PADDINGTON GREEN
POLICE STATION

Be Seen Evidence

Be Seen Evidence–
November 2022 - GLA0711

NOVEMBER 2022

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BUROHAPPOLD ENGINEERING

Design Note: Be Seen

Project	Paddington Green Police Station
Subject	RIBA Stage 2 GLA 'Be Seen'
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P01	GLA 'Be Seen' Stage 2 - Issue for Comments	Christopher Razo/Kostas Doumanoglou	8 November 2022	Laura Plazas
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Contents

Tables

Figures

1 The purpose and the background

The Mayor of London has declared a climate emergency and has set an ambition for London to be net zero-carbon. This means all new buildings must target net zero carbon. The Mayor's London Plan sets the targets and policies required to achieve this. It includes:

- A net zero-carbon target for all major developments
- A requirement for all major development to 'be seen'. In particular, to monitor and report its energy performance post-construction to ensure that the actual carbon performance is aligned with the Mayor's net zero-carbon target.
- A requirement for all referable planning applications to calculate and reduce whole life-cycle carbon emissions to fully capture a development's carbon impact.

To address the energy performance gap between design and operation, London Plan Policy introduces a 'Be Seen' policy. It requires monitoring and reporting of the actual operational energy performance for at least five years after construction via the Mayor's 'Be Seen' monitoring portal. Figure 1—1 illustrates the 'Be Seen' process and its underpinning responsibilities of the planning applicants, developers, and/or building owners.

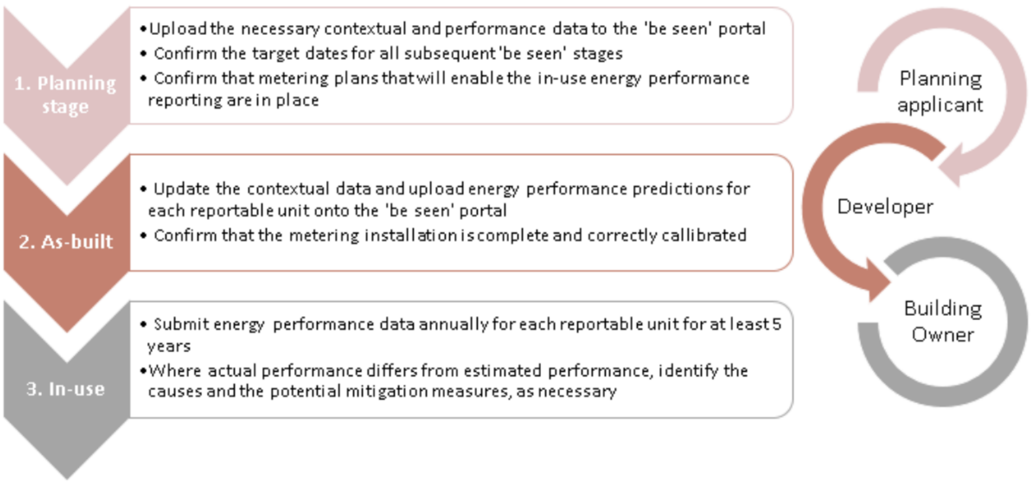

Figure 1—1. 'Be Seen' process and responsibilities.

This report aims to evaluate the operational energy use of the landlord and commercial spaces of the proposed Paddington Green Police Station development. It is a high-rise residential development, mixed with a retail and reception on the ground level and a 2-storey basement. The CIBSE TM54 :2022 'Evaluating operational energy use at the design stage' methodology has been used to predict the proposed building's energy use. This approach is recommended on the Be Seen guide to be undertaken to estimate the regulated and unregulated energy consumption and carbon emissions.

2 Methodology

2.1 Workflow

The methodology followed at this stage is based on TM54:2022, as illustrated in Figure 2—1. The annual energy consumption of the building is determined by both the design and operation of the building. The design elements are fixed and are as per the design of the building. The operational elements are dependent on how the building is used and particularly the hours the building is occupied, and the building services systems are on.

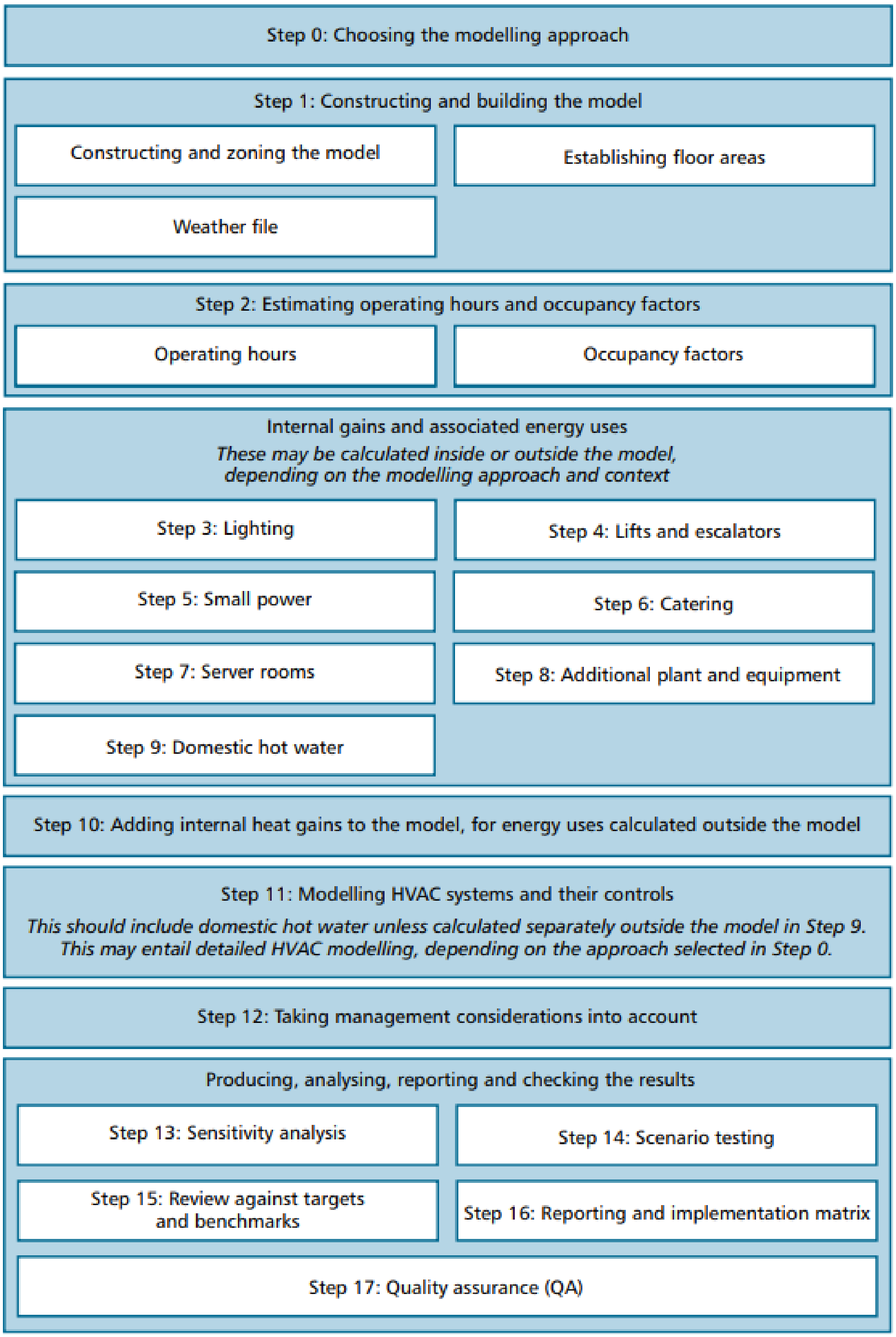

Figure 2—1 TM54 work flow

To understand the impact of how the building is operated on the annual energy consumption four scenarios have been analysed:

- Likely - the likely consumption based on anticipated occupancy and operation
- Low End - the low-end consumption if the occupancy is lower
- High End - the high-end consumption if the occupancy is higher and equipment and systems are used more than anticipated
- Worst case - the worst-case consumption if the occupancy is higher and the lighting, equipment and system are used more than anticipated

For the likely scenario, the anticipated occupancy, usage, and loads are established. Those are based on references such as MEP Basis of Design, NABERS for office occupancy profile and CIBSE Guide A.

2.2 Software

The software IESVE 2022 is found suitable for the project being modelled. It is fully accredited under CIBSE TM33. The modelling includes the building location, massing, envelope, thermal loads, system efficiencies, and other energy consuming systems. The analysis is run in Apache simulation module.

2.3 Geometry and the building fabric

The building geometry is based on the architectural drawing submitted to Buro Happold dated 12th of October 2022 with the ground floor amendments received on the 2nd of November included as well. The model includes the proposed building alongside its external shading elements and the surrounding context. The 3D render from IESVE can be seen in Figure 2—2.

