

One North Parade

Manchester

CIBSE TM54 Operational Energy Forecast

Date: 21/03/2025

Ref: 3369-CWC-XX-RP-N-7007



Revision Record



Date	Reference	Revision	Prepared	Checked	Authorised
21/03/2025	3292-CWC-XX- RP-N-7007	00	Mohammad Elsarraj	Obaid Rahman	John Barnett

Executive Summary



Based on 'CIBSE TM54: Evaluating Operational Energy Performance of Buildings at Design Stage' ("CIBSE TM54"), this report estimates the operational energy and the potential NABERS energy rating of the One North Parade, Manchester.

Were a NABERS **whole building** assessment to produce the same Energy Use Intensity ("EUI") as the CIBSE TM54 result, this would achieve a **5.5*** **whole building rating** for the baseline model. This result is **31% below** the threshold for a **5.5* rating** and **3.2%** above a **6.0* rating**. Therefore, a 5.5* rating should be targeted.

This is based on the total received NIA of **7,205m²**.

Detailed results of the analysis are given in the "Results" section.

The EUI may be reduced further through the integration of more efficient lighting and the inclusion of photovoltaic panels.

While simulations provide a prediction of potential performance, they involve approximations and cannot fully capture real-world factors such as construction quality, tenant behaviour, operational maintenance, and weather. Consequently, these simulation results are **estimates** only.

The inputs used in the assessments are detailed in the 'Model Inputs' section of this report. Should the final specifications deviate from these inputs, the analysis would need to be updated in-line with the changes.



A range of occupancy levels



A range of operating hours
for systems, lighting &
equipment



Specified internal and
external lighting design

Introduction

CIBSE TM54: Evaluating Operational Energy Use of Buildings at Design Stage

The prediction of operational energy consumption assessment uses 'CIBSE TM54: Evaluating Operational Energy Performance of Buildings at Design Stage'. This method differs from traditional compliance modelling by configuring the dynamic model on the intended occupancy, consumption and operation of a building.

This approach, despite being more aligned with the proposed building, still results in a "performance gap" although this is significantly less than that produced through traditional compliance modelling.

Energy from the retail units will be isolated and excluded from the rating.



Occupancy

A range of occupancy will be included in the scenarios, including the number of people, and the hours the building will be occupied



Operating hours for systems

A range of operating hour, some areas will be connected to the occupancy



Internal gains

Including; internal and external lighting, equipment, including plug-in equipment

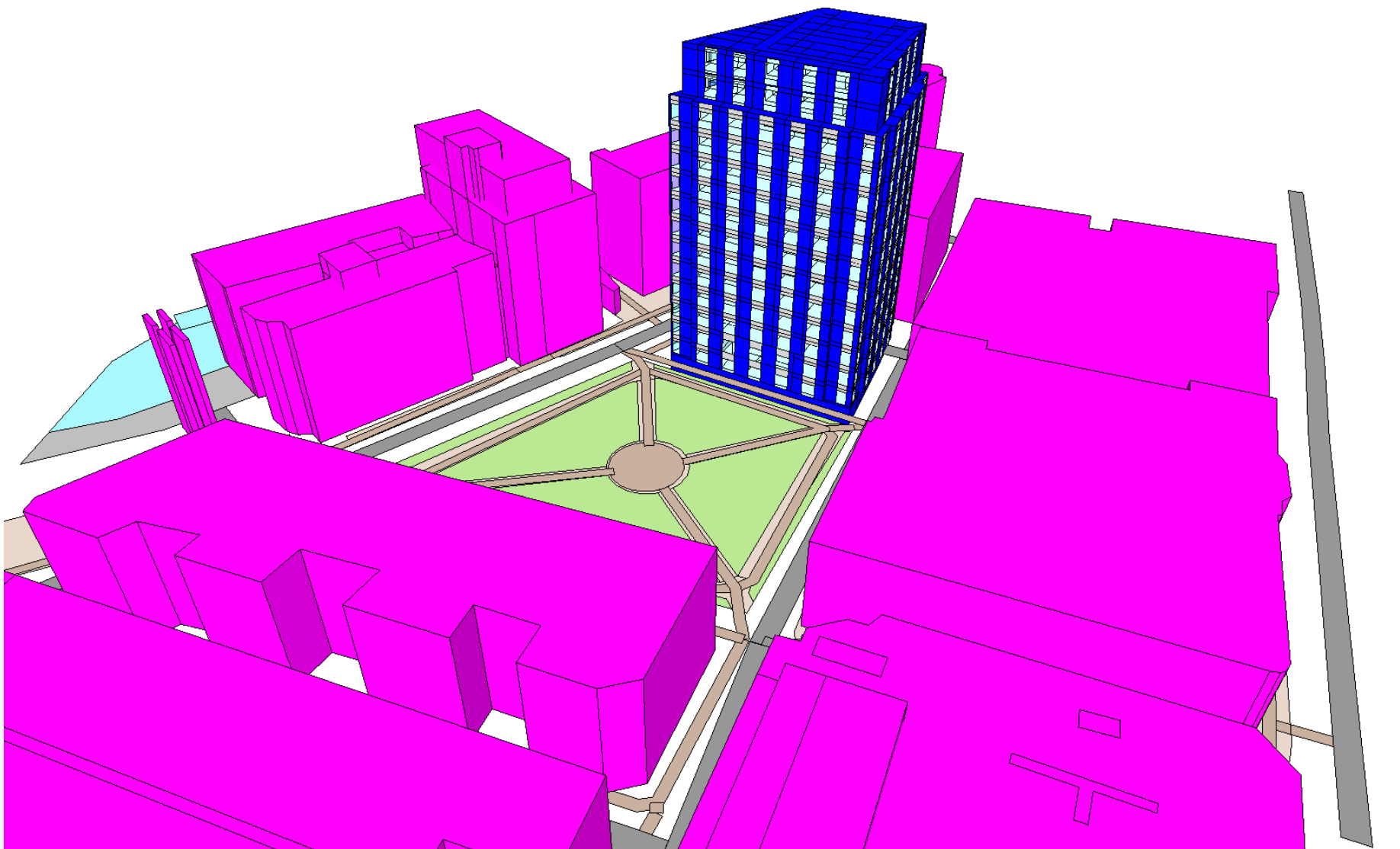


Management factors

Different management factors will be incorporated

Thermal Model

CWC



Modelling Disclaimer



The building has been modelled with accredited software package IES:VE accredited software 2024.0.1.0 which is approved for the purpose of demonstrating compliance with the energy efficiency and carbon emission requirements of the Building Regulations.

These assessments were undertaken by an Energy Specialist; an individual who has acquired substantial expertise or a recognised qualification for undertaking assessments and is not professionally connected to a single technology or manufacturer.

It should be noted that the data generated by this work is obtained using computer calculations. These calculations are the best means of predicting the performance at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

Whilst the calculations have been undertaken in good faith using reasonable skill and care, Crookes Walker Consulting Limited can take no responsibility for differences between the computer calculations and the actual performance of the completed building due to the inherent complexity and variability of the physics in a building and its environment.

Some assumptions have been made at this stage for the following calculations where information was not readily available, these calculations should be revised once the final design is complete.

Model Inputs

Model Inputs: Fabrics

Element	Description	u-value (W/m²K)
External Walls	To achieve NABERS 5*	0.17
Ground Floor		0.10
Roof (Flat)		0.10
Windows		1.40

Model Inputs: Fabrics

Element	Description	g-value	Light Transmittance
Windows	To achieve NABERS 5*	0.4	0.70

Air Permeability	Description	Design Value
(m ³ /h.m ²) @50 Pa	To achieve NABERS 5*	3

Abbreviations

Abbreviation	Full Form
CoP	Coefficient of Performance
DX	Direct Expansion
DFP	Design for Performance
EPH	Electric Panel Heater
EV	Extract Ventilation
HVAC	Heating, Ventilation, and Air Conditioning
MVHR	Mechanical Ventilation with Heat Recovery
NABERS	National Australian Built Environment Rating System
NV	Natural Ventilation
PIR	Passive Infrared Sensor
PV	Photovoltaic
SEER	Seasonal Energy Efficiency Ratio
Sensible/Latent Heat Gain	S/L
SFP	Specific Fan Power
VRF	Variable Refrigerant Flow

Model Inputs: HVAC Systems

The table below confirms the HVAC system details.

Heating is 'off' during the summer months (June the 1st to Sept 15th) except in toilets.

