Facilities manager to complete green italic sections

Note: Whilst based on a real office, the names and locations used in this example are fictional and any resemblance to actual locations, people or firms is unintentional.

Building log book

Vermont Court

Watson Square
London
EC4M 8BR
020 8123 4567

Building owner: Davies Properties plc

Main occupants: London Traders Ltd

Facilities manager responsible for log-book: D Smith Signed: *D Smith*

Wetherby House
Pentham
Essex
01987 654321

This building log book was prepared by

Phil Harris
PH Consultants
12 Balfour House
Lynne Road
York YO6 7AP

Version No 1: 27.5.03

This building log book is analogous to a car handbook, providing the facilities manager with easily understood information about how the building is intended to work. It also allows ongoing building energy performance and major alterations to be recorded.

Please ensure that this log book is kept up-to-date and in a readily accessible (designated) position, e.g. in the main building operations room. It contains important information for anyone carrying out work on the building and its services.

This log book is to be kept at all times in: **Building operations room 1/17**

Electronic master is kept at: **Main server: C:/ building/building log book**

Contents

(Not more than one page)

Do not remove from: ***Building operations room 1/17***

1 Building history

(Not more than one page)

The log book should be reviewed annually as part of the organisation's quality assurance system and an entry should be made for each review. Where the log book has been updated then the changed pages should be recorded.

Review date	Description of annual log book review and updates made	Pages updated or added	Facilities manager's signature	Date
	No significant changes to design made in run up to handover	N/A	D Smith	10.5.03

2 Purpose and responsibilities

(Not more than one page)

Purpose of a building log book

This log book is an easily accessible focal point of current information for all those working in the building. It has four main functions:

- **Summary of the building:** it is a summary of all the key information about the building, including the original design, commissioning and handover details, and information on its management and performance. In being a summary, it does not wholly duplicate or replace the O&M manuals. The log book is necessary for compliance with Building Regulations Part L2.
- **Key reference point:** it is the single document in which key building energy information is logged. It may be regarded as the hub document linking many other relevant documents. The log book should provide key references to the detail held in less accessible O&M manuals, BMS manuals and commissioning records. It should therefore be kept in a readily accessible (designated) position in the main building operations room and should not be removed without the approval of the facilities manager.
- **Source of information/training:** it provides a key source of information for anyone involved in the daily management or operation of the building and to anyone carrying out work on the building and its services. It will be relevant to new staff and external contractors/consultants and may play a role in staff training and induction.
- **Dynamic document:** it is a place to log changes to the building and its operation. It is also used to log building energy performance and continual fine-tuning commissioning. It is essential that it is kept up-to-date. Alterations should only be made with the approval of the facilities manager and should be signed and dated by that person.

Further guidance on using building log books is given in the Carbon Trust's Good Practice Guide GPG 348: *Building log books — a user's guide*, available from www.thecarbontrust.co.uk

This building log book was prepared by

Phil Harris
PH Consultants
12 Balfour House
Lynne Road
York YO6 7AP

Facilities manager responsible for log-book:

D Smith
Wetherby House
Pentham, Essex
01987 654321

Signed: D Smith

Date: 27.5.03

Key responsibilities of facilities manager:

— to ensure that the log book is correct and up-to-date at building handover and when passing it on to a successor

— to ensure that the log book is kept up to date on an ongoing basis including any changes to the building fabric, services, operation or management

— to ensure that building maintenance and energy performance are logged

— to ensure that all those working in the building are made aware of the information contained in the log book

— to ensure that the log book is kept in its designated location at all times.

3 Links to other key documents

(Not more than one page)

Document (where applicable)	Location
Emergency procedures	Standard emergency procedures D/232 Vol. 1 (Main documentation cabinet)
Health and safety file master index	Master Health & Safety File D/228 Vol. 1 Section 1 (Main documentation cabinet)
Hazard register	Health & Safety File D/228 Vol. 1 Section 3 (Main documentation cabinet)
O&M manuals Mechanical Services (Vol. 1-4) Electrical services (Vol. 5-8) BMS (Vol. 9-11) Maintenance (Vol. 12-13) Commissioning (Vol. 14-15) Equipment details (Vol. 16-19)	Operations & Maintenance Manuals D/221 Volumes 1-19 (Main documentation cabinet)
Electronic asset register	F:/Building services/ Documentation/asset register 1
Record drawings	DWG 345/1-143 Mechanical DWG 345/344-521 Electrical DWG 345/522-611 Other (Drawings cabinet)
Boiler log book	D/247 Pocket on side of boiler
Emergency procedures	Standard emergency procedures D/232 Vol. 1 (Main documentation cabinet)
Health and safety file master index	Master Health & Safety File D/228 Vol. 1 Section 1 (Main documentation cabinet)

Location could be a physical place or an electronic location on a server or web page.

4 Main contacts

Emergency contact name 1 D Smith Wetherby House Pentham Essex Tel: 09876 54321 Dave@loa.com	**Emergency contact name 2** F Jones 4 Lincoln Place Fritham Essex UR3 IR1 Tel: 123 456790 Fred@rockwell.co.uk
Electricity emergency contact name Essex Electricity 3 Dale House Fritham Essex Tel: 1029 38847	**Gas emergency contact name** Surrey Gas 72 Winton Ave Pulham Surrey 7HT GH6 Tel: 5638 9193768
Architect Shelford Partners 77 Parkway Camden Town London RF5 NT7 Mr. S. May Tel: 020 7504 1700 Simon.may@ribsonshelford.com	**Building services consultants** Iceman Smith Paris Court 3 Versailles Gardens London 3BT BT6 Mr. S. Reynolds Tel: 020 7123 4567 S.Reynolds@Iceman -group.co.uk
Construction manager Beavis Lend Lease Ltd. 142 Northolt Road Eltham Middlesex 3XY 5TY Mr. S. Cook Tel: 020 899 8000 steve.cook@beavislendlease.co.uk	**Main sub-contractor** Sam Jones Landman Smith plc Pulborough Ave Winton Surrey 3HT FR8 593 71583768 Joness@landman.co.uk
Commissioning agents Excom Ltd 48 Tiffany Rd London 7NS HY3 Mr F Elliot Tel: 0498 755859 Elliotf@commech.com	**Mechanical services contractor** Proxima Building Services Ltd. 1 Michael Street London NY3 5BY Mr. P. Morley Tel: 020 7369 7634 e-mail: service@proxima.com
Electrical services contractor Clerks PLC 116-118 Wigham Road London 4GN JY9 Mr. P. Brown Tel: 020 7987 8000 brownp@clerks.co.uk	**Sprinkler services** Wormwood Fire Systems Bedford Avenue Heathrow Trading Estate Heathrow Berkshire 6MD SH9 Mr. A. Herman Tel: 020 7479 5909 AHerman@wormwood.com
Planning supervisor Beavis Lend Lease Ltd. 142 Northolt Road Eltham Middlesex 3XY 5TY Mr. D Stevens Tel: 020 899 8000 Dave.stevens@beavislendlease.co.uk	**O&M and log book producer** Watson & Sole Associates Ltd. 97 Westmead Road Sutton Surrey SM1 4HX Mr. P. Vermont Tel: 020 8642 1101 e-mail: paul.Vermont@watsonsole.co.uk

Ductwork contractor Daffy Ductwork Ltd. Trafford Park Industrial Estate Trafford East Sussex BH9 5DT Mr. D. Baldock Tel: 01975 63537323 baldock@daffy.co.uk	**Controls & BMS contractor** BMS Energy Control Ltd. Systems House Railway Road High Wycombe Bucks. PD4 7HG Mr. A. Macgregor Tel: 014794 3458000 e-mail: AMacGregor@ bmsec.com
Boiler maintenance contractor H Simpson Simpson & Son 234 Grand drive Springfield 01234 56789 hsimpson@groenig.co.uk	**A/C maintenance contractor** Mr B Squire Speedy Maintenance Circa square London WD3 7HS Tel: 0937 56473929 squire@speedym.co.uk

5 Commissioning, handover and compliance

(Not more than two pages, if possible)

Part L requires the building services systems be commissioned so that the system(s) and their controls are left in working order and can operate efficiently. Use CIBSE Commissioning Code M to develop a commissioning plan and ensure that the systems operate correctly.