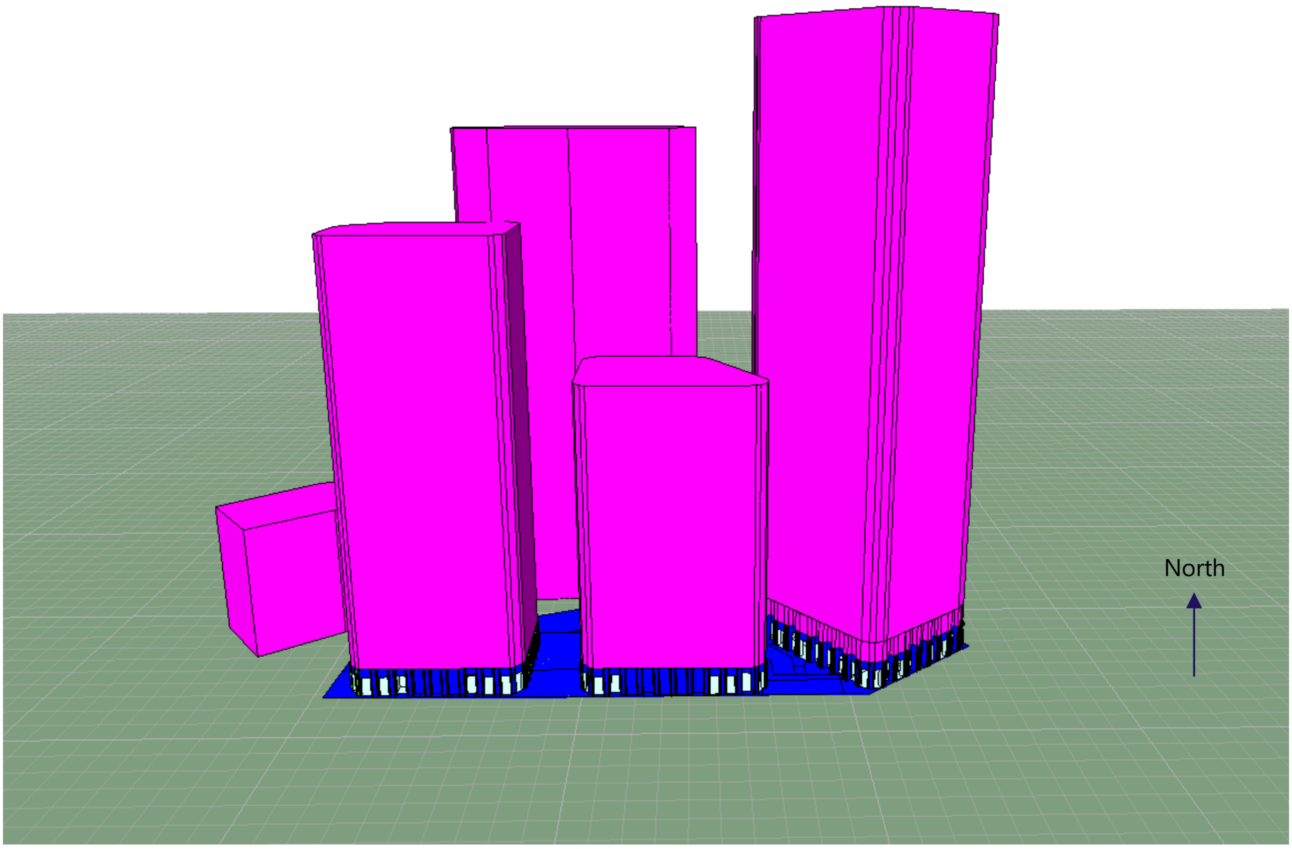

Figure 2—2 IES Model

The proposed building fabric, listed in Table 2—1, is the first opportunity for the building to reduce the energy demand and greenhouse emissions. Good air permeability of $3m^3/hr/m^2$ @ 50Pa is set for the airtightness to minimise energy loss and comply with Building Regulations.

Table 2—1 Building Fabric

Element	U-value (W/m^2K)
Floor	0.13
Roof	N/A
External Wall	0.13
Basement Wall	0.2
Glazing	1.2
Glazing g-value	0.3 entrances, 0.4 stores and circulation
Air Permeability	3 m^3/m^2hr

2.4 Establishing Floor Areas

Each room has been categorised into different spaces type:

- Circulation
- Management offices (one office for a single person and one for 3 people
- Amenity in Building K Level 1 (as Lounge)
- Flexible Commercial (assumed as Retail)
- Private Residential Entrance (Reception)
- Community space
- Storage
- Storage Bin
- Plantroom
- Car park
- Corridors within the residential blocks

2.5 Weather File

The simulation uses the Test Reference Year (TRY) of 2020 of London. It has been chosen to be ideal for energy modelling and represents the most average month. TRY weather files are used to do compliance analysis for UK Building Regulations.

2.6 Operating Hours and Occupancy

The occupancy density factors for each space are shown in table 2-2 for the likely scenario. The management office occupancy is based on NABERS while other spaces are based on assumptions representing a typical operation of the spaces The anticipated occupancy density and profiles for all the scenarios are presented in Appendix A.

Four different scenarios of occupancy and the intended operating profiles of lighting and equipment are summarised below. Operating profiles of lighting and equipment are assumed similar during the day for all scenarios while spaces with lighting and equipment 'On' for 24/7 such as Flexible Commercial and Reception have different load profiles at night.

Table 2—2. Occupancy density (likely scenario)

Spaces	Occupancy (m^2/people)
	Likely
Circulation	-
Amenity (Lounge) & Community space	6
Management Offices	1&3 people
Flexible Commercial (Retail)	5
Reception/Entrances	12
Storage/cupboard	-
Storage Bin	-
Plantroom	-
Car Park	-

2.7 Internal Heat Gains and Profiles

Internal gains are critical parameters in estimating the building operational energy. The small power and lighting density for the likely scenario are shown in tables 2-4 and 2-5 respectively. The densities and the profiles used for the other scenarios are shown in the Appendix A.

Table 2—3 Small power density

Spaces	Small power density(W/m2)	Diversity Factor
		Likely
Circulation	-	-
Amenity (Lounge)	10	0.5
Community space	10	0.5
Management Offices	20	1.0
Flexible Commercial (Retail)	5	1.0
Reception/Entrances	8	1.0
Storage/cupboard	5	1.0
Storage Bin	-	1.0
Plantroom	5	1.0
Car Park	6	1.0

Table 2—4 Lighting density

Spaces	Lighting density(W/m2)	Diversity Factor	Parasitic Power (W/m2)	Daylight Dimming
Circulation	6	0.8	0.1	No
Amenity (Lounge)	15	1.0	0.1	Yes
Community space	15	1.0	0.1	Yes
Management Offices	15	1.0	0.1	Yes
Flexible Commercial (Retail)	25	1.0	0.1	Yes
Reception/Entrances	6	1.0	0.1	Yes
Storage/cupboard	7	0.8	0.1	No
Storage Bin	7	0.8	0.1	No
Plantroom	6	0.8	0.1	No
Car Park	4	0.8	0.1	No
Residential corridors	6	1.0	0.1	No

2.8 Lifts

The proposed three blocks have dedicated lifts between the ground and cycle storages, and between the ground level and residential spaces. The table below shows the number of lifts per building block and their servicing floors. These lifts are assumed to be powered by electric motors.

Lift energy consumption is calculated based on the methodology presented in CIBSE TM54 (2022) Section 7.5. The inputs are based on the information provided by the Lift consultant, CIBSE TM54 and assumptions made on hours and days of operation and idle/standby time. All inputs from TM54 guide are based on Category 3 lift usage which is described in CIBSE Guide D, Table 13.5. See Appendix A for the input summary.

Table 2—5 Number of lifts and floor servicing

Lifts	Floor Servicing	Number of Units
Building I	Lower Ground (Cycle) - Ground	1
Building I	Lower Ground (Cycle) - Residential Floors	2
Building J	Lower Ground (Cycle) - Ground	1
Building J	Lower Ground (Cycle) - Residential Floors	2
Building K	Lower Ground (Cycle) - Ground	1

Building K	Lower Ground (Cycle) - Residential Floors	4

Based on TM54, the estimated number of trips per day for Category 3 is between 200 and 500. Hence, three hundred (300) trips per day is chosen to represent the likely scenario. The number of trips for the other scenarios are presented below.

Table 2—6 Lifts' trips per day for different scenarios

	Likely	Low	High	Worst
Number of trips per day	300	200	400	500

2.9 Domestic Hot Water

The energy consumption on Domestic hot water (DHW) was calculated using a spreadsheet. The number of people is determined based on the occupancy in m^2/person assigned in the IES model for occupied spaces except the two Management offices which are specified with 1 and 3 people.

In terms of water consumption, 4 L/person/day is assumed for the likely scenario for all spaces. Projected water consumptions for other scenarios are quantified below.

Table 2—7 Estimated domestic hot water consumptions for different scenarios

	Likely	Low	High	Worst
Water consumption, L/person/day	4	4	6	8

At this stage, central hot water system is not proposed therefore heat loss from storage are neglected. All other assumptions for DHW demand and consumption are presented in Appendix A.