System	Heating Seasonal Efficiency (SCoP)	Cooling Seasonal Efficiency (SEER)	Mech Fan SFP (W/l/S)	Heat Recovery Efficiency (%)	Demand Control Ventilation
HVAC 1: EPH MVHR (WC)	1.0	-	1.0	85	-
HVAC 2: EPH Natural Vent	1.0	-	-	-	-
HVAC 3a: VRF (Office) MVHR	4.5	6.5	1.0	85	Yes
HVAC 3b: VRF (Reception/Security) MVHR	4.5	6.5	1.0	85	Yes
HVAC 3c: VRF (Restaurant) MVHR	4.5	6.5	1.0	85	-
HVAC 4: DX Cooling	4.0	6.5	-	-	-

At this stage, no selections have been made and therefore all VRF systems have the same performance figures. Once selections have been made they either need to be at least these numbers or the assessment needs to be redone to update in line with the selection.

Model Inputs: Ventilation

Ventilation is modelled to activate when carbon dioxide concentration exceeds **600 ppm**, gradually increasing airflow, and will supply the full flow rate upon reaching **800 ppm**.

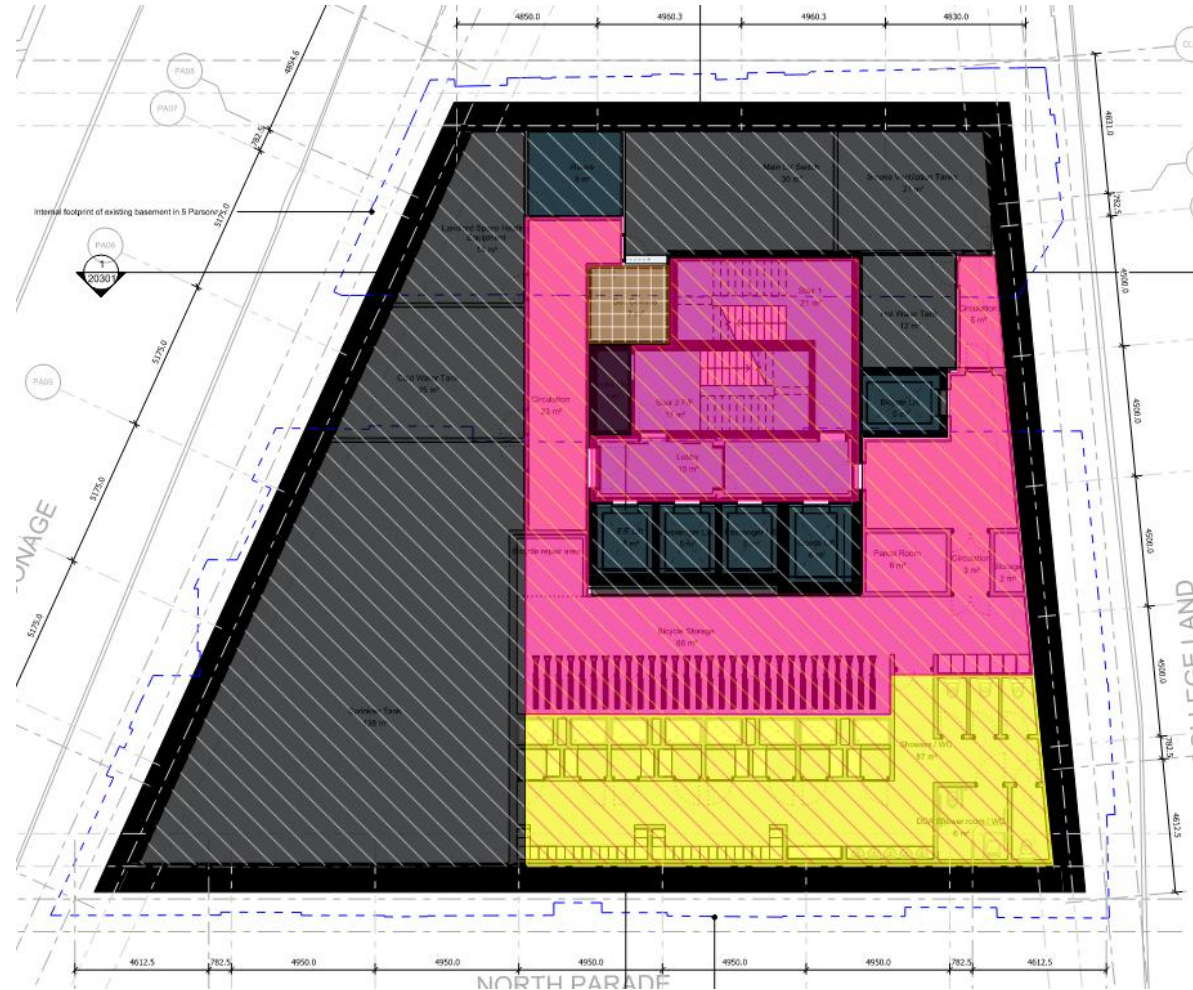
Purge ventilation during summer is modelled to operate overnight at **20%** of the design flow rate when the outside air temperature is below the room air temperature. This aims to reduce the cooling load.

Zone	Mode	Flow Rate	Demand Control Ventilation	Night Purge (Summer)
Changing (Showers)	Supply & Extract	10 ACH ⁻¹	-	-
Circulation	-	-	-	-
Comms	Supply Only	-	-	-
Office	Supply & Extract	14/l/s/p	Yes	Yes
Plant	-	-	-	-
Reception	Supply & Extract	12/l/s/p	Yes	Yes
Store	-	-	-	-
WC	Supply & Extract	6 ACH ⁻¹	-	-

Model Inputs: HVAC System Assignment

Different systems have been created for different space types. The following images highlight where each system is assigned.