Commissioning overview

CIBSE Commissioning Code	Followed? (Yes/No)	Certificate included in appendix? (Yes/No)
Code M: Commissioning management	Yes	Yes
Code A: Air distribution systems	Yes	Yes
Code B: Boilers	Yes	Yes
Code C: Automatic controls	Yes	Yes
Code L: Lighting	Yes	Yes
Code R: Refrigerating systems	Yes	Yes
Code W: Water distribution systems	Yes	Yes

Commissioning results

Commissioning period **March to April 2003** **Signed:** *F Elliot*	**1. Were the system and its controls installed as shown in the design drawings? (Yes/No)**	**2. Did operation meet the design specifications in all the required modes? (Yes/No)**	**3. Did the system operate efficiently in all modes? (Yes/No)**	**Comments/problems?** Where the answer is NO, indicate any commissioning problems or significant changes that have been made to the designs during (or as a result of) installation/commissioning, or any value engineering exercises, including any significant commissioning failures and remedial work that took place.
Lighting	Yes	Yes	Yes	
Fans	Yes	Yes	Yes	AHU No. 2 supply fan was replaced due to fault
Air handling units	Yes	Yes	Yes	
Pumps	Yes	Yes	Yes	
Mechanical cooling	Yes	Yes	Yes	Chiller performance was slightly lower than spec. but still within design limits
Heat rejection	Yes	Yes	Yes	
Space heating	Yes	Yes	Yes	Boiler No. 2 controls replaced due to problem on BMS
HWS	Yes	Yes	Yes	
Central BMS	Yes	Yes	Yes	
Lifts	Yes	Yes	Yes	

Air infiltration

A building air pressure test was carried out on 10.4.03 and showed a measured air permeability of 9.6 $(m^3/h)/m^2$, within the target standard of 10 $(m^3/h)/m^2$ at 50 Pa in Part L2. Some remedial work was carried out in riser 1 immediately before the test took place.

Insulation continuity

An infra-red thermography investigation was carried out to identify the continuity of insulation and any thermal bridging in the building fabric. These test showed a problem in one section of the roof space which has now been remedied and the fabric now complies with Part L2.

Handover

Handover took place on:	27.5.03
End of defects liability period:	27.5.04
The handover procedure was managed by:	Mr S May (for Shelford Partners, lead designer)

The documents handed over are listed in section 3

6 Overall building design

(Not more than three pages, if possible)

General description of building

Vermont Court is a 7-storey prestige air conditioned office located on the south side of Oldgate Street in the City of London. The site is bounded by Oldgate Street, Kings Head Passage and Pleasant Street. Central to the redevelopment is the creation of a new public square and Vermont Court faces the northern side of this new square. As part of this public space, there is an arcade or loggia which runs almost the full length of the southern site boundary. The building predominantly lies behind the loggia which forms the north side of the square. The central rectangle of the plan extends over and rests on the loggia, forming a pavilion on the south elevation.

The building is based around a steel framework lightweight concrete structure with stone cladding. The upper storeys of the building are set back to reduce the apparent bulk of the building. On the western side of the site, where local height restrictions are less onerous, the building extends two storeys higher than the eastern side. The building is served by a vehicular gyratory system at basement level, which provides access to car parking and for deliveries, waste collection etc.

Two atria on the west and east sides of a central office space provide daylight to the floors. The west atrium is designed to run from seventh floor level down to ground level, creating a pool of light at the main entrance from Peter Square. The east atrium extends from roof to second floor level. There are three service cores running up the building. Core 2 contains a bank of six 21-person passenger lifts which serve ground to seventh floors with one lift extended to the basement. Also in core 2 is a dedicated goods lift which serves from basement to 7th floor. Toilets are provided on each office floor located between cores 2 and 3.

The building has two basement levels. The (lower) basement provides service area for the offices, plant rooms, storage areas and car parking for 20 cars with a vehicle drop off point. The lower ground floor provides office ancillary space plus the upper part of double height plant rooms and service areas below.

The main entrance from Peter Square is on the ground floor with a second entrance from Oldgate Street with connected reception areas and some office space. The first floor comprises office space with increased floor to ceiling height, raised floors and increased services provision for dealing room facilities. The west atrium provides light to the main reception area below. The second, third, fourth, fifth floors provide general office space and the two atria run up through the building at each level. The east atrium base is at second floor level. The sixth and seventh floors cover roughly half the building footprint, providing office space and a single central atrium runs up through each level.

Client requirements

External design conditions

Summer: 29 °C dry-bulb at 20 °C wet-bulb
Winter: -4 °C saturated

Internal design conditions

Offices, summer: 22 °C ± 1.5 °C dB
Offices, winter: 22 °C ± 1.5 °C dB
Stairs: 20 °C minimum (heated only)
WC areas, winter: 20 °C minimum (no humidity control).
Plant rooms and storage areas: heated only to 10 °C minimum (no humidity control).
Atrium, winter: 15 °C minimum (heated only)
Entrance/reception, summer: 22 °C ± 1.5 °C dB
Entrance/reception, winter: 20 °C ± 1.5 °C dB

Lighting and power load densities for cooling base loads

Lighting: 12 W/m2
Small power and office equipment: 25 W/m2
Dealing areas: 120 W/m2
Additional small power (office): 15 W/m2 (provided within the riser)

Outside air provision

14.4 litres/second/person (allowing for a further 10% availability for meeting rooms on central AHUs)

Electrical design criteria for office floors

Lighting: 15 W/m2
Small power and office equipment: 25 W/m2
Dealing areas: 120 W/m2
Fan coil unit motor allowance: 7.5 W/m2
Provision for future: 15 W/m2 (provided within the riser)
High usage areas: an allowance of 500 W/m2 has been made for 50 m2 on each floor to allow for servers, telecoms etc.

Lighting

Levels of illumination (average maintained) are as follows:
General areas: 350-400 lux (measured 750 mm AFFL) 0.8 uniformity
Toilets: 200 lux
Corridors and stairs: 200 lux
Car park: 250 lux
Office storage: 100 lux

Conceptual design (see diagram below)

The building is fully air conditioned (with humidity control) by two main air handling units (AHUs) in the basement. These incorporate variable speed drive fans. Variable recirculation and a heat recovery device provide energy saving features. Three chillers in the basement provide chilled water to the AHUs and to fan coil units in the office ceiling voids and around the perimeter. Heat rejection is provided by dry coolers on the roof. Space heating is from two boilers located in the basement. The condenser and chilled water pumps are variable speed drive although the secondary circuits are not.

The building is controlled via a building management system (BMS) from BMS Energy Control Ltd via a central supervisor PC in the main building operations room. The two atria provide daylight to the floors but do not contribute to the ventilation strategy. Lighting is generally fluorescent with automatic lighting controls via the BMS. Domestic hot water is provided by central gas fired storage water heaters on each floor. Six lifts provide access to the office floors.

Special design features

- heat recovery on the AHUs
- variable speed drive fans and pumps
- daylighting via the two atria
- automatic lighting controls via the BMS

Design assessment

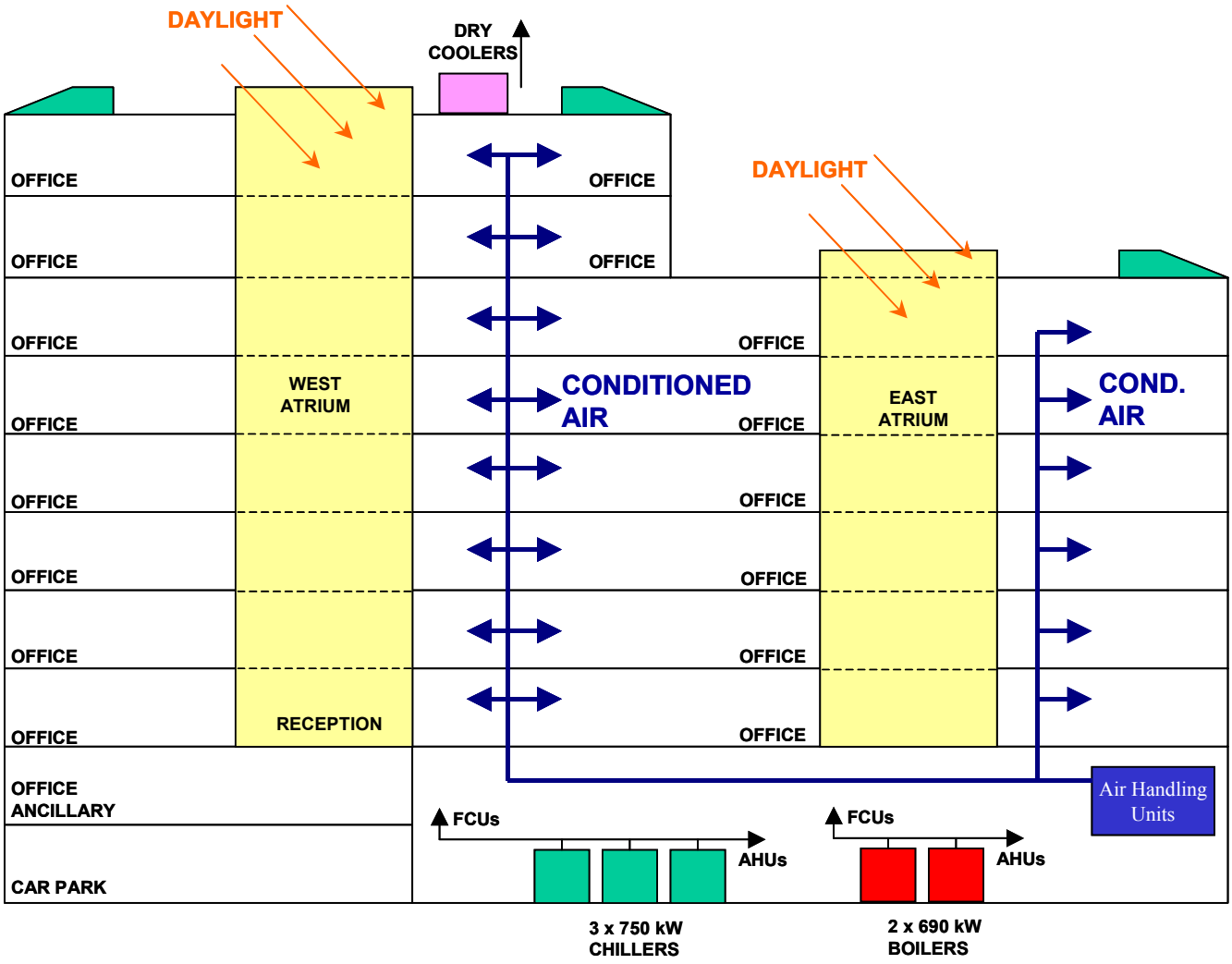
The design team carried out an assessment of carbon emissions using the carbon emissions method. This showed the calculated annual carbon emissions of the building are estimated to be 36.4 kg C/m^2/yr and this should be no greater than those from a notional building of the same size and shape designed to comply with the Elemental Method.

