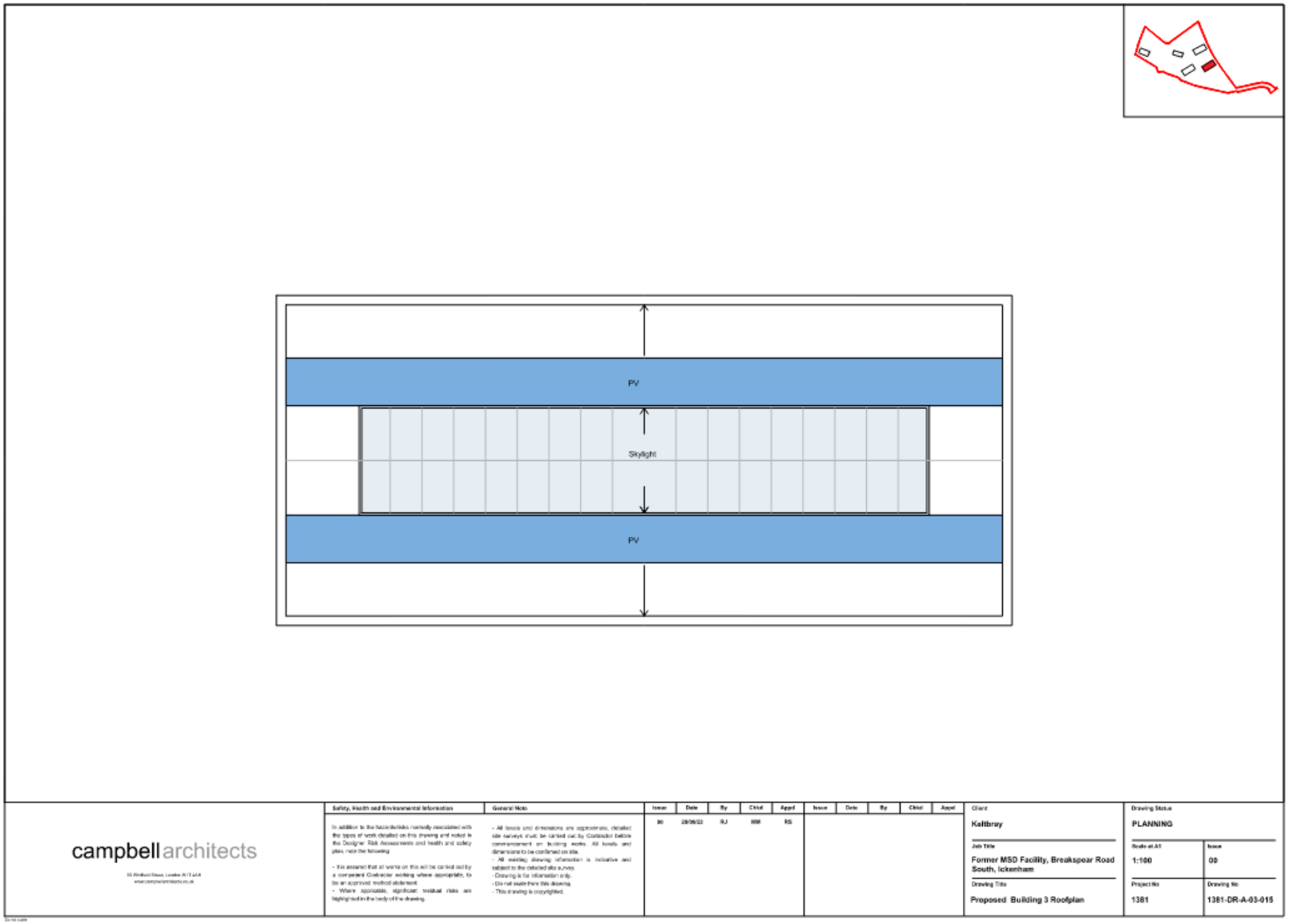
Project No
1381
Drawing No
1381-DR-A-02-015