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	

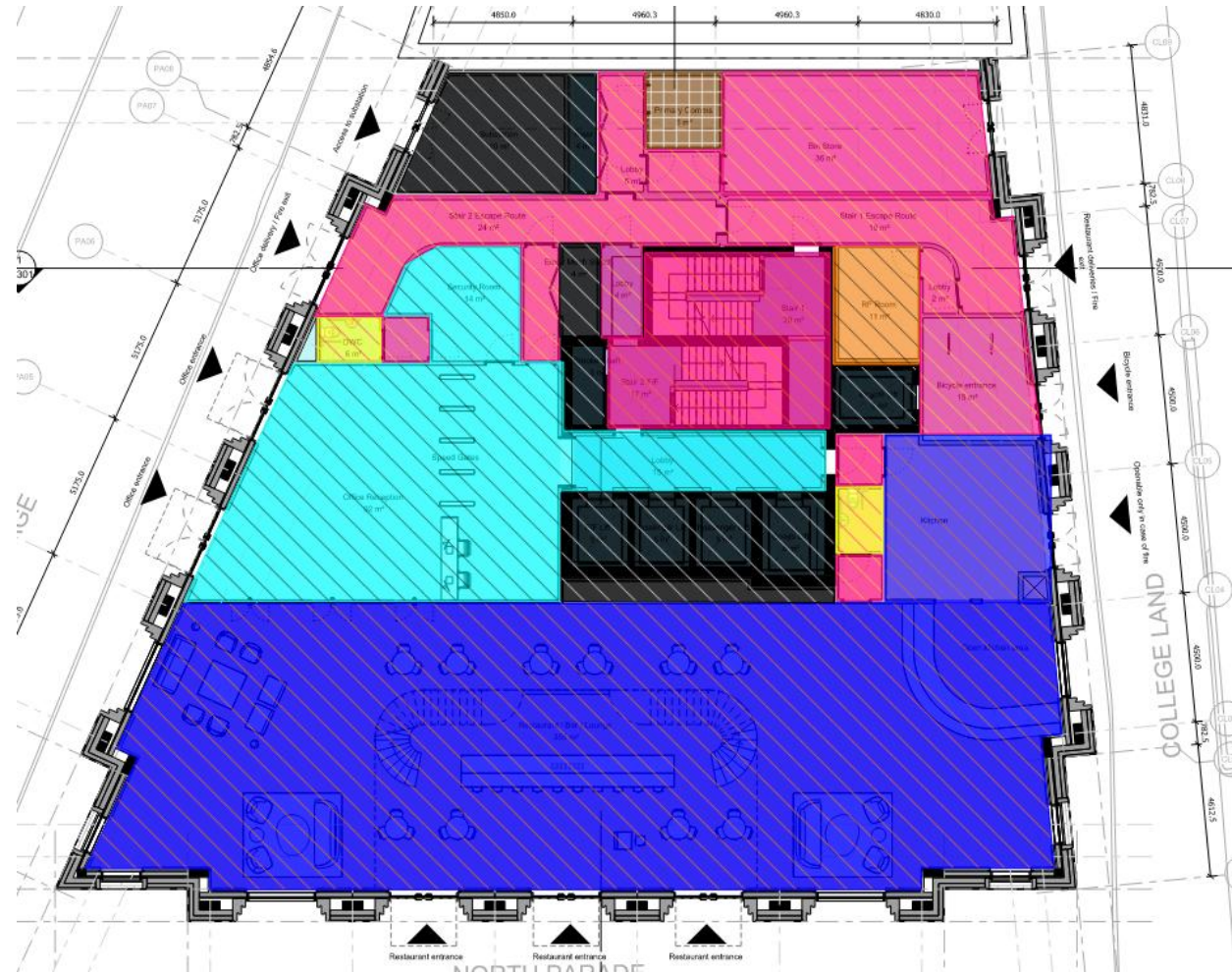


HVAC System Assignment: Basement

Model Inputs: HVAC System Assignment

CWC

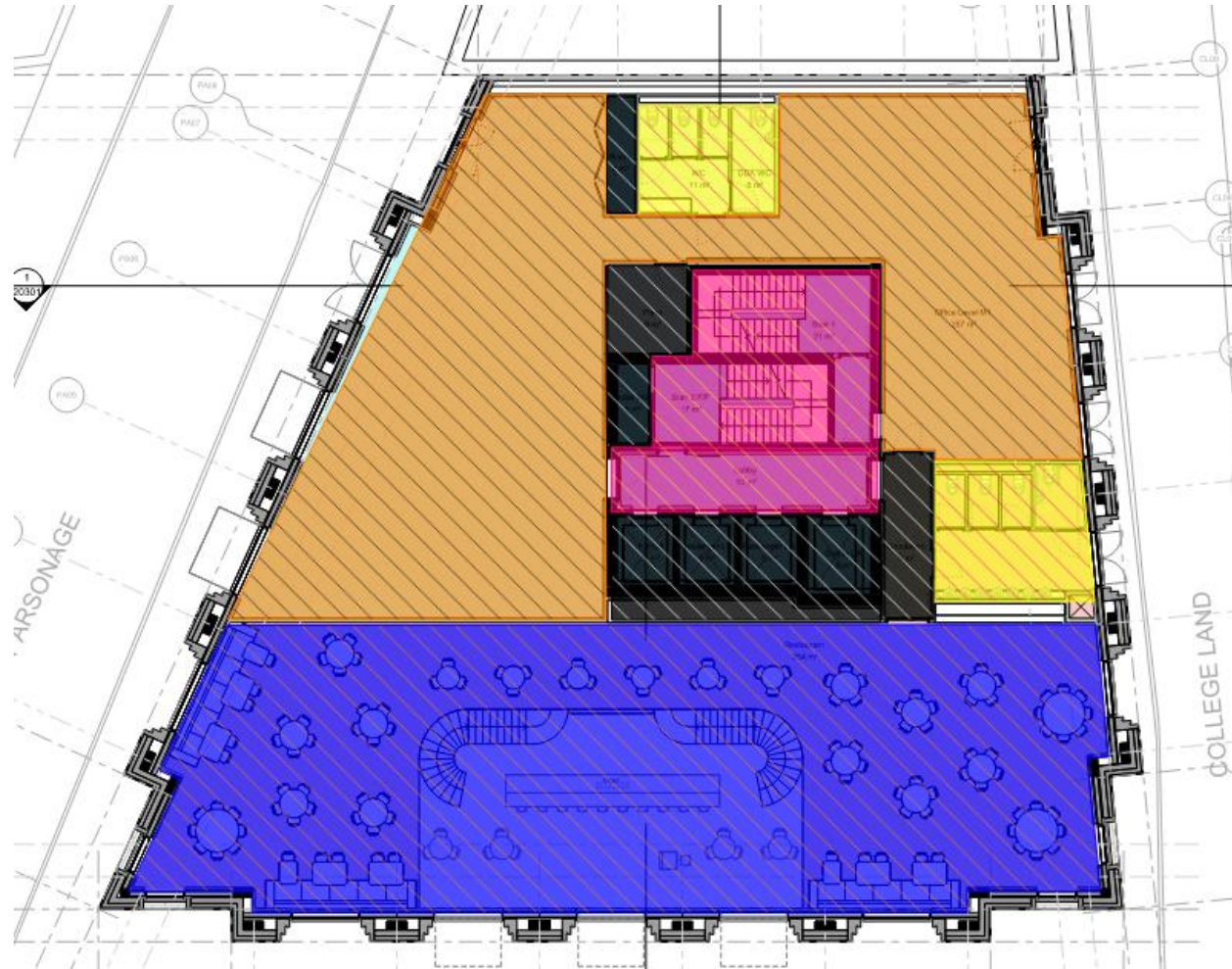
HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	