2.10 Space Heating, Cooling and Ventilation

The calculation of energy consumption for space heating, cooling, and ventilation have been undertaken in IES using the internal heat gains, occupancy, and lighting and equipment operating profiles as mentioned above. The heating operates with set-point and setback at night for Circulation, Flexible Commercial, Amenity, community space, Management Office, and Reception. Cooling is "ON" with set-points during the day for the Flexible Commercial, Amenity, and Management Offices while Reception is being cooled whenever is required. See Appendix A for further details.

All occupied spaces are being ventilated through centralised mechanical ventilation systems with heat recovery. The ventilation controls strategy is based on CO_2 sensors and outdoor and indoor temperature difference. Supply air flowrates for each type of space are also defined with specific supply air temperature. The default NCM values for the pump and fan power density have been used for the auxiliary energy consumption. Further details about the input and profiles are presented in Appendix A.

2.11 Management Factor

Well operated and well-maintained systems are not often the case, thus resulting higher energy use. The low-end scenario envisages good management of the building or the ideal operation. For the likely scenario, an additional 5% factor is added to all energy consuming sectors to account for a realistic building management. High-end and worst-case scenarios are assumed to have bad management. Management factors are presented on the table below.

Table 2—8 Management Factors

	Likely	Low	High	Worst
Management Factor	1.05	1.0	1.1	1.2

3 Operational Energy Results

3.1 Range of Possible Energy Consumption

Figure 3-1 below shows the range of the overall annual energy consumption per square-meter for each scenario. Energy uses include lighting, small power, heating, cooling, auxiliary, lifts, and DHW. Lifts and DHW have been both calculated outside the dynamic thermal model.

Lighting and auxiliary energy are the biggest energy consumers for all scenarios, followed by the equipment, while DHW has the lowest energy consumption. Among the energy use for space conditioning, cooling has the highest consumption for all scenarios. Lifts are expected to have almost similar consumption for all the scenarios. The low-end scenario is expected to decrease the energy consumption by 12% while the high-end is projected to increase by 17%. The worst case is predicted to increase the energy consumption by almost half of the likely scenario.

Figures 3-2 to 3-8 illustrate the range of the energy consumption for each energy use category. The bottom line of each box represents the low-end scenario, followed by the likely and high-end scenario then the worst case on the top. The lighting and the auxiliary energy have the biggest range among all the energy use categories highlighting the consideration that should be taken into account during the design process for the design parameters that impact these energy use categories.

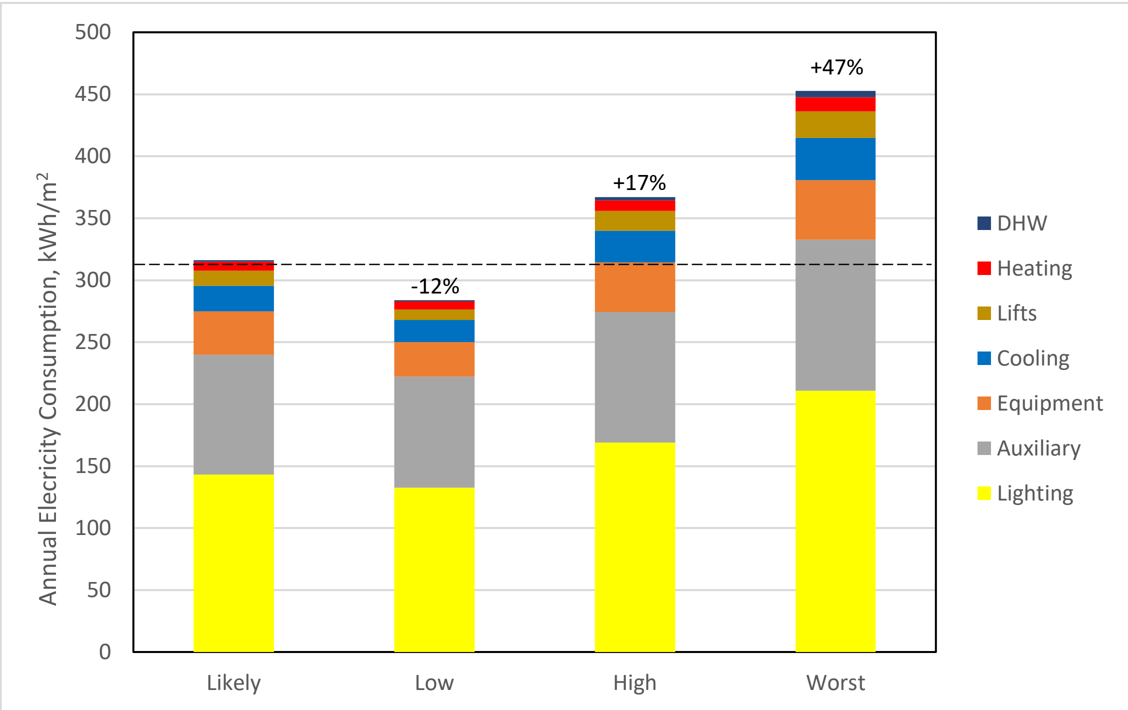

Figure 3—1 Overall energy consumption comparison between scenarios

Figure 3-2 illustrates the split between the landlord spaces and the flexible commercial units in terms of the energy use. As it can be seen, the commercial spaces account for the 80% of the total energy use as they have higher energy consumption from, lighting, small power, auxiliary energy and cooling.