PV
Skylight
PV
campbell architects
Safety, Health and Environmental Information
General Note
Issue
Date
By
Chkd
Appd
Client
Keltbray
Job Title
Former MSD Facility, Breakspear Road South, Ickenham
Drawing Title
Proposed Building 3 Roofplan
Drawing Status
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Scale at A1
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Issue
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Project No
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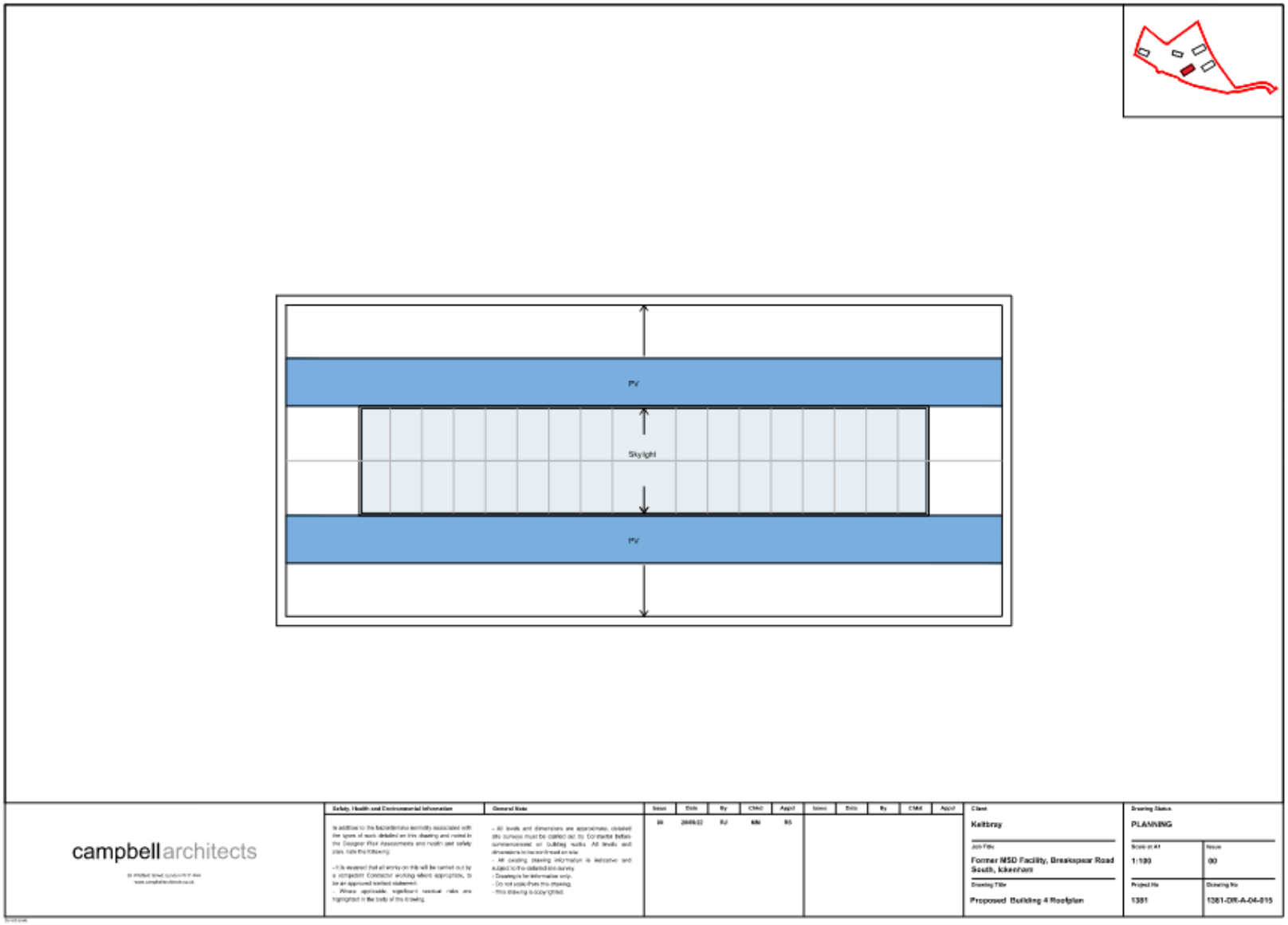
Drawing No