HVAC System Assignment: Ground Floor

Model Inputs: HVAC System Assignment

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	

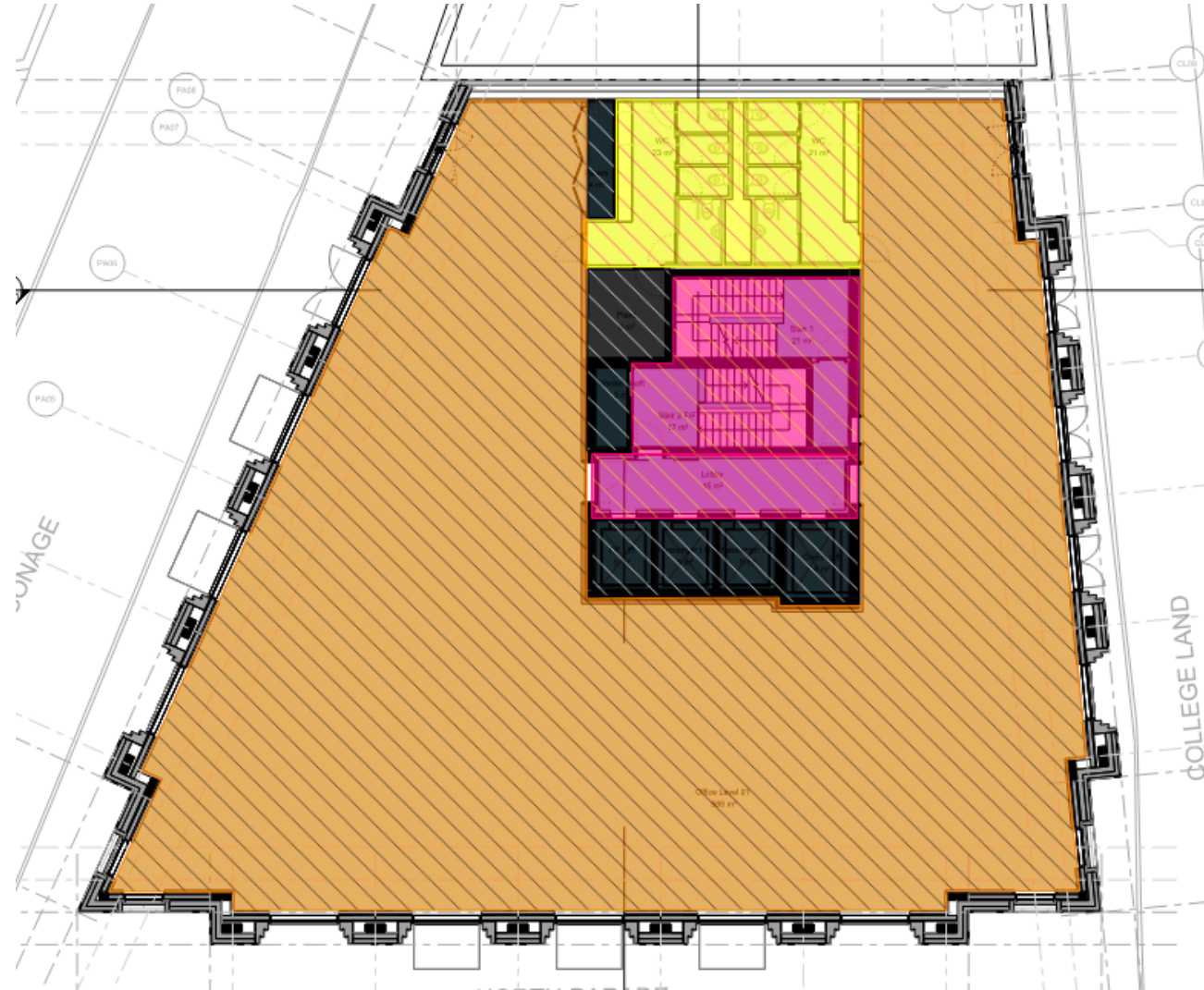


HVAC System Assignment: Mezzanine Floor

Model Inputs: HVAC System Assignment

CWC

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	

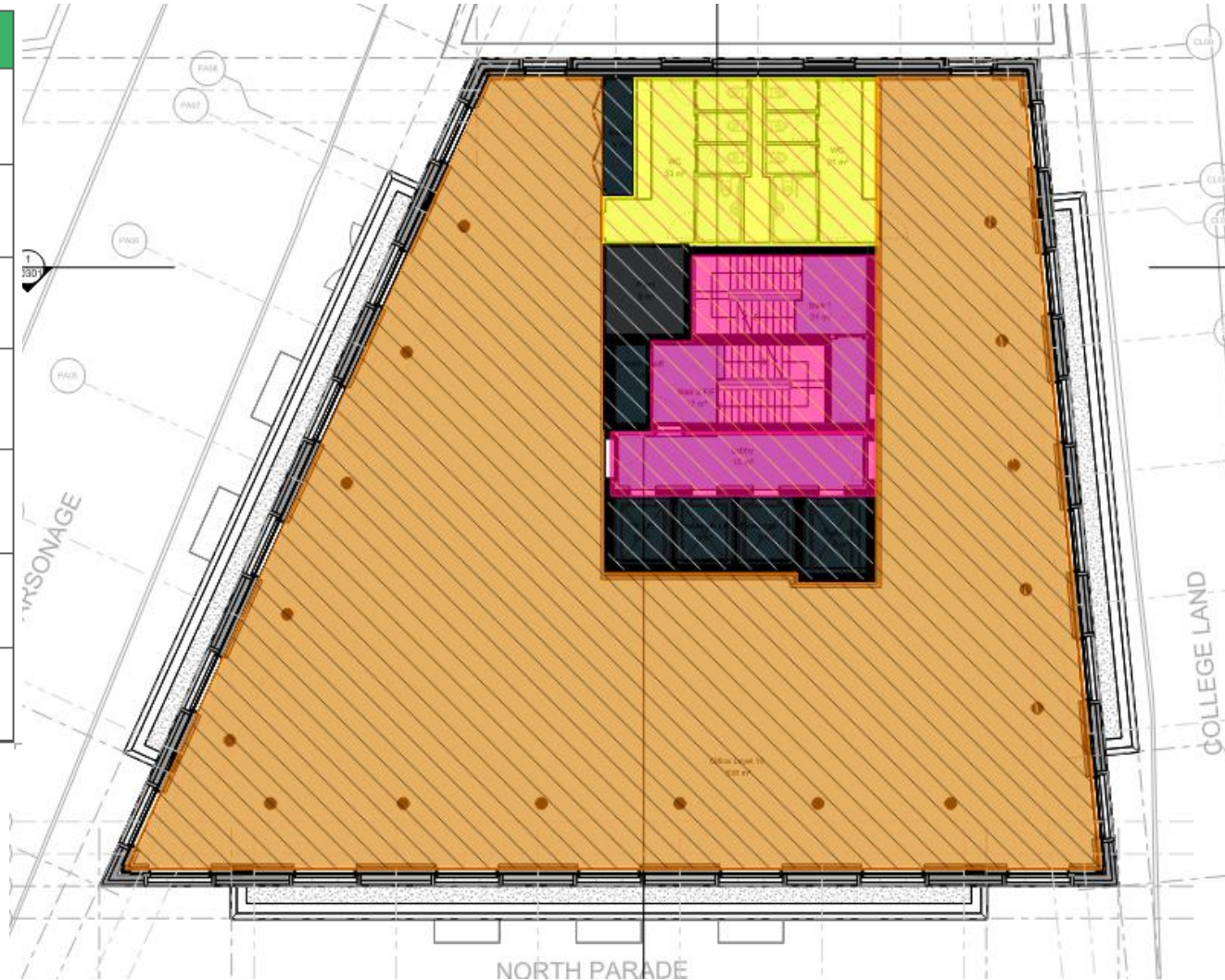


HVAC System Assignment: Floor 01-09

Model Inputs: HVAC System Assignment

CWC

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	

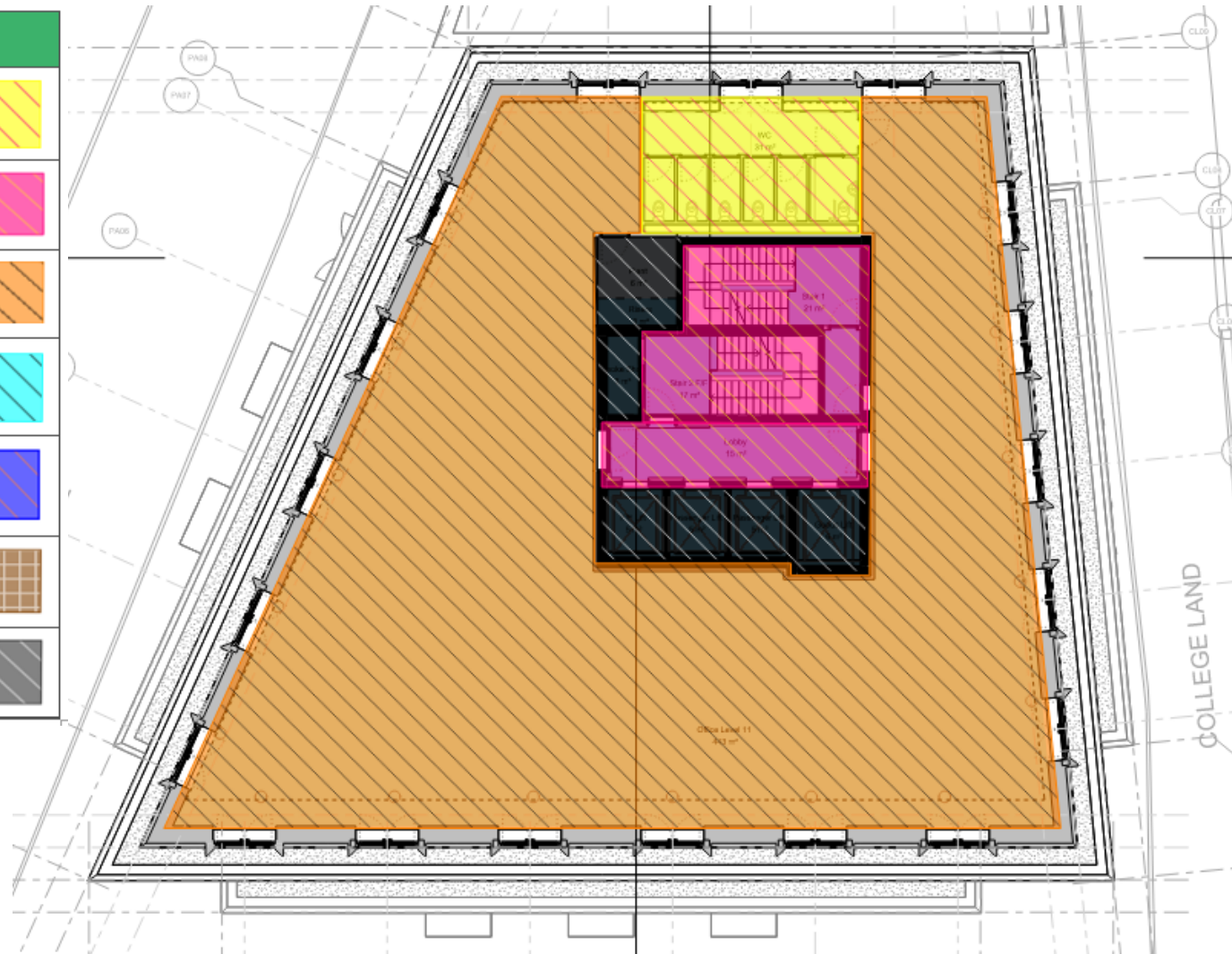


HVAC System Assignment: Floor 10

Model Inputs: HVAC System Assignment

CWC

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	

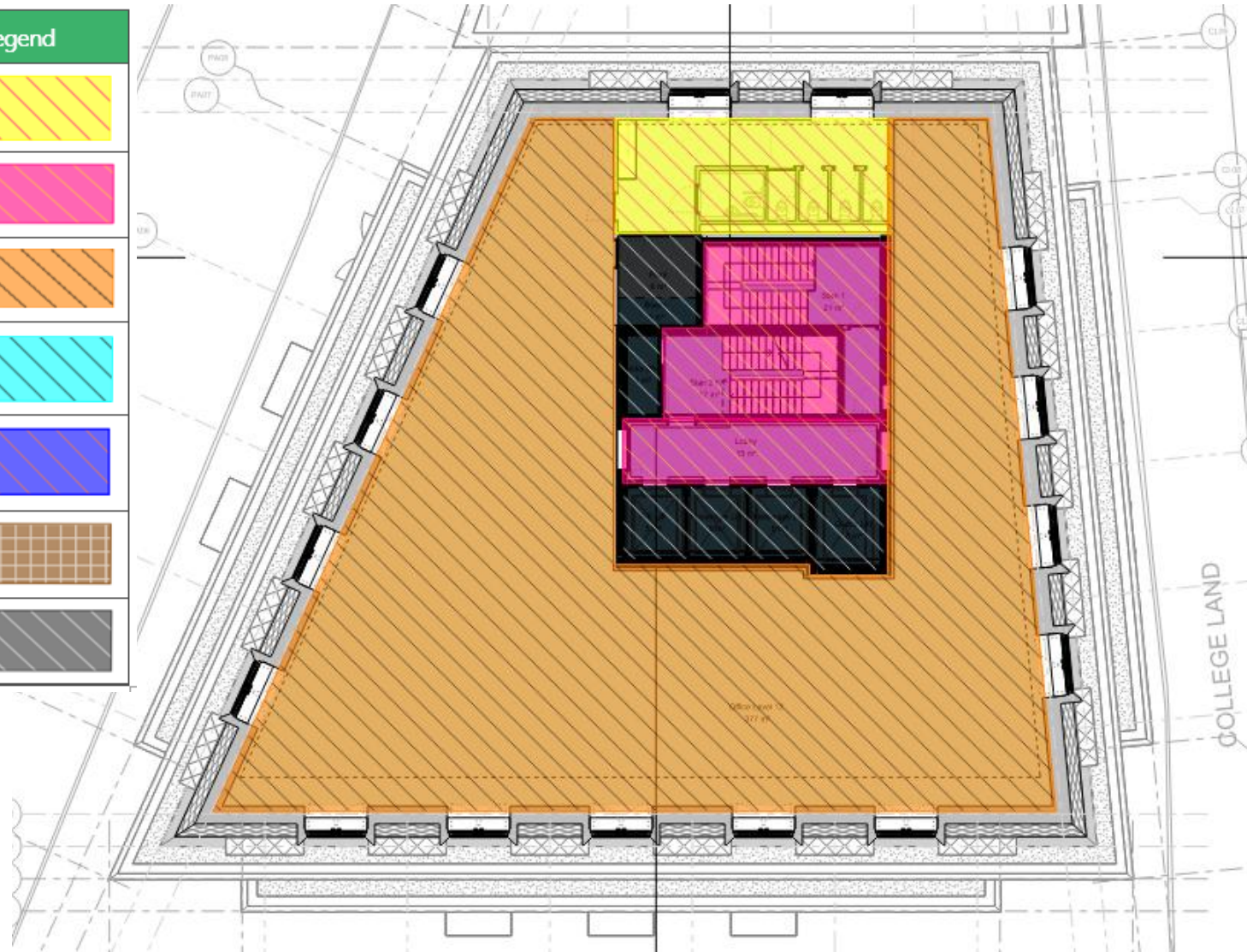


HVAC System Assignment: Floor 11

Model Inputs: HVAC System Assignment

CWC

HVAC System Name	Legend
HVAC 1: EPH Mechanical Vent (WC)	
HVAC 2: EPH Natural Vent	
HVAC 3a: VRF Mechanical Vent (Office)	
HVAC 3b: VRF Mechanical Vent (Reception/Security)	
HVAC 3c: VRF Mechanical Vent (Restaurant)	
HVAC 4: DX Cooling	
None	



HVAC System Assignment: Floor 12

Model Inputs: Domestic Hot Water

Domestic water is via central heat pumps with the details outlined in the Table below.

The hot water demand, applied to the offices, is taken from the NABERS Design for Performance UK guide as 0.36 l/(h.person). This figure incorporates 'end-of-trip facilities' consumption in common areas as well.

Parameter	Central Heat Pump
Heating Seasonal Efficiency (SCoP)	4
Delivery Efficiency	100%
Storage Volume (L)	300
Storage Losses (KWh/(l.day))	0.00870
Pump Power (kW)	0.05

Should the final specifications deviate from these inputs, the analysis would need to be updated in-line with the changes.

Model Inputs: Lighting

CWC

Zone Name	Energy W/m ²	Control Mechanism	Weekday Profile	Weekends & Holiday Profile
Changing (Showers)	8	PIRs	07-09 : 100% 12-13: 100% 17-16: 100% Else: 0%	-
Circulation		PIRs + Daylight Dimming	07-09 : 100% 12-13: 100% 17-16: 100%	08-17 : 10%
Comms		PIRs	1 hr/day	-
Office	2.55	PIRs + Daylight Dimming	00-07: 5% 07-08: 30% 08-09: 75% 09-17: 100% 17-18: 75% 18-19: 25% 19-21: 15% 21-24: 5%	00-08: 5% 08-17: 15% 17-24: 5%