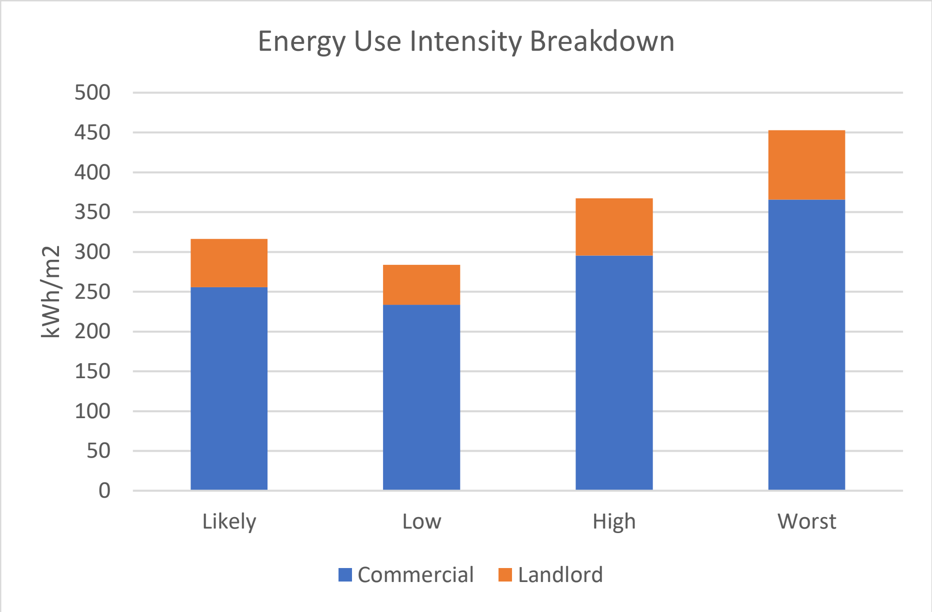

Figure 3—2 Energy use intensity breakdown

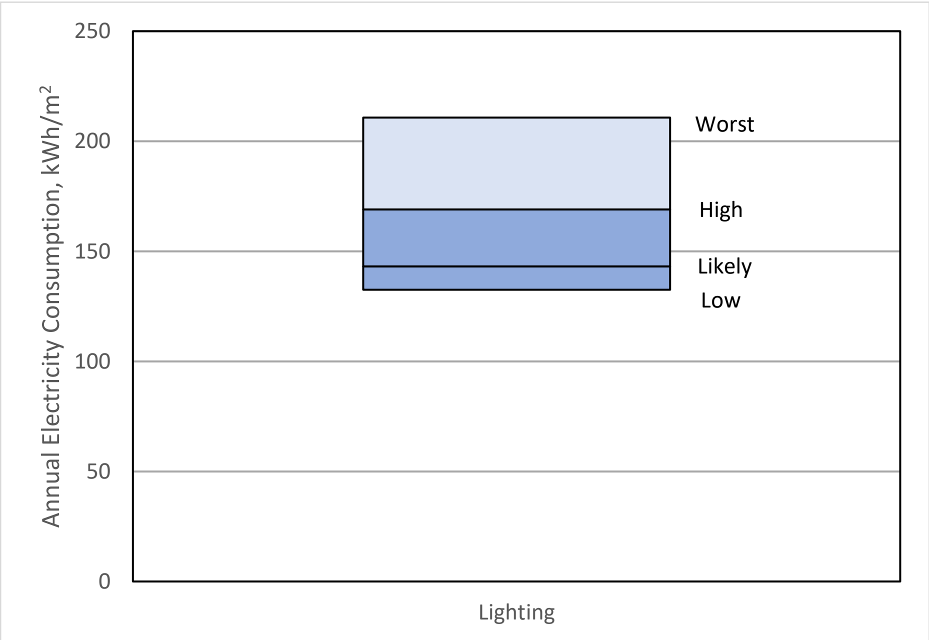

Figure 3—3 Lighting energy consumption comparison between scenarios

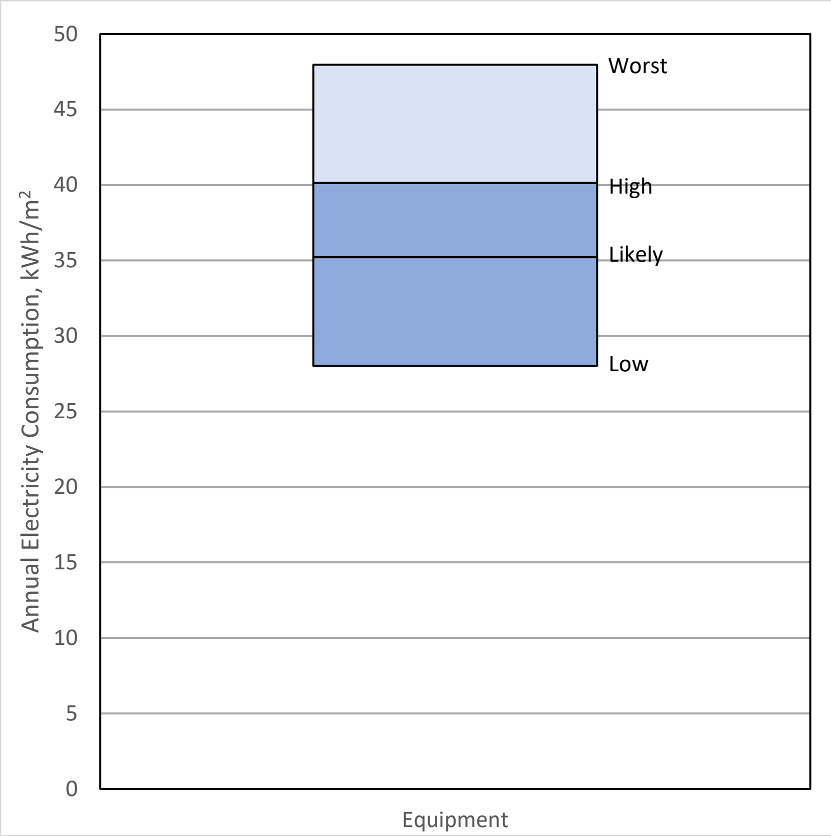

Figure 3—4 Small power energy consumption comparison between scenarios

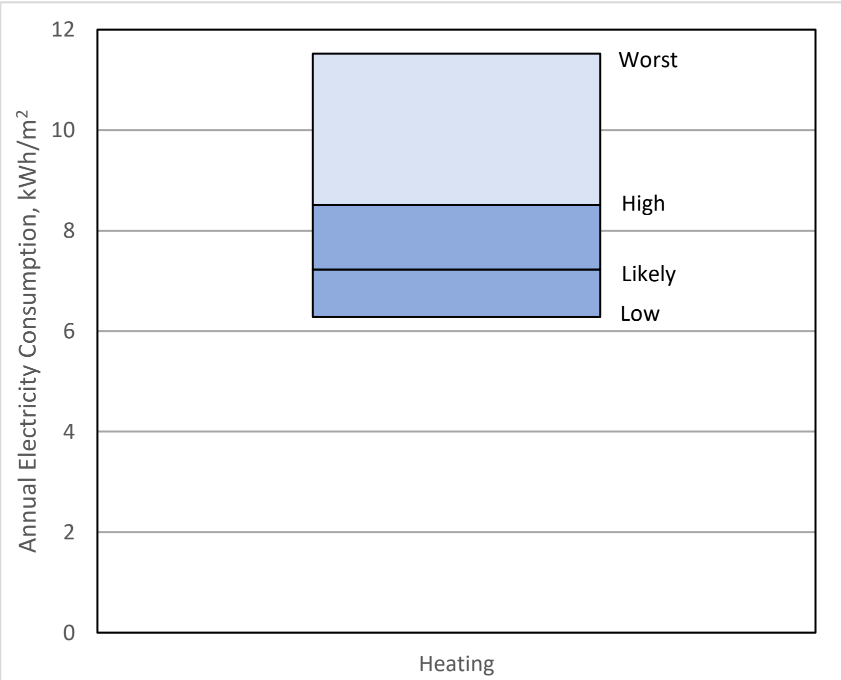

Figure 3—5 Space heating energy consumption comparison between scenarios

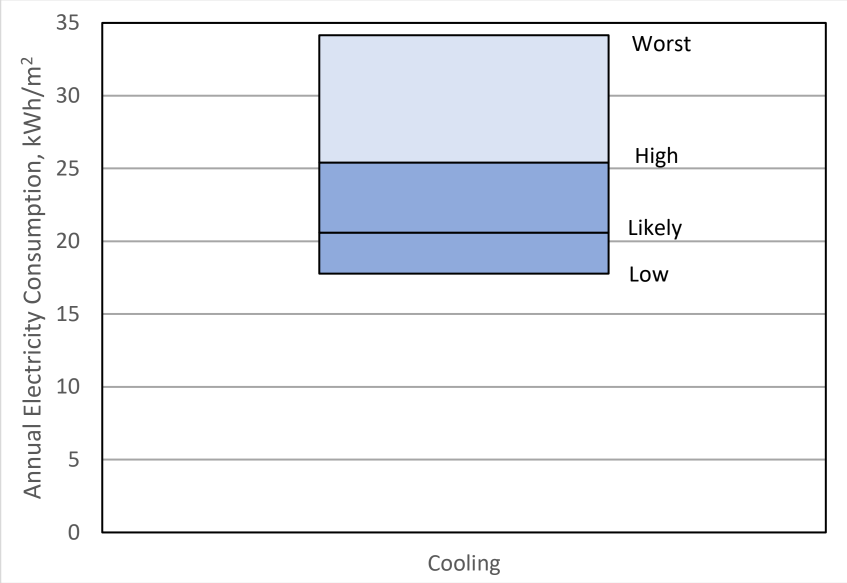

Figure 3—6 Cooling energy consumption comparison between scenarios

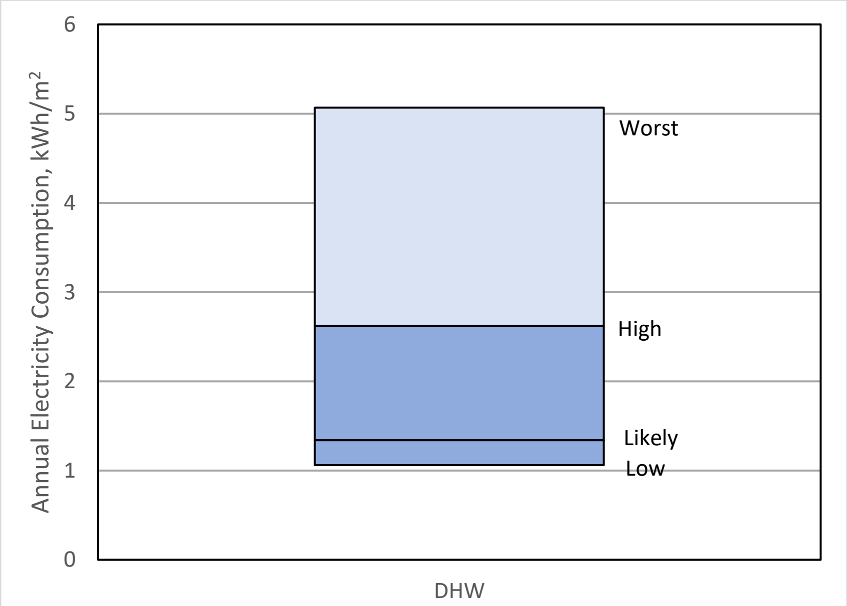

Figure 3—7 Domestic hot water energy consumption comparison between scenarios

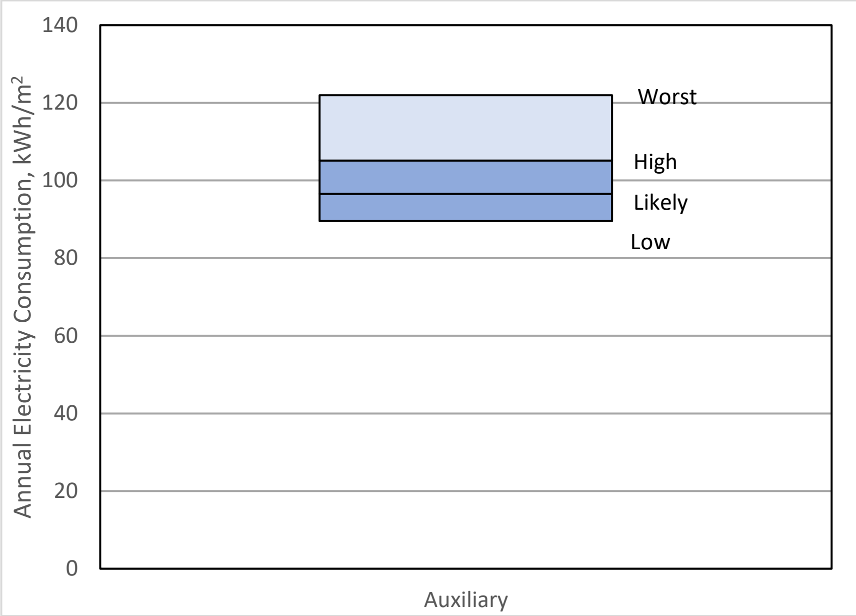

Figure 3—8 Auxiliary energy consumption comparison between scenarios

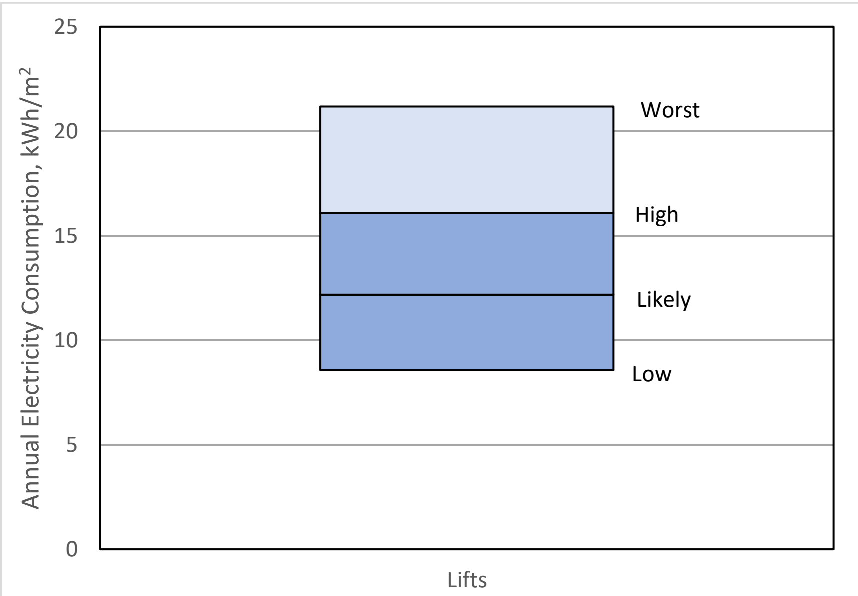

Figure 3—9 Lifts energy consumption comparison between scenarios

3.2 Comparison with Part L and benchmarks

This section provides information about the performance gap between the compliance model (Part L) and the operational model (TM54). It also discusses how the operational model compares against the CIBSE Guide F benchmarks. The electricity consumptions broken down into energy use for the compliance and operational models are presented in the figure below. The compliance model results are based on the BRUKL report while the operational are based on the likely scenario (Figure 3-10).