Key interactions

Return air is extracted through the light fittings in the open plan office areas in order to reduce internal heat gains to the space.

The two atria are used to capture daylight but overheating may occur in the top of the atria during summer. An overheat sensor then opens vents in the atria roof space.

Rotary heat recovery wheels in the two main AHUs recover heat from return air back into the supply.



Benefits and limitations of the design

There is a maximum occupancy density of 10 persons/m^2 throughout the whole building, and exceeding this will give rise to summer overheating and poor comfort conditions.

Key 'dos and don'ts'

Do:

(1) Ensure good filter maintenance in AHUs to avoid restricting air flow.
(2) Carry out surveys to ensure that local heating/cooling controls are set correctly.
(3) Ensure that AHU heat recovery only takes place when it is advantageous.

Don't:

(1) Allow additional office equipment to be added that may exceed design heat gains leading to comfort problems – particularly in the dealing areas.
(2) Run the main plant beyond the actual occupancy requirements – in particular, avoid 24 hrs/day operation.
(3) Allow local control settings to result in excessive heating/cooling consumption.

7 Summary of areas and occupancy

(Not more than one page of text plus one simple plan per floor)

Occupancy and activities

Level	NIA (m2)	Occupancy type	Floor space factor (persons/m^2)	Population sum
Basement	0			
Lower Ground	0			
Ground	2,800	Office	12	233
First	2,699	Dealer	7	270
Second	2,843	Office	12	237
Third	2,750	Office	12	229
Fourth	2,750	Office	12	229
Fifth	2,501	Office	12	208
Sixth	1,341	Office	12	112
Seventh	1,059	Office	12	88
Eighth	0			
Sum	18,742			1,607

The total number of occupants in the building is 1607 (based on core hours of use)

Main occupied areas	Weekday hours	Saturday hours	Sunday hours	Total hours/week	Flextime (Yes/No?)	Late working sometimes (Yes/No?)	No. of occupants
Dealing Floor	07.00-21.00	09.00-12.00	None	73	Yes	Yes	270
General offices	08.00-18.00	None	None	50	Yes	Yes	1330
Restaurant catering staff	06.00-15.00	None	None	45	No	No	7

Floor areas

The total floor area of the building is 27,531 m^2 (based on gross floor area)

	% of total area by servicing system						Total %	Total area (m^2)
Area type	**Untreated (%)**	**Naturally ventilated (%)**	**Mechanically ventilated (%)**	**Mixed mode (%)**	**Heating and cooling only (%)**	**Full air conditioning with humidity control (%)**		
Basement	9.36%		4.11%				13.47%	3,708
Lower Ground	0.53%		5.62%				6.15%	1,693
Ground	1.15%		6.35%			4.19%	11.69%	3,218
First	0.80%		0.83%			9.64%	11.27%	3,103
Second	0.85%		0.80%	0.38%		9.84%	11.87%	3,268
Third	0.82%		0.84%			9.82%	11.48%	3,161
Fourth	0.81%		0.84%			9.83%	11.48%	3,161
Fifth	0.82%		0.86%			8.76%	10.44%	2,874
Sixth	1.46%		0.64%			3.50%	5.60%	1,542
Seventh	0.44%		0.48%			3.50%	4.42%	1,217
Eighth	1.81%		0.34%			0.00%	2.15%	592
Total %	18.85%		21.71%	0.38%		59.08%	100%	
Total area (m^2)	5,190		5,977	105		16,265		27,531

Tenancies

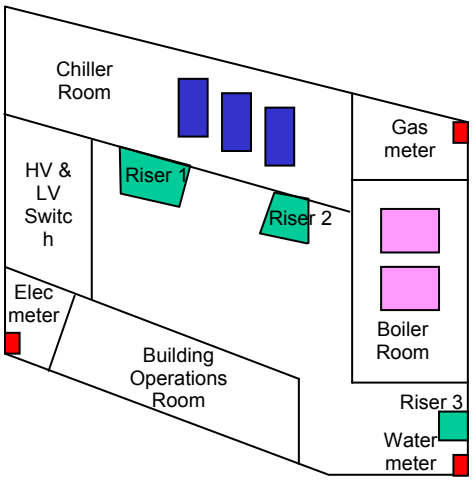
There are no sub-tenancies within the building.

Separately managed and special areas

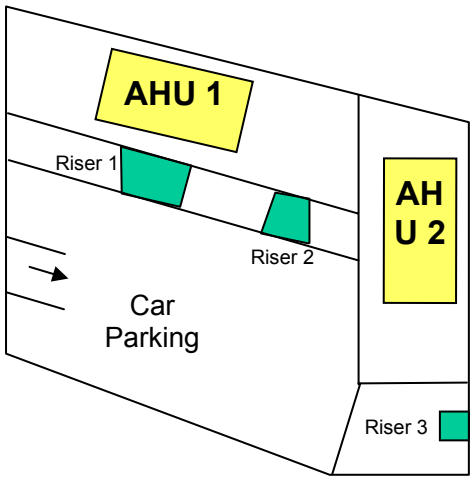
The restaurant and kitchens are a separately managed area under the control of the caterers (W Peabody Ltd). Separate energy metering allows them to be billed for what they use on a monthly basis. Occupant information is provided for this separately managed area under section 10.

Floor 5 houses a computer/telecom suite with separate air conditioning. Separate energy metering allows consumption to be monitored but this is not used for billing purposes.