Office Level 01 (after-hours zones)	2.55	PIRs + Daylight Dimming	00-07: 5% 07-08: 30% 08-09: 75% 09-17: 100% 17-18: 75% 18-19: 25% 19-21: 15% 21-24: 5%	Saturday: 00-08: 5% 08-12: 40% 12-17: 15% 17-24: 5% Sundays & Holidays: 00-08: 5% 08-17: 15% 17-24: 5%
Plant	8	PIRs	1 hr/day	-
Reception	10	PIRs + Daylight Dimming	00-09: 0% 09-17: 100% 17-24: 0%	08-17 : 10%
Store	8	PIRs	1 hr/day	-
Toilet		PIRs + Daylight Dimming	00-07: 0% 07-17: 100% 17-24: 0%	08-17 : 10%

a different way of thinking.

Model Inputs: Occupancy



Zone Name	Energy W/m²	Control Mechanism	Weekday Profile	Weekends & Holiday Profile
Changing (Showers)	15	90/50	07-09 : 100% 12-13: 50% 17-16: 35% Else: 0%	-
Circulation	15	100/60	07-18: 100% Else: 0%	08-17 : 10%
Comms	1 Person	90/50	1 hr/day	-
Office	8	90/50	00-07: 0% 07-08: 10% 08-09: 20% 09-17: 70% 17-18: 35% 18-19: 10% 19-21: 5% 21-24: 0%	00-08: 0% 08-17: 5% 17-24: 0%
Office Level 01 (after-hours zones)	8	90/50		Saturdays: 00-08: 0% 08-09: 5% 09-12: 15% 12-17: 5% 17-24: 0% Sundays and Holidays: 00-08: 0% 08-17: 5% 17-24: 0%
Plant	1 Person	90/50	1 hr/day	-
Reception	8	90/50	00-09: 0% 09-17: 100% 17-24: 0%	08-17 : 10%
Store	1 Person	90/50	1 hr/day	-
Toilet	8	90/50	07-09: 20% 09-10: 80% 10-13: 20% 13-14: 50% 14-18: 20% Else: 0%	08-17 : 10%

Model Inputs: Equipment

Office Equipment loads are set to **6 W/m²** and are likely to vary from zone-to-zone.

Zone loads are set to **50%, 75%, 100%, 125% and 150%** of average equipment load in approximate area ratios of **1:1:2:1:1**.

Zone name	Equipment Gain (W/m ²)	Weekday Profile	Weekends & Holiday Profile
Changing (Showers)	5	1 hr/day	-
Circulation	-	-	-
Comms	250	On Continuously	On Continuously
Office	7.5	00-07: 25% 07-08: 65% 08-09: 80% 09-17: 100% 17-18: 80% 18-19: 65% 19-20: 55% 20-24: 25%	00-24: 25%
Office Level 01 (after-hours zones)	7.5	00-07: 25% 07-08: 65% 08-09: 80% 09-17: 100% 17-18: 80% 18-19: 65% 19-20: 55% 20-24: 25%	Saturdays: 00-24: 25% Sundays & Holidays: 00-24: 25%
Plant	-	-	-
Reception	15	00-09: 20% 09-17: 100% 17-24: 20%	08-17: 20%
Store	-	-	-
Toilet	Hand Dryer – 1400 Watts	1 hr/day	1 hr/day

Model Inputs: Other Equipment

Item	Energy
Building Mounted External Lighting	-
Lift	46,919.57 kW (Appendix B)

Note:

The table above indicates assumed/manually calculated power loads, all other gains are calculated via the model using occupancy profiles.