The predicted energy consumption from TM54 calculation is higher than the Part L calculation. This difference is mainly due to the higher energy consumed by the lighting and the pumps and fans alongside with the addition of some energy uses which are excluded in Part L such as equipment, lifts and the lighting from the corridors within the residential blocks. This is due to the different occupancy, ventilation rates, set-points, supply air-temperature and the operational profiles of the building.

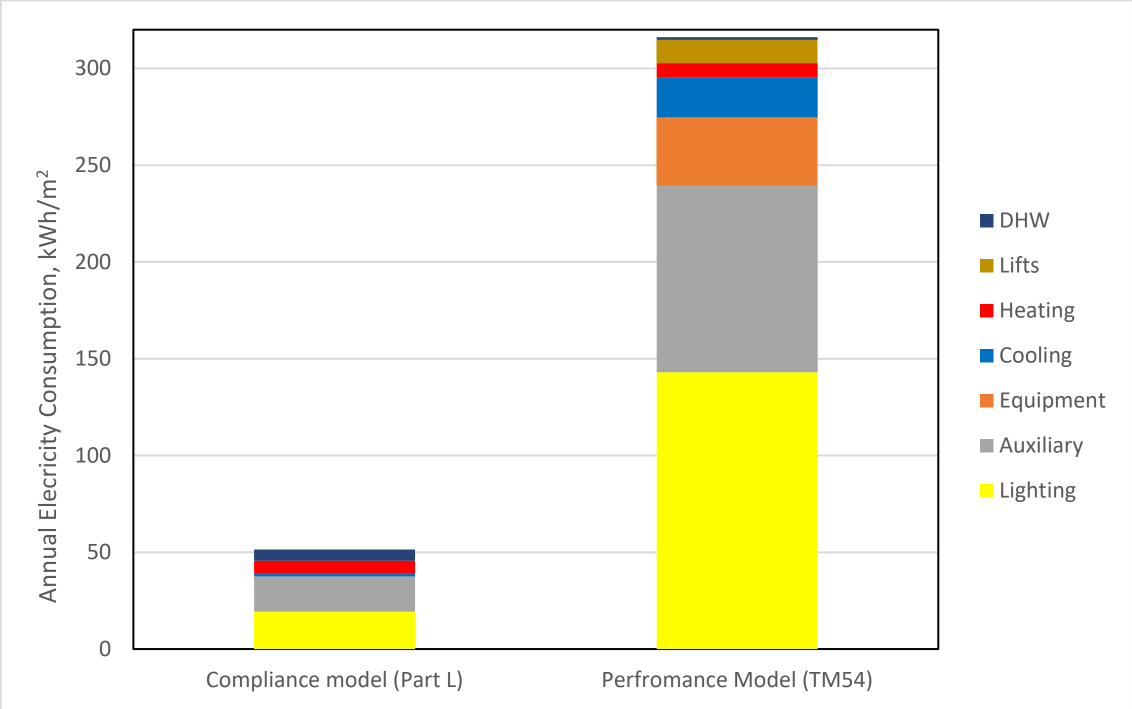

Figure 3—10 Comparison of Part L and TM54 annual energy consumptions

Nevertheless, as mentioned above the commercial spaces contribute to the 80% of the total energy use. Figure 3-11 shows the comparison between the Part L, operational model and some benchmarks for various retail units from CIBSE Guide F. The four scenarios of the TM54 model align with the benchmarks, i.e the likely scenario has a similar energy use of an all-electric department store (typical practice) and the low scenario has a similar energy use of an all-electric electrical goods retail (typical use). As expected, the Part L model has lower energy consumption for the reasons mentioned in the above paragraph. The CIBSE Guide F benchmark values can be found in the Appendix B.

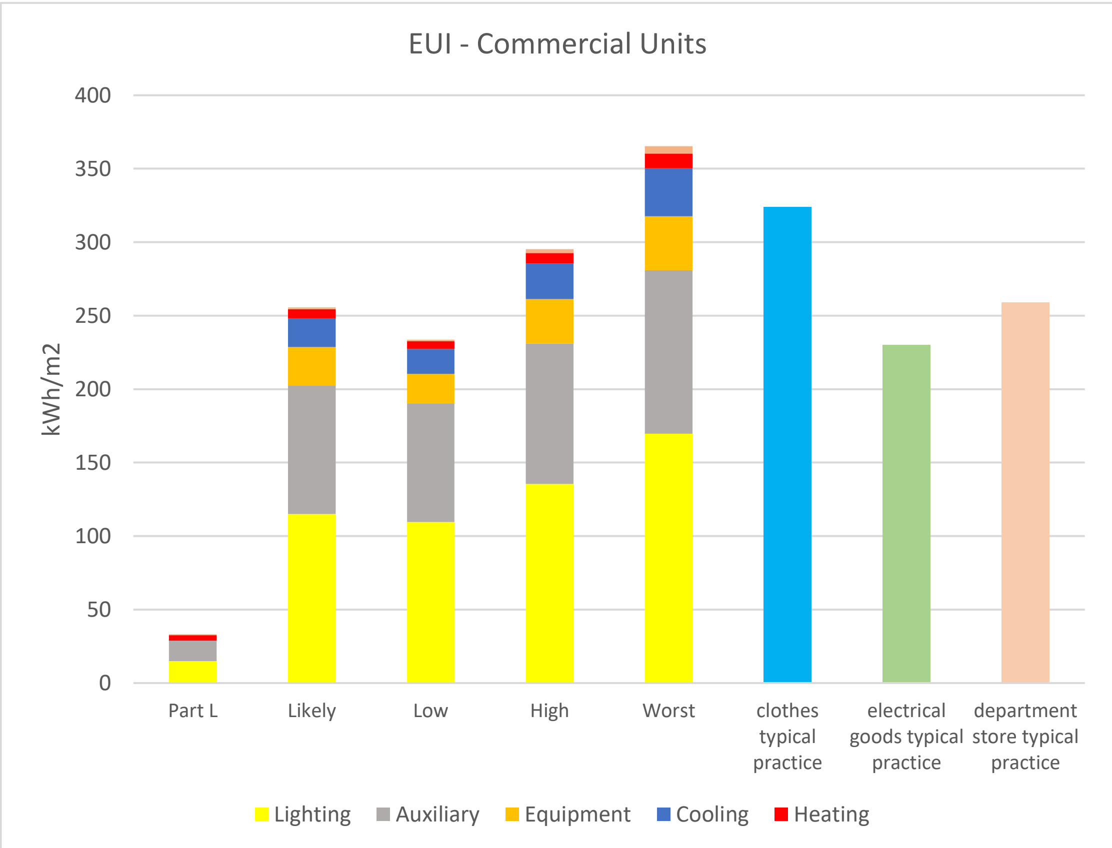

Figure 3—11 Comparison between Part L, operational model and CIBSE Guide F benchmarks

4 'Be Seen' Results

Table 4—1 summarises the Be Seen reporting requirement of the current phase of the project. It shows the predicted annual energy use from the 'Be Green' BRUKL report and TM54 calculation for the non-residential spaces. The GLA Spreadsheet form can be seen in Appendix C.