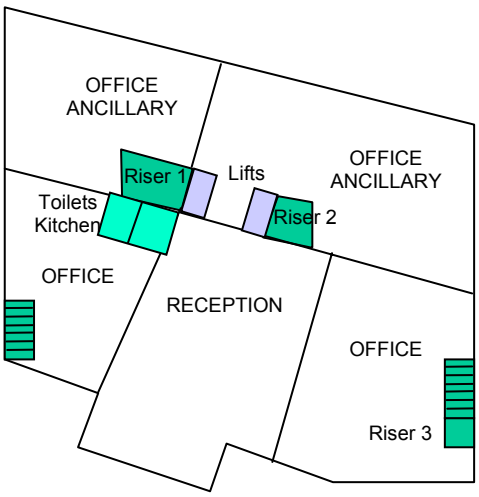
Floor plans



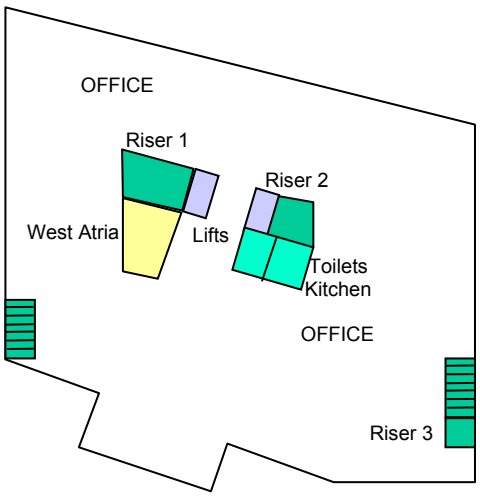
Lower Basement



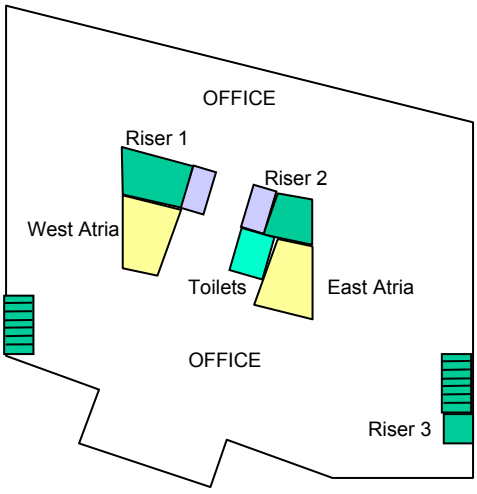
Basement



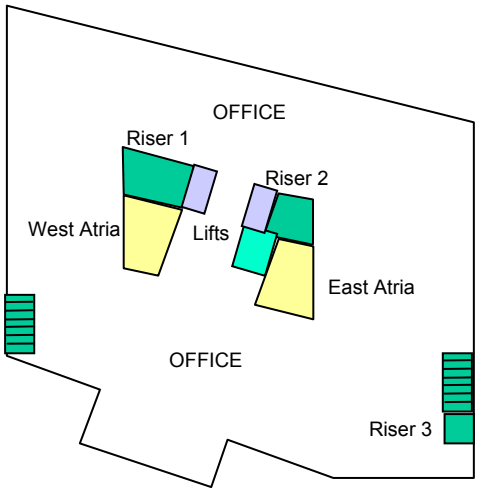
Ground



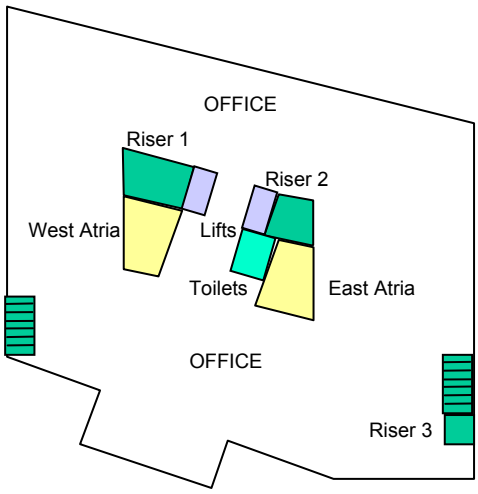
First Floor



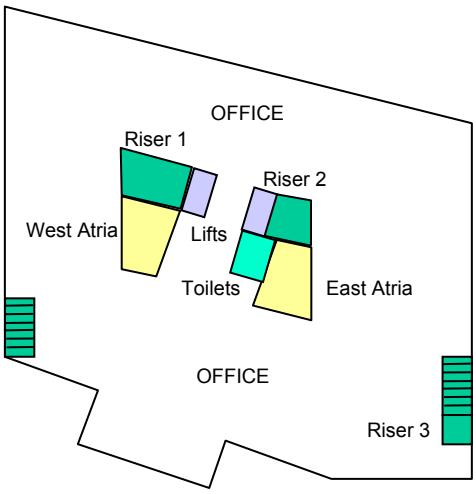
Second Floor



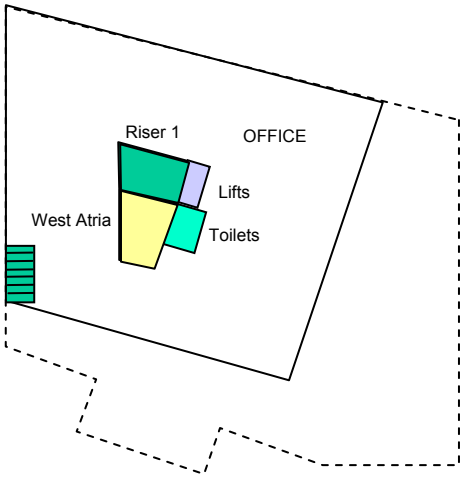
Third Floor



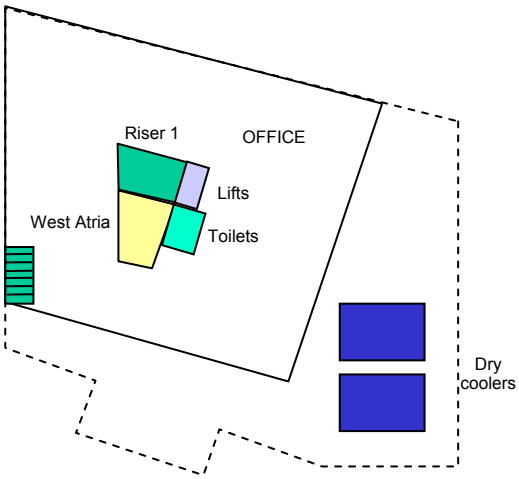
Fourth Floor



Fifth Floor



Sixth Floor



Seventh Floor

8 Summary of main building services plant

(Not more than one summary page and one page per main system)

Main plant items above 3 kW are shown below. The asset register (F:/Building services/ documentation/asset register1) provides further detail.

Main plant	Location	Input (kW)	Output (kW)
VENTILATION			
AHU1 supply fan	Basement plant room	55	
AHU1 extract fan	Basement plant room	30	
AHU2 supply fan	Basement plant room	55	
AHU2 extract fan	Basement plant room	30	
Smoke extract fans F 13 & 14	Level 6 roof	5.5	
Smoke extract fans F 15 & 16	Level 6 roof	5.5	
Smoke extract fans F 17 & 18	Level 8 roof	5.5	
Smoke extract fans F 19 & 20	Level 8 roof	5.5	
AHU3 supply fan	Basement South East	5	
Basement extract fans F 11 & 12	Basement plant room	5	
AHU4 supply fan	Basement South East	2	
Basement extract fans F 23 & 24	Basement plant room	3	
Atrium smoke extract fans SF 01 & 02	Level 8 roof plant area	22	
Atrium smoke extract fans SF 03 & 04	Level 6 roof plant area	22	
Atrium extract fan F 21	Level 8 roof plant area	3	
Atrium extract fan F 22	Level 6 roof plant area	3	
Plant room extract fans F 02 & 03	AHU 2 basement plant room	3	
Toilet extract fan F 10	Level 8 roof	5	
Car park/loading bay extract fans F08 & 09	Basement	30	
COOLING			
Water cooled chillers	Basement chiller room	3 x 250	3 x 750
Packaged dry coolers fans 01 to 06	Roof level	5 kW x 10	
Condenser water pump (P 05 & 06)	Basement pump room	2 x 45 (R&S)	
Chilled water primary pumps (P01 & 02)	Basement pump room	2 x 25 (R&S)	
Chilled water secondary pumps (P 03 & 04)	Basement pump room	2 x 33 (R&S)	
LTHW SPACE HEATING			
LTHW boilers B1 & B2	Basement boiler room		2 x 690
LTHW pumps LTHW P-1A & 1B	Basement pump room	7	
LTHW pumps LTHW P-2A & 2B	Basement pump room	7	
LIFTS			
6 passenger lift motors	Lift motor rooms A & B	6 x 10	
Goods lift motor	Goods lift motor room	8	

Utilities

Electricity distribution

Electrical power is provided to the building by Essex electricity at 11,000 volts via switch gear in the basement. The main incoming electricity meters located in the incoming services room LB 43b in the lower basement. Two incoming HV solka ring supplies from diverse routes are separately routed, from opposite directions and separated externally and internally within the building. Rising bus-bar mains utilising three phase plug-in tap-off units on each floor for any future tenants fit out of distribution boards. A future tenant electrical riser, each with a rising bus bar is provided at each core. Power factor correction to major items of plant will be provided locally at plant item.

Generator sets to supply life safety system are located at 8th floor level with a 48-hour oil storage tank in the basement. Two diesel driven 350 kVA generator sets provide emergency supplies to designated core building services. Two separate 300 kVA UPS installations provide conditioned power and back up facilities for the dealing room and 5th floor computer suite. See drawing no. DWG 345/344.

Gas distribution

One metered mains gas supply is provided by Surrey Gas to supply the boilers, storage water heater and some catering appliances. The meter is located in room LB 42a in the lower basement and is automatically adjusted for pressure and temperature of the supply. See drawing no. DWG 345/18.

Water services

Three incoming mains water supplies are provided by Thames Water Authority from the mains consisting of one metered domestic supply and two fire main supplies. The main meter is located in the lower basement room LB 47a.

The cold water distribution system will be divided into mains pressure and two separate booster pump systems. The mains pressure system includes supply to the domestic water tanks and cold water supply to booster pumps. The booster pump system services building domestic water requirements (i.e. toilet fixtures, drinking water, HVAC requirements etc). See drawing no. DWG 345/48.

Ventilation

Central primary air handling plant is provided within the basement plant room to serve the office areas. Two main air handling plant are AHU 1 located in basement North West and AHU 2 located in Basement North East. These comprise: inlet dampers, filters, electrical frost coil, heater battery, cooling coil, heat recovery section, supply and extract fans and controls. Supply and extract air is distributed via ductwork within the core to serve fan coil units on each floor. The air handling units also have an adiabatic type humidifier. Intake will be provided to fresh air systems from sixth floor roof. Fresh air supplies are provided from core 2 and core 3, with return air connections from core 1, core 2 and core 3. See drawing no. DWG 345/105.

Control settings

Supply temperatures are 21°C ± 1.5°C in winter and automatically adjusted down to 16°C ± 1.5°C in summer. AHU 1 fans operate from 06.30 to 18.00, 5 days per week. AHU 2 fans operate 05.00 to 21.00 weekdays and 08.00 to 12.00 Saturday for the dealing floor. A small element of optimum start control is imposed by the BMS.