1381-DR-A-03-015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Skylight
PV
campbell architects
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Proposed Building 4 Roofplan
PLANNING
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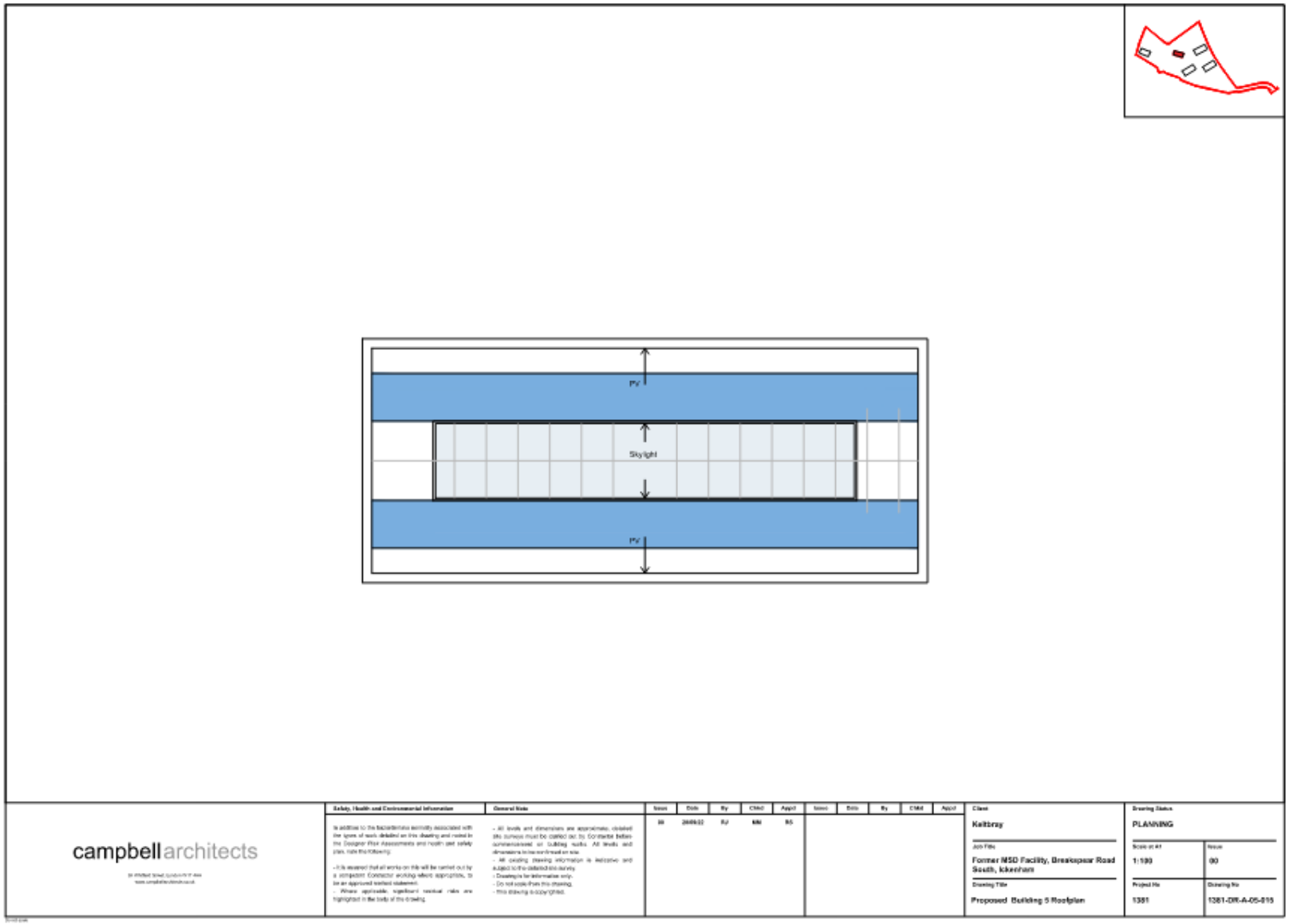
1381
1381-DR-A-04-015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Skylight
PV
campbell architects
Client
Kellbray
Former MSD Facility, Breakspear Road South, Ickenham
Proposed Building 5 Rooftplan
PLANNING
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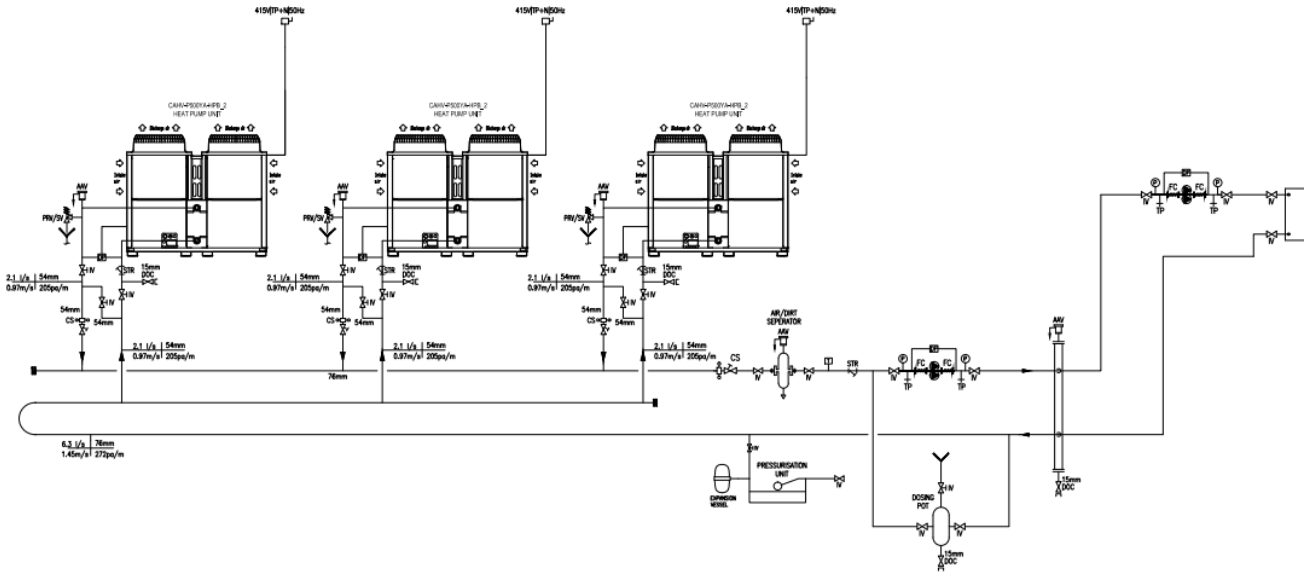
1381
1381-DR-A-05-015

