Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Admin Office	NO (-69.4%)	NO
01_Admin Space	NO (-87.1%)	NO
01_Anaesthetic Room	NO (-42.3%)	NO
01_Audiology Manager	N/A	N/A
01_Breast Treat	N/A	N/A
01_C.U. 004	NO (-77.2%)	NO
01_C.U. 005	NO (-62%)	NO
01_C.U. 010	N/A	N/A
01_C.U. scope Decont	N/A	N/A
01_C.U./Med Store/Prep	N/A	N/A
01_C/E 001	NO (-84.3%)	NO
01_C/E 002	NO (-87.3%)	NO
01_C/E 003	NO (-88.6%)	NO
01_C/E 004	N/A	N/A
01_C/E 005	NO (-85%)	NO
01_C/E 006	N/A	N/A
01_C/E 007	NO (-85.1%)	NO
01_C/E 008	NO (-38.6%)	NO
01_C/E 009	NO (-88.1%)	NO
01_C/E 010	N/A	N/A
01_C/E 011	N/A	N/A
01_C/E 012	NO (-88%)	NO
01_C/E 013	NO (-84.9%)	NO
01_C/E 014	NO (-69.5%)	NO
01_C/E 015	NO (-88.3%)	NO
01_C/E 016	NO (-69%)	NO
01_C/E 017	N/A	N/A
01_C/E 018	NO (-86.4%)	NO
01_C/E 019	NO (-86.8%)	NO
01_C/E 020	NO (-86.5%)	NO
01_C/E 021	NO (-87.9%)	NO
01_C/E 022	NO (-82.7%)	NO
01_C/E 023	NO (-86.1%)	NO
01_C/E 024	NO (-95.2%)	NO
01_C/E - Optometrist 001	N/A	N/A
01_C/E - Optometrist 002	N/A	N/A
01_C/E Large/MDT 001	N/A	N/A
01_C/E Large/MDT 002	N/A	N/A
01_C/E Large/MDT 003	N/A	N/A
01_Cannualtion room 001	N/A	N/A
01_Cannualtion room 002	N/A	N/A
01_Cannualtion room 003	N/A	N/A
01_Cannualtion room 004	N/A	N/A
01_Cardiac/ECG 001	NO (-88.9%)	NO
01_Cardiac/ECG 002	N/A	N/A
01_Cardiac/Echo 001	NO (-69.5%)	NO
01_Cardiac/Echo 002	NO (-69.1%)	NO
01_Cardiac/Echo 003	NO (-68.1%)	NO
01_Cardiac/Echo 004	NO (-69.5%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Child Wait	NO (-98.9%)	NO
01_Clean St.	N/A	N/A
01_Clinical Room	N/A	N/A
01_Coffee Shop	NO (-99.8%)	NO
01_Coffee Shop Seating 001	N/A	N/A
01_Coffee Shop Seating 002	NO (-99.5%)	NO
01_Colposcopy	NO (-86.6%)	NO
01_Complementary Therapy/Group Meeting	NO (-89%)	NO
01_Consult Booth	N/A	N/A
01_Contrast Prep Room	N/A	N/A
01_Control 001	NO (-17.5%)	NO
01_Control 002	NO (-69.6%)	NO
01_Control 003	N/A	N/A
01_Control 004	NO (-75%)	NO
01_Corridor 023	N/A	N/A
01_Corridor 030	NO (-32.7%)	NO
01_CT Control 001	NO (-68.5%)	NO
01_CT Control 002	N/A	N/A
01_CT Scanner 001	NO (-71.6%)	NO
01_CT Scanner 002	N/A	N/A
01_CT Scanner 003	NO (-76.5%)	NO
01_CT Scanner 004	N/A	N/A
01_Cubicle 001	N/A	N/A
01_Cubicle 002	N/A	N/A
01_Cubicle 003	N/A	N/A
01_Cubicle 004	N/A	N/A
01_Cubicle 005	N/A	N/A
01_Cubicle 006	N/A	N/A
01_Day treat (recliner) 001	NO (-93.9%)	NO
01_Day treat (recliner) 002	NO (-90.3%)	NO
01_Day treat (recliner) 003	NO (-94.4%)	NO
01_Day treat (recliner) 004	NO (-90.2%)	NO
01_Day treat (recliner) 005	NO (-93.5%)	NO
01_Day treat (recliner) 006	NO (-94.7%)	NO
01_Day treat (recliner) 007	NO (-93.5%)	NO
01_Day treat (recliner) 008	N/A	N/A
01_Day treat (recliner) 009	NO (-60.3%)	NO