Model Inputs: HVAC Operation



Heating is set to Off during the summer months June the 1st to Sept 15th.

Zone name	Heating Operation Weekday Profile	Heating Weekends & Holiday Profile	Cooling Operation Weekday Profile	Cooling Weekends & Holiday Profile
Changing (Showers)	07-18: 100%	-	-	-
Circulation	07-18: 100%	08-17: 10% Else: 0%	-	-
Comms	-	-	On Continuously	
Office	07-18: 100%	09-12: 100% Else: 0%	07-18: 100%	09-12: 100% Else: 0%
Office Level 01 (after-hours zones)		Saturdays: 09-12: 100% Else: 0% Sundays and Holidays: 0%		Saturdays: 09-12: 100% Else: 0% Sundays and Holidays: 0%
Plant	-	-	-	-
Reception	07-18: 100%	-	07-18 : 100%	-
Store	-	-	-	-
Toilet	07-18: 100%	09-12: 100% Else: 0%	-	-

Model Inputs: Internal Conditions



Heating is set to Off during the summer months June the 1st to Sept 15th.

Zone	Summer (°C)	Winter (°C)
Changing (Showers)	-	21
Circulation	-	18
Comms	24	24
Office	24	21
Reception	24	21
Toilet	-	21
Store	-	-
Plant	-	-

Model Inputs: Renewables

CWC

None.

Results

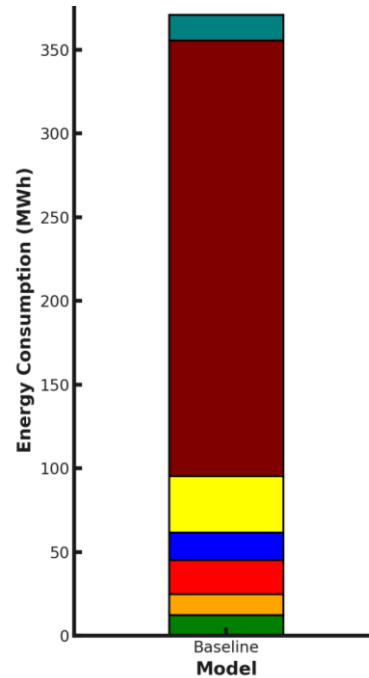
TM54 Results – Baseline

The figures below demonstrate the results from the dynamic simulation for the complete building for the 'Baseline' scenario.

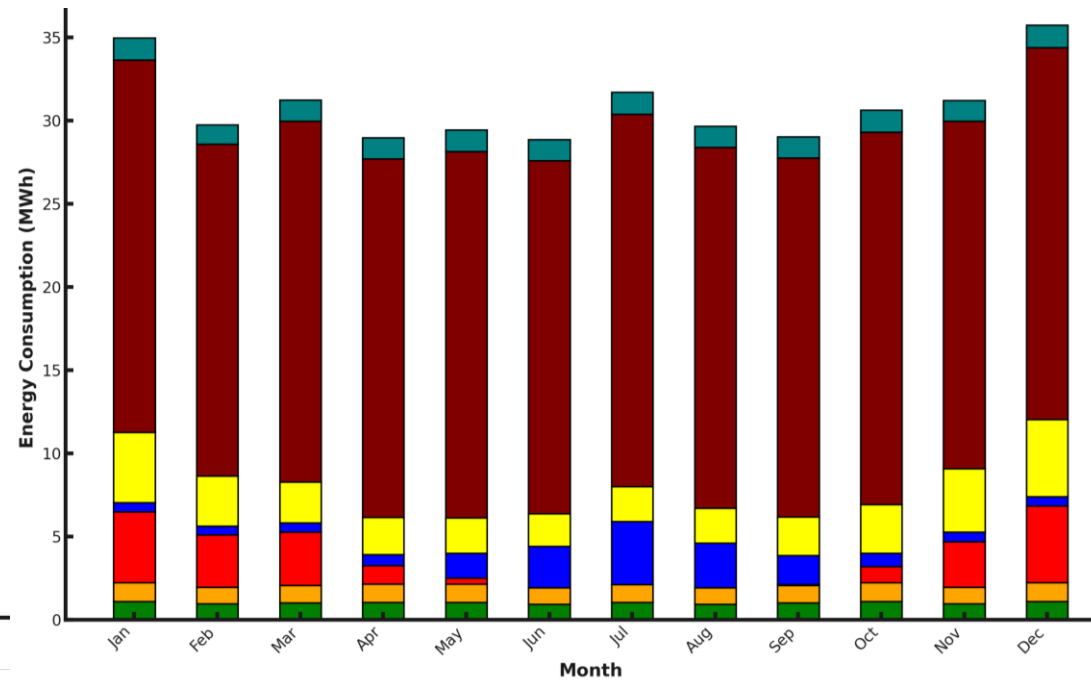
All energy consumption has been significantly minimised, with the equipment power consumption the greatest consumer of energy in the building.

Lift energy has been calculated manually (Appendix B).

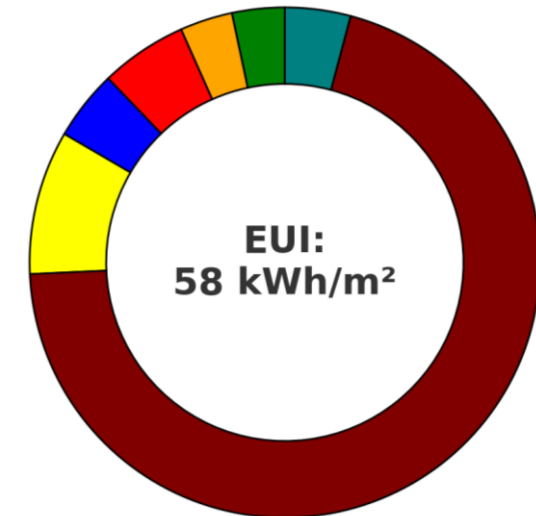
Baseline - Total Yearly Consumption



Baseline - Total Monthly Consumption



Baseline - Total Yearly Consumption

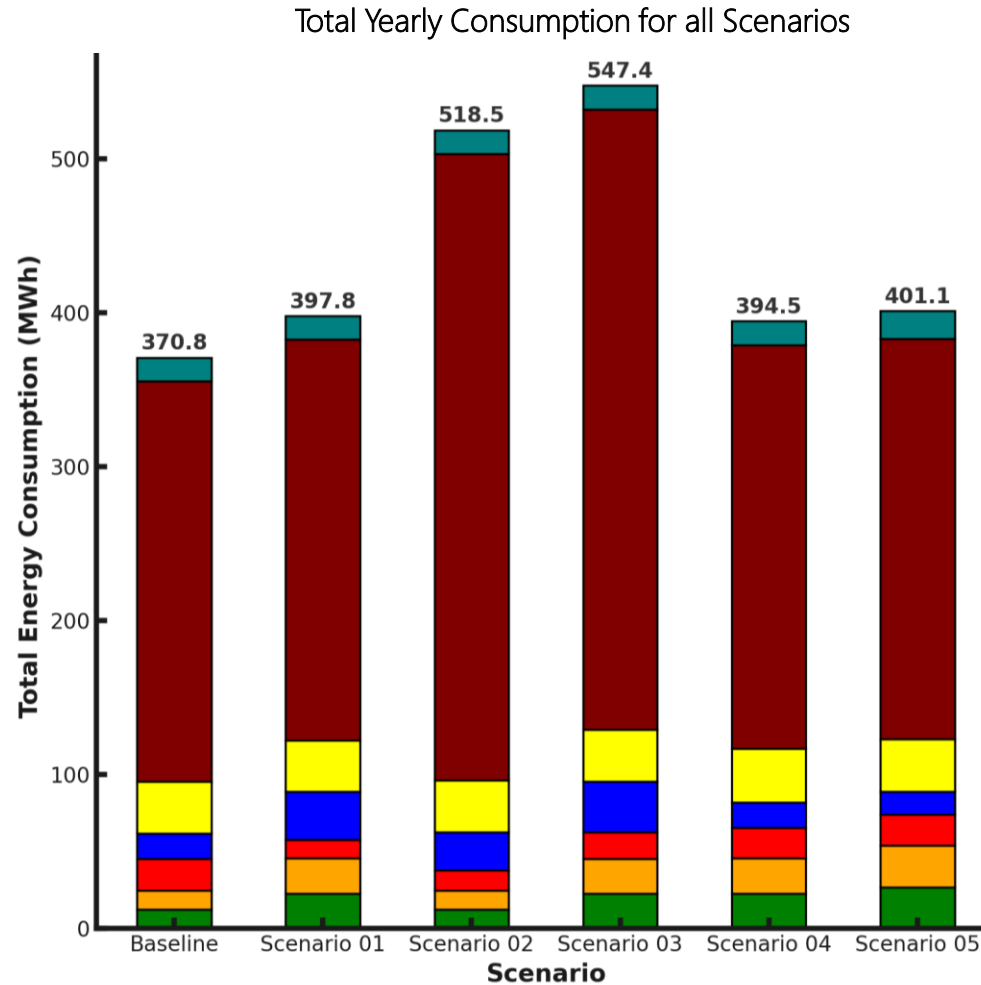


The EUI may be **lowered** further by incorporating a photovoltaic array and utilising more efficient lighting.