Table 4—1. 'Be Seen' summary

Performance Indicator Group			Part L 'Be Green'	TM54
Contextual Data	Address	4 Harrow Road, Westminster, London, W2 1XJ		
	Site Plan	Included in the planning documentation		
	Planning Use Class	Mix of Residential and Non-Residential		
	Anticipated target dates for each 'Be Seen'	Planning Stage	November 2022	
		As-built	TBC by planning consultant	
		In-use	TBC by planning consultant	
	GIA	m^2	2,598.1	11,830
Building Energy Use	Grid electricity	kWh/year	67,599.65	906,000
	Fuel	kWh/year	0	0
	Other fuels	kWh/year	0	0
	Energy generation	kWh/year	0	0
	District heating consumption	kWh/year	0	0
Carbon Emissions	Predicted annual carbon emissions	tCO_2/year	9.05	123.2
	Predicted carbon shortfall	tCO_2/year	110	
	Estimated carbon offset amount	£ /year	10,459	

5 Conclusions

The operational energy use of the commercial space of the proposed Paddington Green Police Station development was evaluated using the CIBSE TM54:2022 methodology. Loads from occupancy, lighting, small loads and equipment, occupancy and usage profiles, lifts, DHW, HVAC systems and usage profile, and management factors were among design factors considered in the energy estimation. Scenario testing was also conducted to provide valuable insight between the ideal operation and the worst case.

Among the energy end uses, lighting and pumps and fans have the highest energy consumption while DHW has the least. The worst case was expected to be more than half of the likely scenario whereas the low-end is 12% lower than the likely scenario.

The likely scenario was found higher when it was compared against the Part L model. The performance gap is not only due to the different occupancy, ventilation rates, set-points, supply air-temperature and the operational profiles of the building, but also due to the inclusion of energy uses that are excluded in the Part L such as car park, lifts, and the lighting in the corridors within the residential blocks.

However, comparing the four scenarios of the TM54 model against CIBSE Guide F benchmarks for three types of retail units, the likely and low scenarios have similar energy uses with the typical practice of two retail types which are all-electric. Therefore, considering the contribution of the commercial spaces (80%) and the landlord areas (20%) to the overall use, the total energy consumption from the non-residential spaces should be representative of a residential development which has similar commercial spaces in the ground floor.

Appendix A Inputs

Table 5—1 Operational profiles for the offices

		Management Office (based on NABERS)					
Time	**Occup_Wkdy**	**Occup_Wkend**	**Light_Wkdy**	**Light_Wkend**	**Eqpt_Wkdy**	**Eqpt_Wkend**
00-01	0%	0%	5%	5%	25%	25%
01-02	0%	0%	5%	5%	25%	25%
02-03	0%	0%	5%	5%	25%	25%
03-04	0%	0%	5%	5%	25%	25%
04-05	0%	0%	5%	5%	25%	25%
05-06	0%	0%	5%	5%	25%	25%
06-07	0%	0%	5%	5%	25%	25%
07-08	25%	5%	35%	15%	25%	25%
08-09	50%	15%	100%	15%	65%	25%
09-10	70%	15%	100%	15%	80%	25%
10-11	70%	15%	100%	15%	80%	25%
11-12	70%	15%	100%	15%	80%	25%
12-13	70%	15%	100%	15%	100%	25%
13-14	70%	15%	100%	15%	100%	25%
14-15	70%	15%	100%	15%	100%	25%
15-16	70%	15%	100%	15%	100%	25%
16-17	70%	15%	100%	15%	100%	25%
17-18	50%	15%	5%	5%	80%	25%
18-19	25%	5%	5%	5%	65%	25%
19-20	25%	0%	5%	5%	55%	25%
20-21	0%	0%	5%	5%	25%	25%
21-22	0%	0%	5%	5%	25%	25%
22-23	0%	0%	5%	5%	25%	25%
23-00	0%	0%	5%	5%	25%	25%

Table 5—2 Operational profiles for the retails

	Retail					
Time	**Occup_ Wkdy**	**Occup_ Wkend**	**Light_ (Likely)**	**Light_ (Low/high/Worst)**	**Eqpt_(Likely)**	**Eqpt_ (Low/High/Worst)**
00-01	0%	0%	15%	15/30/50%	50%	30/60/70%
01-02	0%	0%	15%	15/30/50%	50%	30/60/70%

02-03	0%	0%	15%	15/30/50%	50%	30/60/70%
03-04	0%	0%	15%	15/30/50%	50%	30/60/70%
04-05	0%	0%	15%	15/30/50%	50%	30/60/70%
05-06	0%	0%	15%	15/30/50%	50%	30/60/70%
06-07	0%	0%	15%	15/30/50%	50%	30/60/70%
07-08	20%	20%	100%	100%	50%	30/60/70%
08-09	20%	20%	100%	100%	50%	30/60/70%
09-10	40%	50%	100%	100%	60%	60%
10-11	50%	70%	100%	100%	60%	60%
11-12	50%	70%	100%	100%	70%	70%
12-13	50%	70%	100%	100%	70%	70%
13-14	50%	70%	100%	100%	70%	70%
14-15	40%	50%	100%	100%	70%	70%
15-16	70%	80%	100%	100%	70%	70%
16-17	70%	80%	100%	100%	70%	70%
17-18	80%	95%	100%	100%	70%	70%
18-19	80%	95%	100%	100%	60%	60%
19-20	70%	80%	100%	100%	50%	30/60/70%
20-21	60%	60%	100%	100%	50%	30/60/70%
21-22	0%	0%	15%	15/30/50%	50%	30/60/70%
22-23	0%	0%	15%	15/30/50%	50%	30/60/70%
23-00	0%	0%	15%	15/30/50%	50%	30/60/70%

Table 5—3 Operational profiles for the lounge (amenity) and community space

	Lounge			
Time	**Occup_Wkdy**	**Occup_Wkend**	**Light_**	**Eqpt_**
00-01	0%	0%	0%	0%
01-02	0%	0%	0%	0%
02-03	0%	0%	0%	0%
03-04	0%	0%	0%	0%
04-05	0%	0%	0%	0%
05-06	0%	0%	0%	0%
06-07	50%	50%	100%	50%
07-08	75%	75%	100%	75%
08-09	100%	100%	100%	100%
09-10	100%	100%	100%	100%

10-11	100%	100%	100%	100%
11-12	50%	50%	100%	50%
12-13	50%	50%	100%	50%
13-14	50%	50%	100%	50%
14-15	50%	50%	100%	50%
15-16	50%	50%	100%	50%
16-17	50%	50%	100%	50%
17-18	50%	50%	100%	50%
18-19	100%	100%	100%	100%
19-20	100%	100%	100%	100%
20-21	100%	100%	100%	100%
21-22	50%	50%	100%	50%
22-23	50%	50%	100%	50%
23-00	0%	0%	0%	0%

Table 5—4 Operational profiles for the car park

	Carpark	
Time	**Light/Eqpt_Wkdy**	**Light/Eqpt_ Wknd**
00-01	10%	10%
01-02	10%	10%
02-03	10%	10%
03-04	10%	10%
04-05	10%	10%
05-06	100%	50%
06-07	100%	50%
07-08	100%	50%
08-09	100%	50%
09-10	100%	50%
10-11	50%	50%
11-12	50%	50%
12-13	50%	50%
13-14	50%	50%
14-15	50%	50%
15-16	100%	50%
16-17	100%	50%

17-18	100%	50%
18-19	100%	50%
19-20	100%	50%
20-21	100%	50%
21-22	100%	50%
22-23	100%	50%
23-00	10%	10%