Appendix F Typical ASHP Arrangement



Heating

Product Information

CAHV-P500YB-HPB
Ecodan Air Source Heat Pump

Making a World of Difference

CAHV Monobloc Heat Pump System

The Ecodan CAHV air source heat pump monobloc system can operate singularly, or form part of a multiple unit system. The CAHV also comes equipped with a wide range of controller features as standard.

A multiple unit system has the ability to cascade available units on and off to meet the load from a building. As an example of this modulation, a 16 unit system allows 0.5kW increments of capacity, from 18kW all the way up to 688kW. This level of modulation is unprecedented within the heating industry and with cascade and rotation built in as standard, the Ecodan CAHV system is perfectly suited to a wide range of commercial applications.

ErP A++

Key Features

- Multiple unit cascade control of up to 688kW capacity
- Split refrigerant circuits within each CAHV provide 50% back up
- Ability to rotate units based on accumulated run hours
- Provides from 25°C up to 70°C water flow temperatures without boost heaters
- Low maintenance, hermetically-sealed monobloc design
- Low on-site refrigerant volume
- HIC (Zubadan) technology delivers 43kW at -3°C with minimal drop off down to -20°C

MITSUBISHI ELECTRIC
Air Conditioning | Heating
Ventilation | Controls

ecodan
Renewable Heating Technology

Heating

Product Information

CAHV-P500YB-HPB
Ecodan Air Source Heat Pump

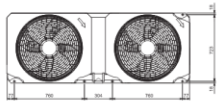
Making a World of Difference

MODEL		CAHV-P500YB-HPB
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	125%
	SCOP	3.19
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+
	η_s	139%
	SCOP	3.54
HEATING*1 (A-3/W35)	Capacity (kW)	42.6
	Power Input (kW)	15.2
	COP	2.80
OPERATING AMBIENT TEMPERATURE (°C DB)		-20~+40°C
SOUND PRESSURE LEVEL AT 1M (dBA)*2*3		59
LOW NOISE MODE (dBA)*2		Variable
FLOW RATE(l/min)		126
WATER PRESSURE DROP (kPa)		18
DIMENSIONS (mm)	Width	1978
	Depth	759
	Height	1710 (1650 without legs)
WEIGHT (kg)		526
ELECTRICAL SUPPLY		380-415v, 50Hz
PHASE		3
NOMINAL RUNNING CURRENT [MAX] (A)		17.6 [52.9]
FUSE RATING - MCB SIZES (A)*4		63

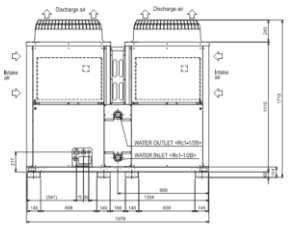
*1 Under normal heating conditions at outdoor temp: -3°CDB / -4°CWB, outlet water temp 35°C, inlet water temp 30°C
*2 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 35°C, inlet water temp 30°C as tested to BS EN14511
*3 Sound power level of the CAHV-P500YB-HPB is 70.7dBA. Tested to BS EN12102
*4 MCB Sizes BS EN60898-2 & BS EN60947-2
η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

DIMENSIONS

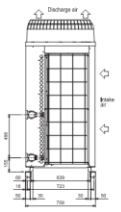
Upper View



Front View



Side View



Appendix G- Overheating results

DSY 2

28.6.2022-breakspear-Updated-t

Adaptive Overheating Report (CIBSE TM52)

Results

Zone Name	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Block 1 00 Office 1	1090	32	0	0.0	0	Pass
Block 1 00 Office 2	1090	32	0	0.0	0	Pass
Block 1 00 Office 3	1090	32	0	0.0	0	Pass
Block 1 00 Office 4	1090	32	0	0.0	0	Pass
Block 1 00 Office 5	1090	32	0	0.0	0	Pass
Block 1 00 Office 6	1090	32	0	0.0	0	Pass
Block 1 00 Office 7	1090	32	0	0.0	0	Pass
Block 1 00 Office 8	1090	32	0	0.0	0	Pass
Block 1 00 Office 9	1090	32	0	0.0	0	Pass
Block 1 00 Office 10	1090	32	0	0.0	0	Pass
Block 1 00 Office 11	1090	32	0	0.0	0	Pass
Block 1 00 Office 12	1090	32	0	0.0	0	Pass
Block 1 00 Office 13	1090	32	0	0.0	0	Pass
Block 1 00 Office 14	1090	32	0	0.0	0	Pass
Block 1 00 Office 15	1090	32	0	0.0	0	Pass
Block 1 01 Office 1	1090	32	0	0.0	0	Pass
Block 1 01 Office 2	1090	32	0	0.0	0	Pass
Block 1 01 Office 3	1090	32	0	0.0	0	Pass
Block 1 01 Office 4	1090	32	0	0.0	0	Pass
Block 1 01 Office 5	1090	32	0	0.0	0	Pass
Block 1 01 Office 6	1090	32	0	0.0	0	Pass
Block 1 01 Office 7	1090	32	0	0.0	0	Pass
Block 1 01 Office 8	1090	32	0	0.0	0	Pass
Block 1 01 Office 9	1090	32	0	0.0	0	Pass
Block 1 01 Office 10	1090	32	0	0.0	0	Pass
Block 1 01 Office 11	1090	32	0	0.0	0	Pass
Block 1 01 Office 12	1090	32	0	0.0	0	Pass
Block 1 01 Office 13	1090	32	0	0.0	0	Pass
Block 1 01 Office 14	1090	32	0	0.0	0	Pass
Block 1 01 Office 15	1090	32	0	0.0	0	Pass
Block 2 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 3 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass

DSY 3

28.6.2022-breakspear-Updated

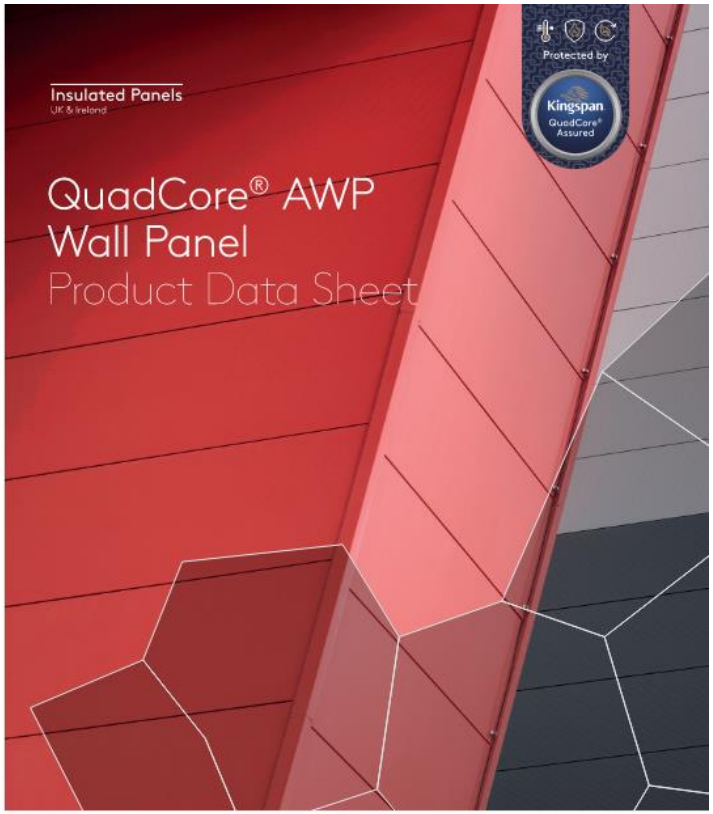
Adaptive Overheating Report (CIBSE TM52)

Results

Zone Name	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Block 1 00 Office 1	1090	32	0	0.0	0	Pass
Block 1 00 Office 2	1090	32	0	0.0	0	Pass
Block 1 00 Office 3	1090	32	0	0.0	0	Pass
Block 1 00 Office 4	1090	32	0	0.0	0	Pass
Block 1 00 Office 5	1090	32	0	0.0	0	Pass
Block 1 00 Office 6	1090	32	0	0.0	0	Pass
Block 1 00 Office 7	1090	32	0	0.0	0	Pass
Block 1 00 Office 8	1090	32	0	0.0	0	Pass
Block 1 00 Office 9	1090	32	0	0.0	0	Pass
Block 1 00 Office 10	1090	32	0	0.0	0	Pass
Block 1 00 Office 11	1090	32	0	0.0	0	Pass
Block 1 00 Office 12	1090	32	0	0.0	0	Pass
Block 1 00 Office 13	1090	32	0	0.0	0	Pass
Block 1 00 Office 14	1090	32	0	0.0	0	Pass
Block 1 00 Office 15	1090	32	0	0.0	0	Pass
Block 1 01 Office 1	1090	32	0	0.0	0	Pass
Block 1 01 Office 2	1090	32	0	0.0	0	Pass
Block 1 01 Office 3	1090	32	0	0.0	0	Pass
Block 1 01 Office 4	1090	32	0	0.0	0	Pass
Block 1 01 Office 5	1090	32	0	0.0	0	Pass
Block 1 01 Office 6	1090	32	0	0.0	0	Pass
Block 1 01 Office 7	1090	32	0	0.0	0	Pass
Block 1 01 Office 8	1090	32	0	0.0	0	Pass
Block 1 01 Office 9	1090	32	0	0.0	0	Pass
Block 1 01 Office 10	1090	32	0	0.0	0	Pass
Block 1 01 Office 11	1090	32	0	0.0	0	Pass
Block 1 01 Office 12	1090	32	0	0.0	0	Pass
Block 1 01 Office 13	1090	32	0	0.0	0	Pass
Block 1 01 Office 14	1090	32	0	0.0	0	Pass
Block 1 01 Office 15	1090	32	0	0.0	0	Pass
Block 2 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 3 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass
Block 4 Welfare Facilities	1090	32	0	0.0	0	Pass