Plant capacity

Total installed fan capacity is 220 kW with an installed power density of 8 W/m^2 based on the overall gross floor area.

Energy/water saving features

Heat recovery via a thermal wheel, variable recirculation and variable speed fans.

Other air conditioning

AHU3 and extract fans provide ventilation for the basement storage areas.
AHU4 and extract fans provide ventilation for the basement electrical switch rooms.

Other mechanical ventilation/extract

The following spaces are mechanically ventilated:

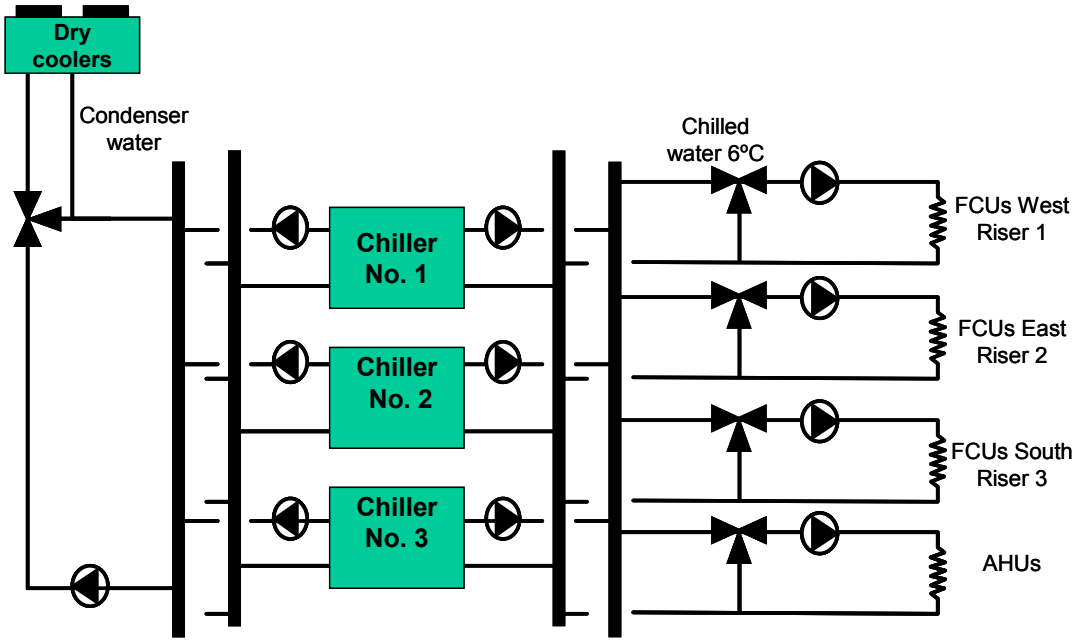
- Toilet extract 10 air changes/hour with duty and standby fans
- Service yard 6 air changes/hour normal; 10 air changes/hour smoke extract
- Car park 6 air changes/hour normal; 10 air changes/hour smoke extract
- Basement plant rooms 3 air changes/hour normal; 10 air changes/hour smoke exhaust
- Oil storage room 3 air changes/hour normal; 10 air changes/hour smoke exhaust
- East and west atrium: up to 3 air changes/hour normal

Cooling

Chilled water is generated by three 750 kW Carrier water cooled packaged chillers using R134a located in the basement level (each at 33% of the total load). Six 380 kW Guntner dry coolers at eighth floor level provide heat rejection via a condenser circuit. Condenser water pumps circulate between chillers and dry coolers. The chilled water pumps circulate chilled water to the central air handling plant and also via a secondary injection system to fan coil units on each floor located in the roof space and around the perimeter. Two chilled water flow and return risers are provided, one in core 2 and one in core 3. See drawing No. DWG 345/158.

The central plant cooling load equipment sizing relies on internal blinds fitted to all external perimeter offices. The 8th floor roof level house toilet and atrium ventilation plant and space for tenant's plant within screened roof enclosure.

Cooling system schematic



Plant capacity

The overall installed plant has a cooling capacity (output) of 2,250 kW and an installed power density of 82 W/m2 based on the overall gross floor area.

Control settings

Chilled water is supplied at 6°C at full load and the BMS increase this to 12°C depending upon weather conditions. Chillers operate from 05.00 to 21.00 weekdays and 08.00 to 12.00 Saturday.

Energy saving features

Electronic capacity control of six stage of cooling on each machine.

Other cooling plant

Seven Mitsubishi packaged split air conditioning units provide cooling for the ground floor security room, LV Switch room 1 (2 units), LV Switch room 2 (2 units) and the goods lift motor room (2 units), all of which are located in the loading bay.

Lighting

Lighting in the offices is generally fluorescent. The entrance lobby reception ground floor lift lobby feature lighting has recessed down-lighters, wall washers and cold cathode feature lighting. Lift lobbies (typical office floors) have feature lighting recessed down-lighters. The atria feature lighting uses recessed down-lighters. Toilets have recessed down-lighters switched from the toilet lobby but also controlled by absence detection. Fluorescent luminaires light the general areas e.g. BMS/security room and fire command centre, plant areas, cleaners cupboards and stairs. The service yard and parking area have external quality discharge lamp luminaires. Atrium lighting consists of twin halide spot luminaires, mounted within bridge structure; contactor controlled switching from security room. See drawing No DWG 345/442.

Emergency lighting is a 3-hour self maintained battery unit within the luminaire.

Fixed external architectural features provide shading when the sun is highest and hottest.

Plant capacity

Total installed lighting capacity is 335 kW with an installed power density of 12 W/m^2 based on the overall gross floor area.

Control settings

The BMS carried out a progressive lighting shut down at 22.00. The majority of the office lighting has reset control where lights are shut off at certain set times and occupants rest to ON if required using infra red remote controls. Perimeter lighting to a depth of 6 m have automatic dimming controls related to the amount of daylight. Toilet areas have absence detection (movement sensor) controls.

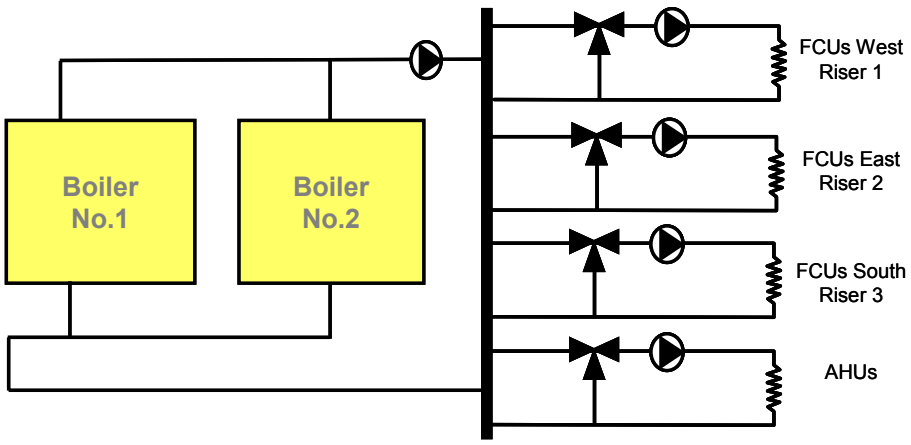
Energy/water saving features

High frequency control gear on all fluorescent fittings plus reset control and absence detection.

Space heating

Space heating is provided by 2 x 690 kW gas fired Hamworthy boilers located in the basement with flues up riser 1. These supply LPHW at 82 °C to heater batteries in the main AHUs to provide central fresh air heating. Perimeter heating to offices is provided by the perimeter fan coil units. The fan coil units mounted in the ceiling do not provide any heating. Radiators provide background heating in toilets and staircases. See drawing no. DWG 345/45.

Heating system schematic



Plant capacity

Total installed heating capacity is 1,380 kW with an installed power density of 50 W/m^2 based on the overall gross floor area.

Control settings

Low pressure hot water is supplied at 82 °C at full load and the BMS decreases this to 65 °C depending upon weather conditions. Boilers operate from 05.00 to 21.00 weekdays and 08.00 to 12.00 Saturday. The boilers are sequenced in four stages.

Safety features

High limit and safety thermostat provide safety controls.

Energy/water saving features

These are non-condensing boilers but have good efficiency down to part load conditions.

Tips for good operation

Ensure that occupants do not feel cold draughts in milder weather when water temperatures have been decreased.

Domestic hot water (HWS)

Hot water is provided by 2 x 125 kW Hamworthy gas fired storage water heaters located in the basement. These supply a circulating loop that feeds toilets and kitchenettes on each floor plus the main kitchens on the ground floor. See drawing no. DWG 345/47.

Plant capacity

Total installed hot water capacity is 250 kW with an installed power density of 9 W/m^2 based on the overall gross floor area.

Control settings

Hot water is controlled to 60 °C at the outlets. Time schedules are from 05.00 to 21.00 weekdays and 08.00 to 12.00 Saturday. The water heaters are sequenced in four stages.

Safety features

The controls ensure a temperature that will prevent legionella and the water heaters have high limit and safety thermostats.