Table 5—5 Operational profiles for the reception areas

	Reception				
Time	**Occup_**	**Light_ (Likely)**	**Light_ (Low/High/Worst)**	**Eqpt_ (Likely)**	**Eqpt_ (Low/High/Worst)**
00-01	10%	35%	35/50/70%	25%	10/40/50%
01-02	10%	35%	35/50/70%	25%	10/40/50%
02-03	10%	35%	35/50/70%	25%	10/40/50%
03-04	10%	35%	35/50/70%	25%	10/40/50%
04-05	10%	35%	35/50/70%	25%	10/40/50%
05-06	10%	35%	35/50/70%	25%	10/40/50%
06-07	35%	100%	100%	100%	100%
07-08	35%	100%	100%	100%	100%
08-09	35%	100%	100%	100%	100%
09-10	35%	100%	100%	100%	100%
10-11	35%	100%	100%	100%	100%
11-12	35%	100%	100%	100%	100%
12-13	35%	100%	100%	100%	100%
13-14	35%	100%	100%	100%	100%
14-15	35%	100%	100%	100%	100%
15-16	35%	100%	100%	100%	100%
16-17	35%	100%	100%	100%	100%
17-18	35%	100%	100%	100%	100%
18-19	35%	100%	100%	100%	100%
19-20	35%	100%	100%	100%	100%
20-21	35%	100%	100%	100%	100%
21-22	35%	100%	100%	100%	100%
22-23	10%	35%	35/50/70%	25%	10/40/50%
23-00	10%	35%	35/50/70%	25%	10/40/50%

Table 5—6 Occupancy density and heat gains

Spaces	Occupancy density (m^2/person)				Occupancy Heat Gain		
	Likely	Low	High	Worst	Sensible Heat Gain (W/m^2)	Latent Heat Gain (W/m^2)	Diversity
Circulation	-	-	-	-	-	-	
Amenity (Lounge) & Community space	6	7	5	4	90	60	1
Management Offices	1&3 people	1&3 people	1&3 people	1&3 people	90	60	1
Flexible Commercial (Retail)	5	6	4	3	90	60	1
Reception/Entrances	12	14	10	8	85	55	1
Storage/cupboard	-	-	-	-	-	-	-
Storage Bin	-	-	-	-	-	-	-
Plantroom	-	-	-	-	-	-	-
Car Park	-	-	-	-	-	-	-

Table 5—7 Lighting power density and controls

Spaces	Lighting				
	Lighting Power density (W/m^2)	Lighting diversity factor	Parasitic Power (W/m^2)	Daylight dimming	Dimming profiles
Circulation	6	0.8	0.1	No	-
Amenity (Lounge) & Community space	15	1.0	0.1	Yes	Occupancy
Management Office	15	1.0	0.1	Yes	Occupancy
Flexible Commercial (Retail)	25	1.0	0.1	Yes	Occupancy
Reception/Entrances	6	1.0	0.1	Yes	Occupancy

Storage/cupboard	7	0.8	0.1	No	-
Storage Bin	7	0.8	0.1	No	-
Plantroom	6	0.8	0.1	No	-
Car Park	4	0.8	0.1	No	-
Residential corridors	6	1.0	0.1	No	

Table 5—8 Small power density

Spaces	Small power load (W/m²)	Diversity			
		Likely	Low	High	Worst
Circulation	-	-	-	-	-
Amenity (Lounge) & Community space	10	0.5	0.3	0.7	0.9
Management Office	20	1	1	1	1
Flexible Commercial (Retail)	5	1	1	1	1
Reception/Entrances	8	1	1	1	1
Storage/cupboard	5	1	1	1	1
Storage Bin		1	1	1	1
Plantroom	5	1	1	1	1
Car Park	6	1	1	1	1

Table 5—9 Lift inputs and calculations for the likely scenario

	Lifts Servicing 2 stops - For Cycle Store			Lifts Servicing >3 stops - For Residential			Source
	Building I	Building J	Building K	Building I	Building J	Building K	
Number of trips per day	300	300	300	300	300	300	(Table 6, TM54 2022)
Estimated running energy consumption for 2 trips (W·h)	280	280	290	370	340	420	TUV: for Cycle Lifts, Assuming 2 bikes & 2 passengers per trip.
Average distance travel ratio	0.49	0.49	0.49	0.49	0.49	0.49	(Table 8, TM54 2022)

Average carload factor	0.93	0.93	0.95	0.93	0.93	0.93	(Table 9, TM54 2022)
Standby/Idle (hours/day)	10	10	10	5	5	5	Assumption
Standing time ratio (Table 10, TM54 2022)	0.64	0.64	0.64	0.64	0.64	0.64	TM54
Idle time ratio (Table 10, TM54 2022)	0.36	0.36	0.36	0.36	0.36	0.36	TM54
Standing Power (W)	717	717	717	724	722	724	TUV
Idle Power (W)	1690	1690	1690	1690	1690	1690	TUV
Standby and idle consumption (W)	14,942	14,942	14,942	5,359	5,352	5,359	Calculation
Running consumption (W)	19,139	19,139	20,249	25,291	23,241	28,709	Calculation
Number of lifts	1	1	1	2	2	4	Proposed plan
Daily energy consumption (Wh/day)	34,081	34,081	35,191	61,300	57,186	136,272	Calculation
Days in a year lift's operated	365	365	365	365	365	365	Assumption
Annual energy consumption per year (MWh/year)	**12.44**	**12.44**	**12.84**	**22.37**	**20.87**	**49.74**	Calculation

Table 5—10 Domestic hot water inputs

Hot water supply temperature (°C)	60
Cold water supply temperature (°C)	10
No. of occupied days per annum	252
Proportion of employees in the building per day	0.8
Density of water (kg/litre at 10°C)	0.99977
Specific heat capacity of water (kJ/kg.K)	4.187
Daily hot water consumption (CIBSE Guide G - Tot average)	4
General use outlet temperature (°C)	43
Generator seasonal efficiency (gross)	3.00
Generator fuel type	Electricity

Table 5—11 Heating systems and set-points

Space	Heating				
	Heating	**Set point (°C)**	**Setback (°C)**	**Profile**	**Heating Capacity (W/m^2)**
Circulation	Rads	20	15		
Amenity (Lounge) & Community space	FCUs	22	15	Occupancy	70
Management Office	FCUs	22	15	Occupancy	70
Flexible Commercial (Retail)	FCUs	19-21	15	Occupancy	70
Reception/Entrances	Rads	20	18	Occupancy	70
Storage/cupboard	Rads	19	-		
Storage Bin	None	-	-		
Plantroom	None	-	-		
Car Park	None	-	-		

Table 5—12 Heating set-point profile

	Heating Profile, °C				
Time	Circulation/Retail	Amenity/Community space	Office	Reception	Storage
00-01	15	15	15	18	19
01-02	15	15	15	18	19
02-03	15	15	15	18	19
03-04	15	15	15	18	19
04-05	15	15	15	18	19
05-06	15	15	15	18	19
06-07	15	22	15	20	19
07-08	20	22	22	20	19
08-09	20	22	22	20	19
09-10	20	22	22	20	19
10-11	20	22	22	20	19
11-12	20	22	22	20	19
12-13	20	22	22	20	19
13-14	20	22	22	20	19
14-15	20	22	22	20	19
15-16	20	22	22	20	19
16-17	20	22	22	20	19

17-18	20	22	22	20	19
18-19	20	22	22	20	19
19-20	20	22	22	20	19
20-21	20	22	15	20	19
21-22	15	22	15	20	19
22-23	15	22	15	20	19
23-00	15	15	15	18	19

Table 5—13 Cooling systems and set-points

	Cooling			
Space	**Cooling**	**Set-point (°C)**	**Setback (°C)**	**Cooling Capacity (W/m²)**
Circulation	None	-	-	-
Amenity (Lounge) & Community space	FCUs	23	-	90
Management Office	FCUs	24	-	90
Flexible Commercial (Retail)	FCUs	21-25	-	90
Reception/Entrances	FCUs	24	-	90
Storage/cupboard	None	-	-	-
Storage Bin	None	-	-	-
Plantroom	None	-	-	-
Car Park	None	-	-	-

Table 5—14 Cooling operation

	Cooling Profile, oC				
Time	Retail	Amenity/Community space	Office_Wkdy	Office_Wknd	Reception
00-01	OFF	OFF	OFF	OFF	OFF
01-02	OFF	OFF	OFF	OFF	OFF
02-03	OFF	OFF	OFF	OFF	OFF
03-04	OFF	OFF	OFF	OFF	OFF
04-05	OFF	OFF	OFF	OFF	OFF
05-06	OFF	OFF	OFF	OFF	OFF
06-07	OFF	ON	OFF	OFF	ON
07-08	ON	ON	ON	ON	ON
08-09	ON	ON	ON	ON	ON

09-10	ON	ON	ON	ON	ON
10-11	ON	ON	ON	ON	ON
11-12	ON	ON	ON	ON	ON
12-13	ON	ON	ON	ON	ON
13-14	ON	ON	ON	ON	ON
14-15	ON	ON	ON	ON	ON
15-16	ON	ON	ON	ON	ON
16-17	ON	ON	ON	ON	ON
17-18	ON	ON	ON	ON	ON
18-19	ON	ON	ON	ON	ON
19-20	ON	ON	ON	OFF	ON
20-21	ON	ON	OFF	OFF	ON
21-22	OFF	ON	OFF	OFF	ON
22-23	OFF	OFF	OFF	OFF	OFF
23-00	OFF	OFF	OFF	OFF	OFF