TM54 Results – Full Building: All Scenarios

The figure below demonstrate the results from the dynamic simulation for the complete building for the 'Baseline' scenario.

The power consumed by 'Equipment' is the single biggest energy consumption.



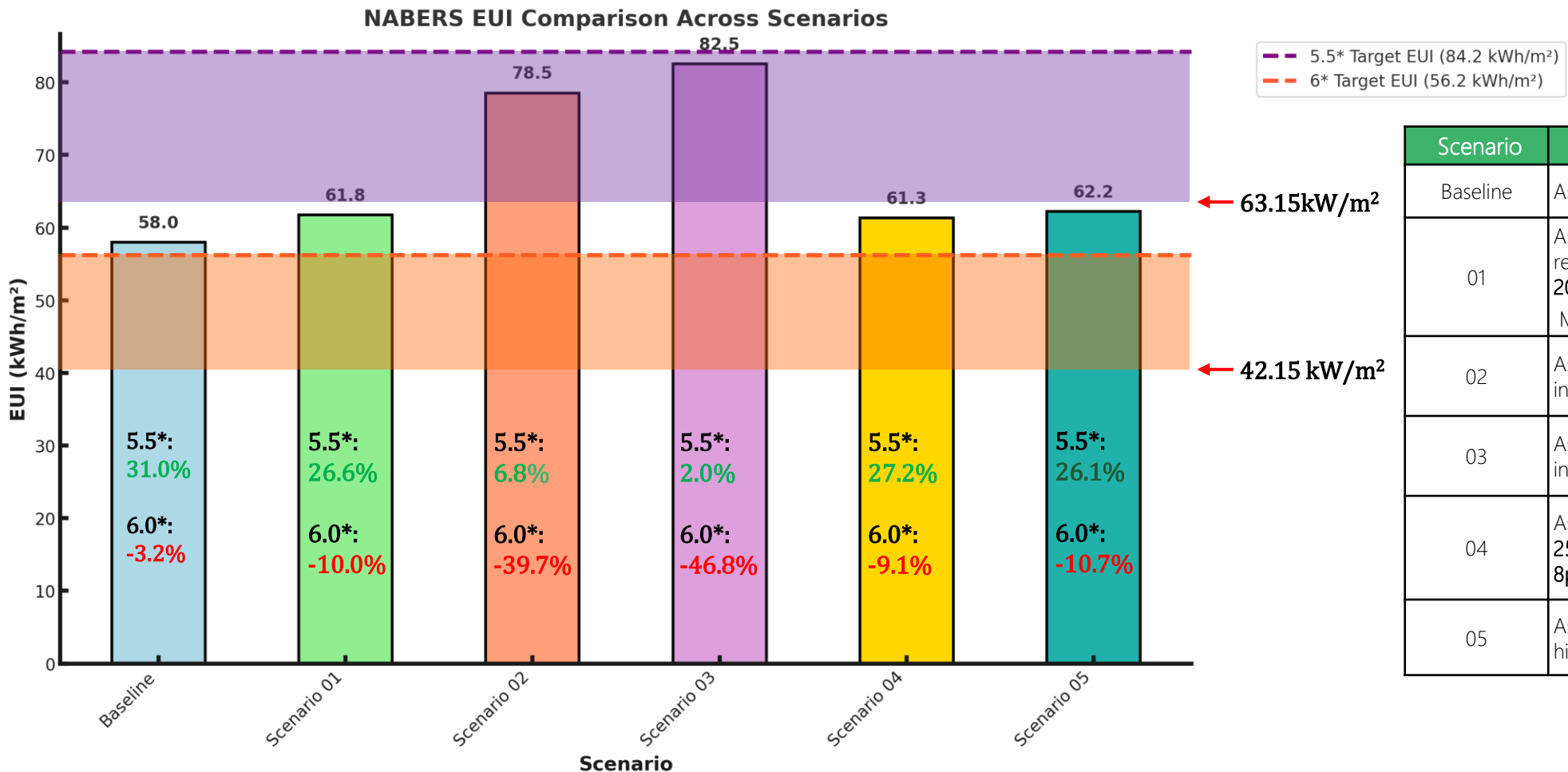
The EUI may be **lowered** further by incorporating a photovoltaic array and utilising more efficient lighting.

Results – NABERS: Offices

An EUI of 84.2kWh/m² or lower, is required to achieve NABERS 5.5* whole building rating.

All scenarios, fall below this threshold and therefore achieve a 5.5* whole building rating.

Typically, a 25% margin is required to achieve a given target. However, this may be reduced with consent.



Scenario	Description
Baseline	As all stated inputs in this report.
01	As the baseline but with a future weather file representing a short, intense heatwave in the 2050s: Manchester_DSY2_2050High50_epw
02	As the baseline except all office zones have an increased office power load density of 11 W/m ² .
03	As the baseline except level 06 having an increased office power load density of 65 W/m ² .
04	As the baseline except levels 2-5 (approximately 25% of offices) operating for longer hours (7am–8pm) for 3 months of the year.
05	As the baseline, except the occupancy density is higher at 6 m ² /person

Detailed Result: Whole Building



Baseline											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	4243	559.9	1107	1144	1330	-	-	-	-	4225	22369
Feb	3148.5	541.7	963	997	1181	-	-	-	-	2994	19941
Mar	3207.2	565.3	1013	1050	1276	-	-	-	-	2446	21688
Apr	1110.2	664.4	1059	1095	1280	-	-	-	-	2221	21560
May	372	1477.8	1061	1098	1303	-	-	-	-	2116	22029
Jun	0	2474.7	952	988	1253	-	-	-	-	1966	21219
Jul	0	3789	1043	1080	1330	-	-	-	-	2109	22369
Aug	0	2679.5	955	992	1276	-	-	-	-	2080	21688
Sept	32.5	1757.6	1026	1062	1280	-	-	-	-	2316	21560
Oct	966.1	795	1107	1144	1330	-	-	-	-	2919	22369
Nov	2742.1	575.7	966	1002	1227	-	-	-	-	3817	20878
Dec	4595.2	553.7	1105	1143	1330	-	-	-	-	4639	22369
Total	20416.6	16434.5	12358	12795	15397	46920	-	-	-	33848	260038

Scenario 01											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	2314.9	588.9	1850	1887	1276	-	-	-	-	3994	21688
Feb	1732.3	549	1759	1793	1181	-	-	-	-	2943	19941
Mar	1193.7	876.2	2020	2057	1330	-	-	-	-	2592	22369
Apr	632.1	1388.1	1934	1970	1280	-	-	-	-	2183	21560
May	6.5	4692.5	1848	1885	1276	-	-	-	-	1993	21688
Jun	0	2743.5	1881	1917	1280	-	-	-	-	2027	21560
Jul	0	7826.6	1893	1930	1303	-	-	-	-	2019	22029
Aug	0	7607.6	1898	1935	1303	-	-	-	-	2131	22029
Sept	52.8	2372.2	1902	1938	1280	-	-	-	-	2334	21560
Oct	192.5	1402.2	1850	1887	1276	-	-	-	-	2764	21688
Nov	2169.1	590.5	1933	1969	1280	-	-	-	-	3731	21560
Dec	3914.6	567.8	2022	2059	1330	-	-	-	-	4672	22369
Total	12208.5	31205.3	22789	23227	15397	46920	-	-	-	33381	260038