Appendix H- Proposed Material Selections

Proposed Wall Panel



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Applications

QuadCore® AWP Wall Panel is a range of secret-fix wall panels that offer freedom of design and high performing insulated panel solutions to architects. The wide range of profiles on offer go beyond traditional insulated panel designs. The QuadCore® AWP Wall Panel range is available in nine distinct profiles, in a variety of panel widths and can be installed both horizontally and vertically.

Available Lengths

Standard Lengths (m)	1.8 - 14.5
Longer Lengths (non-standard) (m)	14.5 - 17.5
Shorter Lengths (non-standard) (m)	Below 1.8

Note: Additional costs and transport restrictions may apply for non-standard lengths. All lengths may change for export (outside of the UK & Ireland).

Dimensions, Weight & Thermal Performance

	Convex, Euro-Box, Flat, Flat-Stucco, Mini-Micro, Micro-Rib, Plank, Tramline & Wave										
Core Thickness (mm)	45	54	60	70	74	80	90	100	120	140	150
U-Value (W/m^2K)	0.46	0.35	0.32	0.27	0.25	0.23	0.20	0.19	0.15	0.13	0.12
Weight (kg/m²)	8.7	9.1	9.3	9.7	9.8	10.1	10.5	10.8	11.6	12.4	12.7

The QuadCore® insulation used in QuadCore® AWP Wall Panel has a Thermal Conductivity (λ) of 0.018W/m.K

QuadCore® AWP Wall Panel has a Thermal Transmittance (U-Value), calculated using the method required by the Building Regulations Part L2 (England & Wales), Building Standards Section 6 (Scotland), Part L (Republic of Ireland) and Part F2 (Northern Ireland).

Insulation Core

QuadCore® AWP Wall Panel is manufactured with an HCFC, CFC and HFC free QuadCore® insulation core.

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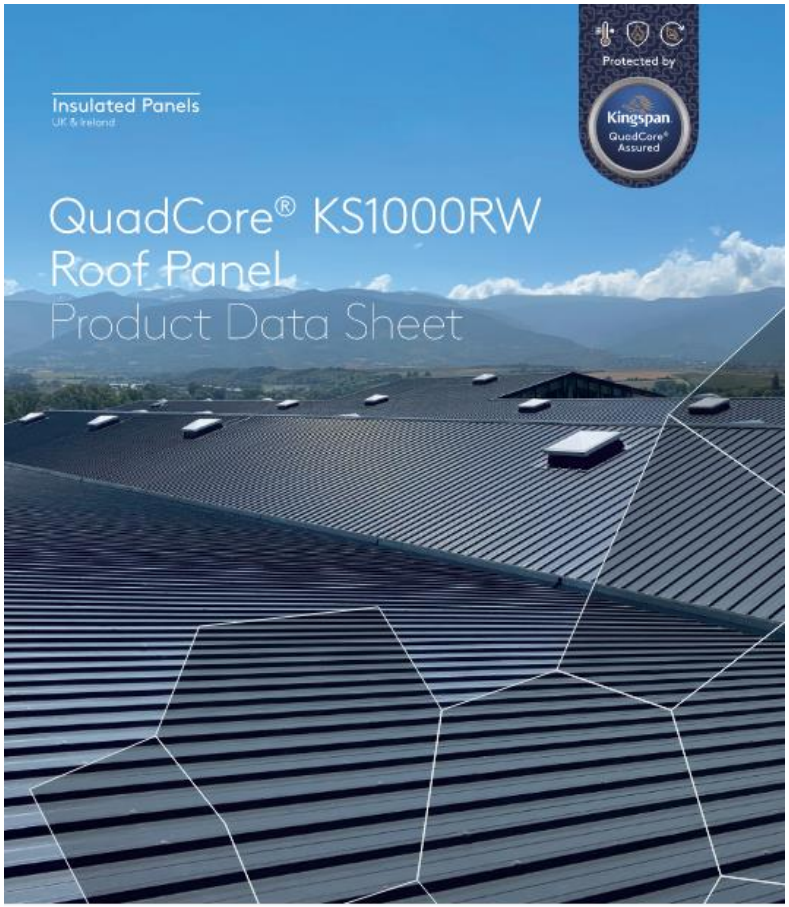
Proposed Roof Panels



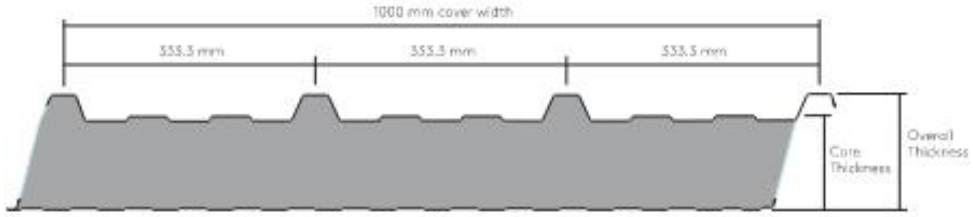
Applications

QuadCore® KS1000RW Roof Panels are through-fix, trapezoidal profiled, insulated roof panels which can be used for building applications with roof pitches of 4° or more after deflection.