Energy/water saving features

All toilets and kitchenettes have timed spray taps. The dishwasher in the main kitchens is a low water usage device.

Lifts

There are six 21-person (1600 kg) passenger lifts travelling at 1.6 metres per second serving ground to 7th floors. The group of passenger lifts provide an interval time of less than 30 seconds with a handling capacity greater than 15%. One of this group of lifts will also serve basement and lower ground floor levels. Three firefighting lifts are provided. The lift in core 2 will serve basement to 6th and 7th floors, and the two in cores 1 and 3 serve ground to 5th floors. One dedicated 2500 kg goods serves the basement to 7th floors of the office accommodation.

9 Overview of controls/BMS

(Not more than two pages)

The building is controlled via a building management system (BMS). This comprises stand alone intelligent out stations which control and monitor the plant, connected together via a digital communication network back to central data gathering and reporting supervisory station.

The intelligent out stations are distributed throughout the building within the plant rooms and service risers to serve adjacent areas and plant. The out stations are capable of local interrogation and have a battery backed up memory. Outstations are provided at every other floor to provide sufficient BMS points capacity.

The operator's supervisory terminal is one central PC terminal located in the fire command centre and comprises dynamic colour graphics display, printer and central data processing unit providing priority based alarm handling and historical data file processing. 10% spare BMS points will be provided to make the system capable of limited extension.

Main control/monitoring functions

All main plant is connected to the BMS:

- ventilation plant
- cooling plant
- heating and hot water plant
- lighting

All the above is both controlled and monitored with alarm functions to indicate limits have been exceeded. Incoming energy/water meters are connected to the BMS. Sub-meters on the chillers, boilers and AHU fans are also connected to the BMS.

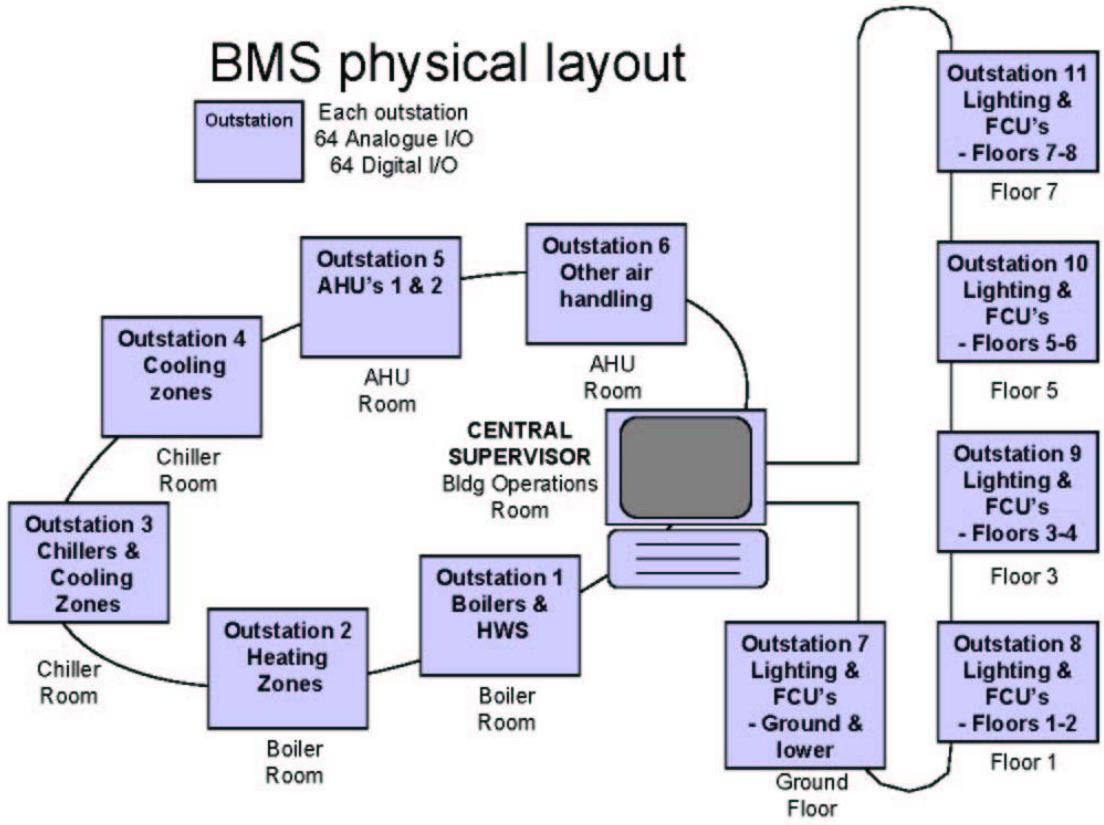
Authorised personnel

Staff have been trained and given access passwords for:

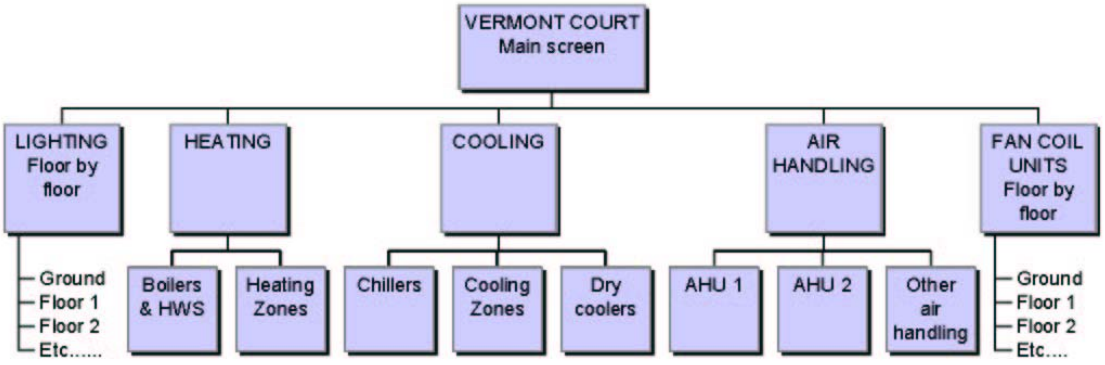
Top level access:
D Smith – Facilities manager
S Johnson – Head works engineer
B Hardwick – Shift leader
P Gent – Shift leader
S Wilkins – Shift leader

Secondary access:
All internal maintenance/works engineers

BMS physical layout



BMS software hierarchy



10 Occupant information

(This information should be photocopied and passed on to the building occupants, particularly new staff members)

(Not more than two pages)

Your working environment

In order to achieve a good working environment it is important that you understand how to control the building services in your space.

OFFICES

Air conditioning

Your office space is air conditioned, that's why the windows are not openable. You will get cooling in summer and heating in winter depending on how you set the thermostat. The conditioned air comes from units in the ceiling and around the perimeter at low level.

The system is divided into zones controlled by local thermostats located on the central pillars.

Set the temperature you require and then leave it for a while to see how the temperature settles down. Make minor adjustments if necessary but don't alter them too much as the system may over compensate and you will get too hot/cold.

These thermostats should generally be set to around 20-21 °C in winter and up to 24 °C in summer. Avoid over-heating and over-cooling as this wastes energy.

Lighting

The fluorescent lighting is controlled by switches located on the central pillars and by the main doors. In order to save energy the lights have a number of energy saving features:

- Some lights are automatically shut off at certain set times and you will need to switch them back ON using the infra red remote controls provided.
- The lights near the windows have automatic dimming controls related to the amount of daylight.
- Lights in the toilets have switch ON when they detect someone moving and OFF when nobody is in the room.

Only switch the lights on that you need and make sure you switch them off before you leave.

Office equipment

The more that PCs, printers etc. are left on unnecessarily, the more likely that your office will overheat. This also wastes energy — make sure any energy saving features are turned ON to automatically power down equipment after a certain time.

Simple energy 'dos and don'ts'

- Avoid blocking radiators or ventilation grilles with furniture and books as this will result in a lack of heating/ventilation.
- Set thermostats to the required temperature then leave them alone. Do not use them as ON/OFF switches.
- Set thermostatic radiator valves (TRVs) to the required temperature then leave them alone. Do not use them as ON/OFF switches. If you turn these fully OFF on Friday night then don't expect heat on Monday morning.

- Do not overheat or over-cool your space as this increases running costs and causes extra emissions of CO_2 into the external atmosphere, contributing to global warming.
- Only switch the lights ON as and when necessary as they result in significant emissions of CO_2 into the external atmosphere, contributing to global warming.
- Ensure that PCs, printers etc. are not left ON unnecessarily and have any energy saving features turned ON as this will prevent your space from overheating.

RESTAURANT/KITCHEN

Kitchen extract

is controlled by a manual switch on the wall next to the main hobs. The hob burners won't light unless you switch this on for safety purposes. To save energy, make sure you only switch this extract system ON when you need it and switch it OFF before you leave.

Hobs and ovens

Only switch hobs and ovens ON when you need them in order to save energy.