Table 5—15 Ventilation systems

Space	Ventilation					
	Strategy	**Supply & Extract rate**	**Units**	**Supply Temperature °C (Winter/ Summer)**	**SFP (W/l/s)**	**Heat Recovery (%)**
Circulation	Nat Vent (infiltration)	none	N/A		N/A	N/A
Amenity (Lounge) & Community space	Central Mech with heat recovery	10	L/s/p	21/22	1.4	85
Management Office	Central Mech with heat recovery	12	L/s/p	20/22	1.4	85
Flexible Commercial (Retail)	Central Mech with heat recovery	10	L/s/p	20/22	1.4	85
Reception /Entrances	Central Mech with heat recovery	10	L/s/p	22/22	1.4	85
Storage/cupboard	Extract only	N/A	ach		0.4	N/A
Storage Bin	Supply and Extract	6	ach	External air	1.1	N/A
Plantroom	Supply and Extract	3	ach	External air	1.1	N/A
Car Park	Supply and Extract	6	ach	External air	0.5	N/A

Table 5—16 Ventilation operational profile

	Ventilation				
Time	Retail	Amenity/Community space	Office_Wkdy	Office_Wknd	Reception
00-01	OFF	OFF	OFF	OFF	ON
01-02	OFF	OFF	OFF	OFF	ON
02-03	OFF	OFF	OFF	OFF	ON
03-04	OFF	OFF	OFF	OFF	ON
04-05	OFF	OFF	OFF	OFF	ON
05-06	OFF	OFF	OFF	OFF	ON
06-07	OFF	ON	OFF	OFF	ON
07-08	ON	ON	ON	ON	ON
08-09	ON	ON	ON	ON	ON
09-10	ON	ON	ON	ON	ON
10-11	ON	ON	ON	ON	ON
11-12	ON	ON	ON	ON	ON
12-13	ON	ON	ON	ON	ON
13-14	ON	ON	ON	ON	ON
14-15	ON	ON	ON	ON	ON
15-16	ON	ON	ON	ON	ON
16-17	ON	ON	ON	ON	ON
17-18	ON	ON	ON	ON	ON
18-19	ON	ON	ON	ON	ON
19-20	ON	ON	ON	OFF	ON
20-21	ON	ON	OFF	OFF	ON
21-22	OFF	ON	OFF	OFF	ON
22-23	OFF	ON	OFF	OFF	ON
23-00	OFF	OFF	OFF	OFF	ON

Table 5—17 Pump/Fan power density

System	Pump/Fan Power Density (W/m2)	Fan fraction (%)
FCU	13.57	50
Rads	1.0	0
Rads + extract only	1.0	50

Appendix B GIBSE Guide F Benchmarks

Table 20.1 Fossil and electric building benchmarks — *continued*

Building type	Energy consumption benchmarks for existing buildings / (kW·h·m^{-2}) per year (unless stated otherwise)				Basis of benchmark
	Good practice		Typical practice		
	Fossil fuels	Electricity	Fossil fuels	Electricity	
Public buildings (continued):					
— courts (County)[13][g]	125	52	190	60	Treated floor area
— courts (Crown)[13][g]	139	68	182	74	Treated floor area
— courts (combined County/Crown)[13][g]	111	57	159	71	Treated floor area
— fire stations[11]	385	55	540	80	Treated floor area
— libraries[8]	113	32	210	46	Agent's lettable area
— museums and art galleries[8]	96	57	142	70	Gross internal area
— police stations[11]	295	45	410	60	Treated floor area
— prisons[14]	18861	3736	22034	4460	kW·h per prisoner[h]
— prisons (high security)[14]	18861	7071	22034	7509	kW·h per prisoner[h]
Residential and nursing homes[15]	247	44	417	79	Gross floor area
Retail[16]:					
— banks and building societies	63	71	98	101	Gross floor area
— banks and building societies (all electric)	—	122	—	195	Gross floor area
— book stores (all electric)	—	210	—	255	Sales floor area
— catalogue stores	37	83	69	101	Sales floor area
— catalogue stores (all electric)	—	100	—	133	Sales floor area
— clothes shops	65	234	108	287	Sales floor area
— clothes shops (all electric)	—	270	—	324	Sales floor area
— department stores	194	237	248	294	Sales floor area
— department stores (all electric)	—	209	—	259	Sales floor area
— distribution warehouses	103	53	169	67	Sales floor area
— distribution warehouses (all electric)	—	55	—	101	Sales floor area
— DIY stores	149	127	192	160	Sales floor area
— electrical goods rental	—	281	—	368	Sales floor area
— electrical goods retail	—	172	—	230	Sales floor area
— frozen food centres	—	858	—	1029	Sales floor area
— high street agencies	150	55	230	75	Sales floor area
— high street agencies (all electric)	—	90	—	160	Sales floor area
— meat butchers (all electric)	—	475	—	577	Sales floor area
— off licences (all electric)	—	475	—	562	Sales floor area
— supermarket (all electric)	—	1034	—	1155	Sales floor area
— post offices	140	45	210	70	Sales floor area
— post office (all electric)	—	80	—	140	Sales floor area
— shoe shops (all electric)	—	197	—	279	Sales floor area
— small food shops	80	400	100	500	Sales floor area
— small food shops (all electric)	—	440	—	550	Sales floor area
— supermarket	200	915	261	1026	Sales floor area

Appendix C GLA Be Seen Spreadsheet

MAYOR OF LONDON

N	NEV	N	N	NEVER	NEVER	NEVER	NEVER	NEV	N	NEV

Gap Cat Detail

- 2 Units Note Building / RU Data Reqd?

OVERALL PROGRESS 87%

CURRENT REPORTING STAGE ---------------------------------->>	Planning	*

CONTEXTUAL DATA

Progress: 79%

+ ORGANISATION & CONTACT DETAILS

ORGANISATION DETAILS			
Organisation Name		Berkeley Homes (Central London) Ltd	*
Organisation Address		380 Queenstown Road, London, SW11 8PE	*

CONTACT DETAILS			
Contact Name		Clara-Rose Wright	*
Email		clara.wright@berkeleygroup.co.uk	*
Additional Email(s)			
Telephone No.		07976 428296	*
Mobile No.			

+ DEVELOPMENT INFORMATION

OVERALL DEVELOPMENT DETAILS			
Planning Reference Number	*Must complete ->*		*
Name of Whole Development		Paddington Green Police Station	*

DEVELOPMENT LOCATION			
Development Address			
Address Line 1		2-4 Harrow Road	*
Address Line 2		Westminster	
Address Line 3		London	
Address Line 4			
Post Town		W2 1XJ	*
Postcode		W2 1XJ	*
Ordnance Survey Reference			
Development UPRN (if available)	*Please add if available ->*		
Geo-Location Coordinates			
Latitude (to 6 decimal places)	*Please add if available ->*		
Longitude (to 6 decimal places, +ve or -ve)	*Please add if available ->*		

DEVELOPMENT TOTAL AREA BREAKDOWN			
Residential			
Total Residential Floor Area	GIA m2	59,068	*
Dwelling Counts			
Flats	number	556	*
House	number	0	*
Non-Residential			
Non-Residential Floor Area Breakdown		*Please include complete non-resi details below*	
Landlord Circulation (in Residential Blocks)	GIA m2	5,494	*
General office (A2, B1, B8, D1 planning classes)	GIA m2		*
High street agency (A2 planning classes)	GIA m2		*
General retail (A1, SG planning classes)	GIA m2	1,079	*
Overall Development Summary			
Total Development Floor Area			
Residential	GIA m2	59,068	
Non-Residential	GIA m2	6,706	
Total	GIA m2	65,774	
Total Non-Residential Uses		Landlord Circulation; General retail; General accommodation	

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	1,464,303	*
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		*
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	163	*
Non-Residential Elements of the development (Part L Calculation)			
Predicted Annual Energy Use		*Fill in all applicable fuels below*	
Annual Electricity Use	kWh/yr	61,057	*
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	9	*
Non-Residential Elements of the development (TM54 Calculation)			
Predicted Annual Energy Use		*Fill in all applicable fuels below*	
Annual Electricity Use	kWh/yr	906,000	*
Annual Gas Use	kWh/yr	0	*
Annual Oil Use (if applicable)	kWh/yr		*
Annual Biomass Use (if applicable)	kWh/yr		*
Annual District Htg Use (if applicable)	kWh/yr		*
Annual District Clg Use (if applicable)	kWh/yr		*
Elec Generation, Gross (if applicable)	kWh/yr		*
Solar Thermal Generation (if applicable)	kWh/yr		*
Predicted Annual Carbon Emissions	tCO2/yr	122	*

CARBON OFFSETTING

Predicted Carbon Shortfall (aligned with planning energy st	tCO2	173	*
Total Committed Carbon Offset	£	492,010	*

END