Available Lengths

Standard Lengths (m)	1.8 - 14.5
Longer Lengths (non-standard) (m)	14.5 - 29.2
Shorter Lengths (non-standard) (m)	Below 1.8

Note: Additional costs and transport restrictions may apply for non-standard lengths. All lengths may change for export (outside of the UK and Ireland).



Dimensions, Weight & Thermal Performance

Core Thickness (mm)	40	53	60	75	80	91	100	115	120	137	150
Overall Thickness (mm)	71	84	91	104	111	122	131	146	151	168	181
U-Value (W/m^2K)	0.47	0.35	0.31	0.25	0.23	0.20	0.18	0.16	0.15	0.13	0.12
Weight (kg/m^2)	9.0	9.5	9.7	10.2	10.5	10.9	11.3	11.8	12.0	12.7	13.2

The QuadCore® insulation used in QuadCore® KS1000RW Roof Panels has a Thermal Conductivity (λ) of 0.018W/m.K

QuadCore® KS1000RW Roof Panels have a Thermal Transmittance (U-Value), calculated using the method required by the Building Regulations Part L2 (England & Wales), Building Standards Section 6 (Scotland), Part L (Republic of Ireland) and Part F2 (Northern Ireland).

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Appendix I- Development Information

TABLE 2. DEVELOPMENT DETAILS		Further notes	Response
Application details	Date of Application	Please provide the date the application was submitted to the Local Planning Authority.	
	Local Planning Authority	Please indicate the Local Planning Authority determining the application.	*Hillingdon*
	Confirmed carbon offset price (£/tonne of carbon dioxide)	Please confirm the agreed carbon offset price for the Local Planning Authority. If no value is entered then the GLA's recommend price of £95 per tonne of carbon dioxide will be used.	*95.00*
	Evidence of communication on the carbon offset price included in the energy assessment (Y/N).		*N*
	Residential units number (Part L1)		*N/A*
	Non-residential floor area in m^2 (Part L2)		*7170.00*
Heat risk	CIBSE TM59 undertaken for residential development (Y/N)		*N*
	CIBSE TM52 undertaken for non-residential development (Y/N)		*Y*
	All sample units meet CIBSE criteria with DSY1 weather file (Y/N)		*Y*
	DSY2 and DSY3 included in overheating assessments (Y/N)		*Y*
	Residential g-value		*N/A*

	% Glazing Ratio over façade		*N/A*
	External shading proposed (Y/N)		*N*
Energy efficiency measures	Target Fabric Energy Efficiency met (Y/N)		*Y*
	Mechanical Ventilation with Heat Recovery included (Y/N)		*Y*
	Waste Water Heat Recovery (Y/N)		*N*
	Low energy lighting (Y/N)		*Y*
District heating connection	Development in a Heat Network Priority Area (HNPA) (Y/N)		*N*
	District Heating Network connection (Y/N)		*N*
	Name of District Heating Network		*N/A*
	Carbon factor ($kgCO_2$/ kWh)		*N/A*
	Borough energy officer and Heat Network Operator contacted and evidence of correspondence included in the energy strategy (Y/N)	Applicable to all applications.	*Y*
Site heating distribution configuration	Development future proofed for DHN connection (Y/N)	Note that individual heating systems would not be appropriate for developments in HNPAs.	*Y*
	Drawings of communal system provided (Y/N)	Applicants should provide a drawings of the energy centre, on-site communal network with all building uses connected and future proofing arrangements detailed, including single point of connection.	*Y*

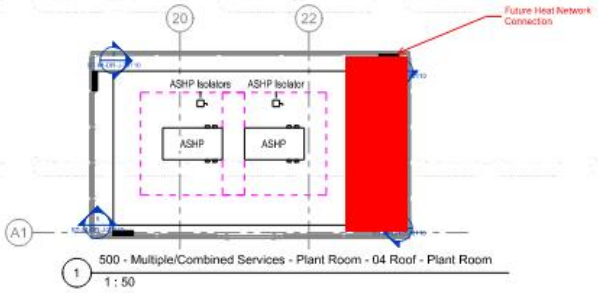
	Distribution type		*communal system (building level)*
	Flow temperature (°C)		*42.00*
	Return temperature (°C)		*35.00*
	Distribution losses modelled (%)	See table 4 below for details.	*10.00*
Heating system performance	Heat Pump (Y/N)		*Y*
	Heat Pump source		Air Source
	Centralised Heat Pump capacity (kWth)		*95.00*
	Heat Pump Seasonal Heating Efficiency (SCoP)		*3.50*
	Heat Pump SCoP calculation includes heat source and heat distribution temperature and seasonal performance factor (Y/N)	See table 5 below for details.	*Y*
	Fraction of heat supplied by heat pump (only for hybrid systems with boilers) (%)		*N/A*
	Low-emission on-site CHP enabling an area-wide heat network (Y/N)	Only low-emission CHP is suitable and only where it is facilitating an area-wide heat network. Therefore, new gas engine CHP is not suitable for any other purpose for new developments.	*N*
	CHP (kWe)		*N/A*
	Estimated end user cost (pence/kWh)		*4.75*