Fridges/freezers

Keep the doors closed as much as possible in order to save energy

Dishwasher

Make sure the dishwasher only operates with full racks — half loads will waste energy

Hot water

Only use the hot water you really need in order to save energy

Save energy

Kitchens can use significant amounts of electricity, gas and hot water. Controlling the kitchen equipment properly will help reduce running costs and avoid extra emissions of CO_2 into the external atmosphere that contribute to global warming.

11 Metering, monitoring and targeting strategy

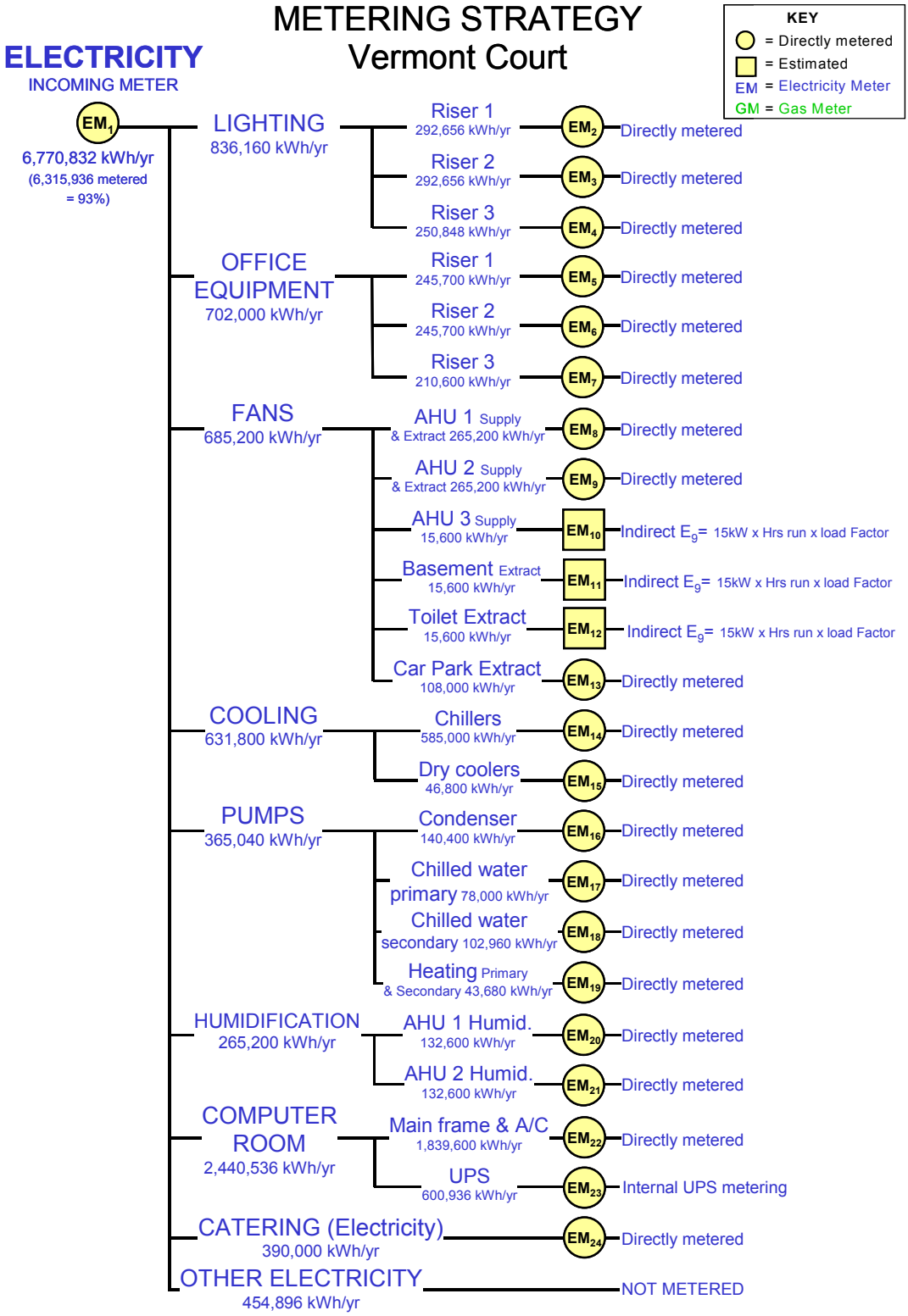
(Not more than three pages)

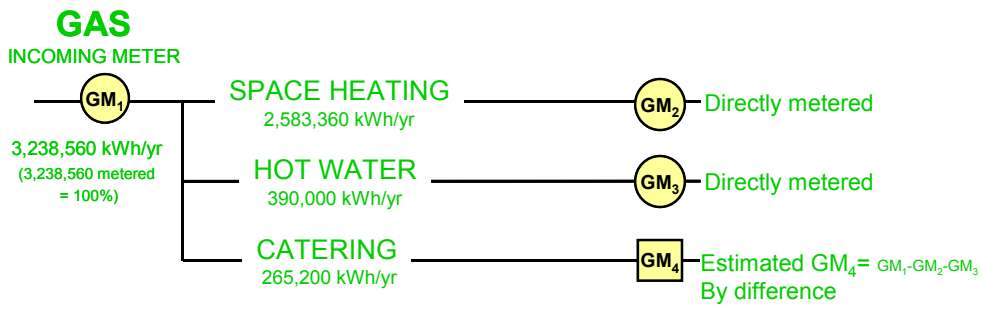
Metering schedule

The following provides a list of meters and design estimates of the likely end use consumptions. See CIBSE TM39: *Building energy metering,* for an example, including how to arrive at a good metering schedule. CIBSE TM22: *Energy assessment and reporting method* also provides a means of assessing energy use in buildings.

Total estimated incoming fuel			Electricity: 7,677,227 kW·h/yr Gas: 3,783,910 kW·h/yr					
Energy			**Meters**		**Method**		**Meter location**	
Type of incoming energy	Main end-use	Estimated end use consumption (kW·h/yr)	Meter no./code	End use/ area/system/circuit or tenancy to be measured	Measurement method and calculation where appropriate	Estimated consumption through each meter (kW·h/yr)	List of meters	Location
ELECTRICITY	MAIN INCOMING		EM1		Directly metered			
	LIGHTING	1,075,685	EM2	Lighting riser 1	Directly metered	344,719	Electricity meter	Basement riser 1
			EM3	Lighting riser 2	Directly metered	387,746	Electricity meter	Basement riser 2
			EM4	Lighting riser 3	Directly metered	343,220	Electricity meter	Basement Riser 3
	SMALL POWER	828,100	EM5	Small power riser 1	Directly metered	273,273	Electricity meter	Basement riser 1
			EM6	Small power riser 2	Directly metered	306,397	Electricity meter	Basement riser 2
			EM7	Small power riser 3	Directly metered	248,430	Electricity meter	Basement riser 3
	FANS	734,500	EM8	AHU1 Supply & extract fans	Directly metered	308,490	Electricity meter	Basement AHU plant room
			EM9	AHU 2 Supply & extract fans	Directly metered	286,455	Electricity meter	Basement AHU plant room
			EM10	AHU 3 Supply fan	Indirect	19,832	Hours run	Basement AHU plant room
			EM11	Basement extract fans	Indirect	16,894	Hours run	Car park plant room
			EM12	Toilet extract fan	Indirect	22,035	Hours run	Roof plant room
			EM13	Car park extract	Directly metered	80,795	Electricity meter	Car park plant room
	COOLING	904,150	EM14	Chillers	Directly metered	836,550	Electricity meter	Chiller plant room
			EM15	Dry cooler fans	Directly metered	67,600	Electricity meter	Roof
	PUMPS	395,460	EM16	Condenser pump	Directly metered	152,100	Electricity meter	Chiller plant room
			EM17	Chilled water primary pump	Directly metered	84,500	Electricity meter	Chiller plant room
			EM18	Chilled water secondary pump	Directly metered	111,540	Electricity meter	Chiller plant room
			EM19	Heating pumps	Directly metered	47,320	Electricity meter	Basement boiler room
	HUMIDIFICATION	287,300	EM20	AHU 1 humidifier	Directly metered	142,550	Electricity meter	Basement AHU plant room
			EM21	AHU 2 humidifier	Directly metered	144,750	Electricity meter	Basement AHU plant room
	COMPUTER ROOM	2,526,384	EM22	Main frame and A/c	Directly metered	1,839,600	Electricity meter	Computer suite supply panel
			EM23	UPS	Directly metered	686,784	Internal UPS	UPS room
	CATERING	420,000	EM24	Catering (Electricity)	Directly metered	420,000	Electricity meter	Kitchen
GAS	MAIN INCOMING		GM1		Directly metered			
	SPACE HTG	3,031,860	GM2	Heating boilers	Directly metered	3,031,860	Gas meter	Basement boiler room
	DHW	464,750	GM3	Hot water	Directly metered	464,750	Gas meter	Basement boiler room
	CATERING (GAS)	287,300	GM4	Catering (Gas)	Estimated by difference	287,300	None	Kitchen

Metering strategy





Read the meters monthly and log the readings on the meter reading pro forma in a separate file. From these readings add up the energy consumption for each end use for the year and log these in the building performance section. See GPG 348 for an example.