Detailed Result: Whole Building

Scenario 02											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	2672.8	563.5	1014	1052	1276	-	-	-	-	4015	33831
Feb	2125.9	577	963	997	1181	-	-	-	-	2998	31196
Mar	2476.6	612	1106	1143	1330	-	-	-	-	2631	35069
Apr	553.7	917.6	1059	1095	1280	-	-	-	-	2228	33778
May	144.7	2422.8	1013	1050	1276	-	-	-	-	2051	33831
Jun	0	3583.2	998	1034	1280	-	-	-	-	2012	33778
Jul	0	5782.8	1001	1038	1303	-	-	-	-	2042	34450
Aug	0	4646	999	1036	1303	-	-	-	-	2149	34450
Sept	4.1	3017.9	1026	1062	1280	-	-	-	-	2332	33778
Oct	279.7	983.5	1014	1052	1276	-	-	-	-	2791	33831
Nov	1988.7	633.1	1058	1094	1280	-	-	-	-	4013	33778
Dec	3117.7	576.3	1107	1144	1330	-	-	-	-	4626	35069
Total	13363.9	24315.9	12359	12797	15397	46920	-	-	-	33889	406838

Scenario 03											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	3586.7	1453.7	2022	2059	1330	-	-	-	-	4225	34717
Feb	2655.2	1426	1759	1792	1181	-	-	-	-	2994	30884
Mar	2722.1	1514.6	1848	1886	1276	-	-	-	-	2446	33495
Apr	927.5	2000.4	1934	1970	1280	-	-	-	-	2221	33439
May	317.8	3129.9	1936	1973	1303	-	-	-	-	2116	34106
Jun	0	4238.1	1788	1824	1253	-	-	-	-	1966	32828
Jul	0	5782.6	1957	1995	1330	-	-	-	-	2109	34717
Aug	0	4483.5	1790	1827	1276	-	-	-	-	2080	33495
Sept	23.9	3578.2	1901	1937	1280	-	-	-	-	2316	33439
Oct	774	2226.2	2022	2059	1330	-	-	-	-	2919	34717
Nov	2281.7	1494.4	1762	1798	1227	-	-	-	-	3817	32217
Dec	3893.8	1444.5	2020	2057	1330	-	-	-	-	4639	34717
Total	17182.6	32772.2	22739	23177	15397	46920	-	-	-	33848	402771

Detailed Result: Whole Building



Scenario 04											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	4056.2	565.2	2056	2093	1400	-	-	-	-	4597	23063
Feb	3009.8	550.3	1789	1823	1242	-	-	-	-	3313	20544
Mar	3071.6	573.9	1879	1916	1341	-	-	-	-	2757	22321
Apr	1103.3	664.7	1935	1971	1280	-	-	-	-	2221	21560
May	372	1477.8	1936	1973	1303	-	-	-	-	2116	22029
Jun	0	2474.8	1788	1824	1253	-	-	-	-	1966	21219
Jul	0	3789	1957	1995	1330	-	-	-	-	2109	22369
Aug	0	2679.5	1790	1827	1276	-	-	-	-	2080	21688
Sept	32.5	1757.6	1901	1937	1280	-	-	-	-	2316	21560
Oct	966.1	795	2022	2059	1330	-	-	-	-	2920	22369
Nov	2742	575.7	1762	1798	1227	-	-	-	-	3817	20878
Dec	4595.2	553.7	2020	2057	1330	-	-	-	-	4639	22369
Total	19948.7	16457.1	22834	23272	15592	46920	-	-	-	34850	261969

Scenario 05											
	Space Heating (kWh)	Space Cooling (kWh)	HVAC Fans (kWh)	HVAC Pumps (kWh)	DHW (kWh)	Vertical Transport (kWh)	Life Safety elec (kWh)	Life Safety Diesel (L)	External Lighting (kWh)	Internal Lighting (kWh)	Equipment (kWh)
Jan	4153.3	559.2	2393	2430	1567	-	-	-	-	4225	22369
Feb	3107.1	528.9	2081	2115	1388	-	-	-	-	2994	19941
Mar	3186.6	556.1	2187	2224	1496	-	-	-	-	2446	21688
Apr	1126.2	635.9	2289	2325	1507	-	-	-	-	2221	21560
May	378.3	1324.9	2291	2328	1531	-	-	-	-	2116	22029
Jun	0.1	2221.8	2118	2154	1471	-	-	-	-	1966	21219
Jul	0	3551.2	2319	2356	1567	-	-	-	-	2109	22369
Aug	0	2371.8	2121	2158	1496	-	-	-	-	2080	21688
Sept	37.8	1532.6	2252	2288	1507	-	-	-	-	2316	21560
Oct	977.6	740.4	2393	2430	1567	-	-	-	-	2919	22369
Nov	2662.2	566.4	2084	2120	1436	-	-	-	-	3817	20878
Dec	4503.1	554	2391	2428	1567	-	-	-	-	4639	22369
Total	20132.3	15143.3	26916	27354	18099	46920	-	-	-	33848	260038

Conclusion



Based on 'CIBSE TM54: Evaluating Operational Energy Performance of Buildings at Design Stage' ("CIBSE TM54"), this report estimates the operational energy and the potential NABERS energy rating of the One North Parade, Manchester.

Were a NABERS **whole building** assessment to produce the same Energy Use Intensity ("EUI") as the CIBSE TM54 result, this would achieve a **5.5*** **whole building rating** for the baseline model. This result is **31% below** the threshold for a **5.5* rating** and **3.2%** above a **6.0* rating**. Therefore, a 5.5* rating should be targeted.

This is based on the total received NIA of **7,205m²**.

Detailed results of the analysis are given in the "Results" section.

The EUI may be reduced further through the integration of more efficient lighting and the inclusion of photovoltaic panels.

While simulations provide a prediction of potential performance, they involve approximations and cannot fully capture real-world factors such as construction quality, tenant behaviour, operational maintenance, and weather. Consequently, these simulation results are **estimates** only.

The inputs used in the assessments are detailed in the 'Model Inputs' section of this report. Should the final specifications deviate from these inputs, the analysis would need to be updated in-line with the changes.

Conclusion – Further Work

The equipment power consumption is the most significant factor influencing overall energy performance.

Further Optimisation Opportunities

- **Lighting Efficiency:** Evaluate and implement high-efficiency lighting solutions for common / landlord areas. For example, a lighting power density between 3-5 W/m².
- **Renewable Energy Integration:** Assess PV array deployment to offset power consumption through the grid.

Further Work

- Baseline without daylight dimming controls (failure of controls).
- Impact of alternate set point temperatures.
- Impact on varying infiltration rates (dependent on build quality).
- Fabrics (dependent on build quality).
- Comfort and HVAC capacity problems (stage 4 / stage 5).
- If diesel is to be used as a fuel source during later design stage (e.g life safety) then this would also need to be incorporated and would impact the results.
- Combination of all risk scenarios assessed.

Appendix A - Risks

Input	Details	Risk
Fabrics	Fabrics used in the model are subject to quality and workmanship with construction works.	Fabric u-values are static when input into a DSM model, in reality they are dynamic and change with temperature and other climatic conditions. These are also dependent on the quality of construction.
HVAC	System details, efficiencies & SFPs have been agreed with the mechanical engineer	HVAC is set to come on when building is occupied and with set point temperatures, due to climate projections from the weather data being used for these calculations, the internal temperatures may be different when in use. HVAC systems specifications could change, therefore TM54 calculations should be re-visited if any design changes are made HVAC system performance dependent on quality of installation.
Lighting	Lighting efficiencies have been agreed with the electrical engineer	Lighting systems specifications could change, therefore TM54 calculations should be re-visited if any design changes are made
Occupancy	Typical office occupancy used, comparing against other similar projects	Occupancy may differ when in use, including different numbers of occupants and occupied hours
IES:VE Software	IES:VE software has been used for the TM54 assessments the DSM modelling cannot create an exact replica of how the building will behave and should be used as guidance on how to reduce the energy use on an annual basis	DSM modelling cannot be relied on to create an exact representation of how a building will behave, buildings should be monitored when in use to compare how the TM54 operational predictions differ to the building when in use

Appendix B – Lift Energy Calculation

In the absence of a detailed lift design, we have used the methodology as set out in Section A.4 of the NABERS Guide to Design for Performance.

$$E_{lifts}(kWh) = (528F + 5.5A)(1 - \alpha)$$

Where A is the net internal area of the building, α is 0.26 for lifts without regeneration and 0.37 for lifts with regeneration and

$$F = \sum_{all\ floors} n$$

Where n is the number of lifts serving or express bypassing the floor.

- 4 lifts serving 16 levels and 1 lift serving 2 levels.
- Net internal area of 7205m² (excluding retail units).
- It is assumed that the lifts will be of regenerative type.
- Total vertical transport energy consumption of **46919.565** kWh/year.