	Energy assessment includes consideration of occupant running costs (Y/N)	Applicants should consider the estimated costs to occupants of the energy assessment and outline how they are committed to protecting the consumer from high prices.	*Y*
Solar technologies	Solar PV included (Y/N)		*Y*
	Roof layout demonstrating solar PV technologies have been maximised included in energy strategy (Y/N)		*Y*
	kWh generated		*213969.00*
	kWp		*270.00*
	Total PV panel area (m^2) installed		*1490.00*
	Solar Thermal included (Y/N)		*N*
	Solar Thermal panel area (m^2) installed		*N/A*
Flexibility and peak energy demand	Site-wide peak demand, capacity and flexibility potential included in energy assessment (Y/N)	Table 9 in the energy assessment guidance to be completed.	*Y*
	Interventions for achieving flexibility included in energy assessment (Y/N)	Table 10 in the energy assessment guidance to be completed.	*Y*
	Estimated peak demand (MW)		*0.60*
	Electrical energy storage (kWh) capacity		*N/A*
	Heat energy storage (kWh) capacity		*N/A*
Other technologies	System type (e.g. wind turbine)		*N/A*
	Capacity (kW)		*N/A*

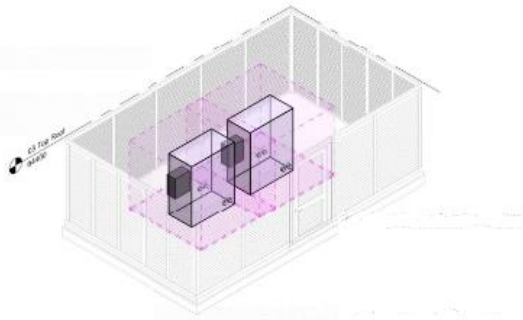
Cooling	Cooling proposed - Residential (Y/N)	It is not expected that 'active cooling' will be proposed for any residential developments. It will be expected that applicants can fully demonstrate that all passive design measures have been thoroughly investigated before considering 'active cooling'.	*N*
	Cooling proposed - Non-residential (Y/N)		*Y*
	Residential Cooling consumption (kWh p.a.)	See note in cell C60.	*N/A*
	Commercial Cooling consumption (MJ p.a.)		*574853*

TABLE 4. DISTRIBUTION LOSSES			
Primary network (buried pipe)	Total pipe length (m)		N/A
	Average heat loss rate (W/m)		N/A
Secondary network (buried pipe)	Total pipe length (m)		400
	Average heat loss rate (W/m)		2
Total losses (MWh/year)			7
Total heat supplied (MWh/year)			67
Distribution Loss Factor (DLF)			0.104477612
Calculation included in energy statement (yes/no)			No

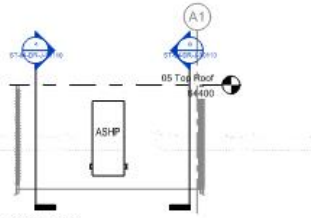
Appendix J- Heat Network Drawings



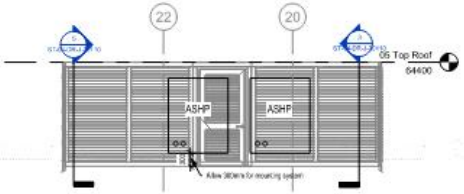
1 500 - Multiple/Combined Services - Plant Room - 04 Roof - Plant Room
1 : 50



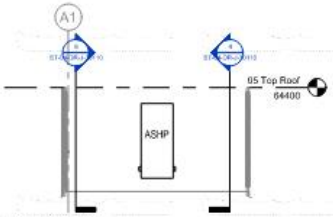
2 3D - Level 04 - ASHP Enclosure



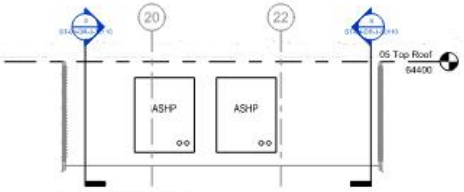
3 Section ASHP North
1 : 50



4 Section ASHP East
1 : 50



5 Section ASHP South
1 : 50



6 Section ASHP West
1 : 50

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