12 Building performance records

(Not more than three pages)

Overall annual energy performance

Summary of overall annual electricity, fossil fuel consumption and CO_2 against simple benchmarks. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building log books – a user's guide*. A copy is included on the CD-ROM issued with CIBSE TM31; printed copies are available from (www.thecarbontrust.co.uk).

Building energy performance for period from *[date]* to *[date]*

Based on a gross floor area of *[number]* m^2

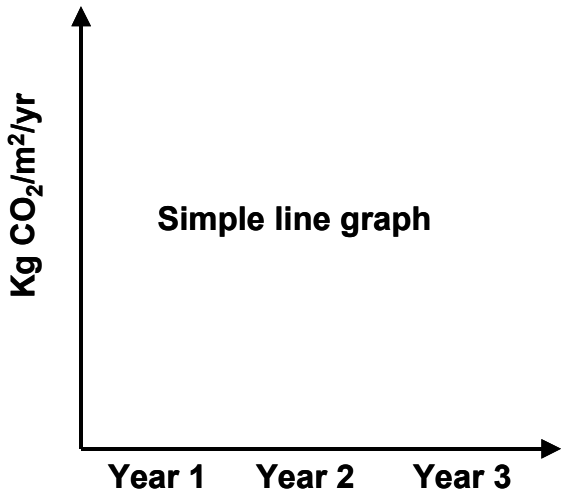
Fuel	Quantity	(A) (kW·h)	(B) CO_2 ratio	(C) (kg CO_2)	(D) Actual (kg CO_2/m^2)	(E) Design estimates (kg CO_2/m^2)	(F) Good practice benchmark (kg CO_2/m^2)
Electricity			0.43*			105.7	85.5
Gas			0.19			26.9	18.4
TOTAL						**133.6**	**103.9**
Electricity			0.43*			105.7	85.5

* This value may change year to year due to changes in the mix of electricity generation plant. Current figures are available from the Energy and Environment Helpline (0800 585 794) or www.actionenergy.org.uk

Ensure that actual consumption figures do not include estimated bills and ensure they relate to a full exact 12 month period. (If not then record actual and adjust by number of days missing/extra). Use the total gross floor area shown in section 5. Multiply column (A) by column (B) to get (C) then divide by treated total building floor area to get (D) for comparison with benchmarks in columns (E) and (F). One overall performance indicator can be established by totalling column (D). Avoid adding column (A) as the fuels have different costs and CO_2 factors.

Historical building performance graph *(in graphical form)*

Facilities manger to insert a graph of the above figures over time to track performance against a benchmark and original design estimates.



CIBSE TM22: *Energy assessment and reporting methodology* provides software to help assess building energy performance using either a simple or a detailed approach. This includes benchmarks for a variety of buildings. A wider range of benchmarks is available in the series of Energy Consumption Guides produced by the Carbon Trust (www.thecarbontrust.co.uk), e.g. ECG019: *Energy use in offices*, and CIBSE Guide F: *Energy efficiency in buildings*.

Asset and operational ratings

Insert the asset and/or operational ratings taken from any energy certification process.

Date	Asset rating	Method used	Operational rating	Method used

Energy end use comparison

Annual summary of actual metered consumption per square metre and the design team's estimates versus benchmarks broken down by main end-uses. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building log books – a user's guide*. A copy is included on the CD-ROM issued with CIBSE TM31; printed copies are available from (www.thecarbontrust.co.uk).

Building energy performance for period from *[date]* to *[date]*

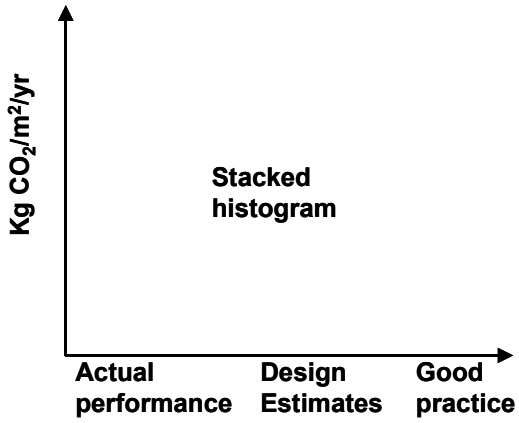
Based on a gross floor area of *[number]* m^2

Fuel type	**Main end use**	**Actual** Metered incoming consumption ((kW·h)/yr)	**Actual** Sub-metered main end use energy consumption ((kW·h/m^2)/yr)	**Design estimates** Main end use energy consumption (kW·h/m^2)/yr	**Good practice benchmark** Main end use energy consumption ((kW·h/m^2)/yr)
ELECTRICITY	Lighting			30.4	24.7
	Office equipment			25.5	19.6
	Fans			24.9	20.4
	Cooling			22.9	17.9
	Pumps			13.3	10.2
	Humidification			9.6	10.2
	Computer room			88.6	74.0
	Catering (electricity)			14.2	11.1
	Total sub-metered electricity				
	Total from incoming meter			245.9	198.9
	Other (unmetered) electricity			16.5	11.1
	Percentage unmetered				
GAS	Space heating			117.6	80.8
	Domestic hot water			14.2	10.2
	Catering (Gas)			9.6	6.0
	Total sub-metered gas				
	Total from incoming meter			141.4	96.9
	Other (unmetered) egas			0.0	0.0
	Percentage unmetered				

Keep the fuels separate as they have different costs and CO_2 emissions

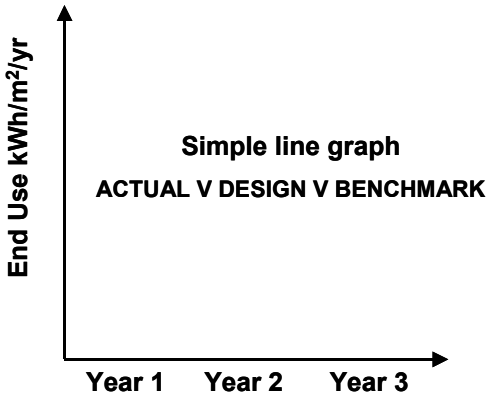
Annual graph of end use breakdown *(in graphical form)*

Facilities manager to insert a graph of the above figures as per Energy Consumption Guide ECG 019[1] or CIBSE TM22[2] to compare end use performance with end use benchmarks etc. See Good Practice Guide GPG 348[3] for examples.



Historical graph of end-use performance *(in graphical form)*

Facilities managers to insert a graph of the above end use figures over time to track performance against end use benchmarks etc. See Good Practice Guide GPG 348[3] for examples.



References

(1) *Energy efficiency in offices* Energy Consumption Guide ECG019 (Carbon Trust) (2000) (www.thecarbontrust.co.uk)

(2) *Energy Assessment and Reporting Methodology – Office Assessment Method* CIBSE TM22 (London: Chartered Institution of Building Services Engineers) (2003)

(3) *Building log books — a user's guide* GPG 348 (Carbon Trust) (2000) (www.thecarbontrust.co.uk)

13 Summary of maintenance

(Not more than two pages)

Maintenance overview

Simpson & Son has a contract to maintain the boilers. Speedy Maintenance Ltd has a contract to maintain all chillers and air handling plant. (See section 4 for addresses.) A small complement of internal staff maintain the remainder of the building including day-to-day management of the BMS.

Maintenance review

Review period *[period]* **Signed:**	**1. Are you reasonably satisfied with the maintenance on this system? (Yes/No)**	**2. Is this system capable of working in all the required modes? (Yes/No)**	**3. If not, is this due to poor maintenance? (Yes/No)**	**Comments/problems?** e.g. maintenance not carried out (give reason) Indicate any major changes to the general arrangement for maintenance including any changes in maintenance regimes or contracts
Lighting				
Main air handling plant				
Minor fans				
Chillers				
Cooling pumps				
Dry coolers				
Humidification				
Computer room A/C				
Lifts				
Catering				
Space heating boilers and pumps				
DHW heater and pumps				

Maintenance/plant failures

Facilities manager to insert a summary of any major plant failures and how these relate to the maintenance regimes or contracts. This should describe what happened, when, why and what action was taken to overcome the problem.

14 Results of in-use investigations

(Not more than one page per investigation)

Defects liability work

Facilities manager to insert a summary of any major remedial work in the period between practical completion (handover) and the end of the defects liability period

'Sea trials'

Facilities manager to insert a summary of any initial 'sea trials' which involve members of the design team monitoring and fine-tuning the building after practical completion (handover).

Post occupancy evaluations

Facilities manager to insert a summary of any post occupancy evaluations, e.g. investigations of energy performance and/or occupant satisfaction.

Surveys

Facilities manager to insert a summary of results from any maintenance, condition or energy surveys.

Inspections

Summary of results of boiler or air conditioning inspections required under the EU directive 'Energy Performance of Buildings' and any actions taken

Appendix: relevant compliance and test certificates

1. Commissioning completion certificate