01_Day treat (recliner) 010	NO (-88.3%)	NO
01_Day treat (recliner) 011	NO (-94.7%)	NO
01_Day treat (recliner) 012	NO (-94.5%)	NO
01_Day treat (recliner) 013	NO (-95.5%)	NO
01_Day treat (recliner) 014	NO (-88.7%)	NO
01_Day treat (recliner) 015	N/A	N/A
01_Day treat (recliner) 016	N/A	N/A
01_Day treat (recliner) 017	NO (-83.4%)	NO
01_Day treat (recliner) 018	NO (-78.3%)	NO
01_Day treat (recliner) 019	NO (-83.8%)	NO
01_Day treat (recliner) 020	N/A	N/A
01_Day treat (recliner) 021	NO (-90.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Day treat (recliner) 022	N/A	N/A
01_Day treat (recliner) 023	NO (-63.2%)	NO
01_Day treat (recliner) 024	NO (-67%)	NO
01_Day treat (recliner) 025	N/A	N/A
01_Dental Surgery 001	NO (-86.7%)	NO
01_Dental Surgery 002	NO (-60.9%)	NO
01_Dental Surgery 003	NO (-59.7%)	NO
01_Donation/Contact Point	N/A	N/A
01_Endoscopy Suites 001	N/A	N/A
01_Endoscopy Suites 002	N/A	N/A
01_Endoscopy Suites 003	N/A	N/A
01_Ensuite 001	N/A	N/A
01_Ensuite 002	NO (-86.6%)	NO
01_Ensuite 003	N/A	N/A
01_Ensuite 004	N/A	N/A
01_Ensuite 005	N/A	N/A
01_Ensuite 006	N/A	N/A
01_Ensuite 007	N/A	N/A
01_Ensuite 008	N/A	N/A
01_Ensuite 009	N/A	N/A
01_Ensuite 010	N/A	N/A
01_Exam room 001	NO (-91.9%)	NO
01_Exam room 002	NO (-91.4%)	NO
01_Exam room 003	NO (-62.6%)	NO
01_Exam room 004	NO (-92.2%)	NO
01_Exam room 005	NO (-62.6%)	NO
01_Fitting Room 001	N/A	N/A
01_Fitting Room 002	N/A	N/A
01_Fitting Room 003	N/A	N/A
01_Fitting Room 004	N/A	N/A
01_General Office	NO (-74.6%)	NO
01_Group Room	NO (-94.9%)	NO
01_Hearing Test Room/Booth	NO (-75.5%)	NO
01_Hearing Therapist	NO (-73.9%)	NO
01_Hot Desk	N/A	N/A
01_Hot Desks	N/A	N/A
01_Hysteroscopy	NO (-84.7%)	NO
01_ICC (Incident Coordination Centre)	NO (-61.3%)	NO
01_Imaging: Fluoro	NO (-90.9%)	NO
01_Imaging: Gamma	N/A	N/A
01_Imaging: IR	YES (+82.5%)	NO
01_Imaging: X-Ray inpatient	N/A	N/A
01_Inj Room	N/A	N/A
01_Inpatient hold 001	NO (-81.4%)	NO
01_Inpatient hold 002	NO (-91.4%)	NO
01_Inpatient hold 003	NO (-51.7%)	NO
01_Inpatient hold for 3	NO (-98.3%)	NO
01_Interview 001	N/A	N/A
01_Interview 002	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Interview 003	N/A	N/A
01_Interview 004	N/A	N/A
01_Interview 005	N/A	N/A
01_Interview 006	N/A	N/A
01_Interview 007	N/A	N/A
01_Interview 008	N/A	N/A
01_Interview 009	NO (-83.5%)	NO
01_Interview 010	N/A	N/A
01_Interview 011	N/A	N/A
01_Interview 012	NO (-93.4%)	NO
01_Interview & Virtual Cnslt	N/A	N/A
01_IT HUB 001	N/A	N/A
01_IT HUB 002	N/A	N/A
01_IT HUB 003	N/A	N/A
01_IT HUB 004	N/A	N/A
01_IT HUB 005	N/A	N/A
01_IT HUB 006	N/A	N/A
01_IT HUB 007	NO (-95.3%)	NO
01_Laboratory	N/A	N/A
01_Laser	N/A	N/A
01_Linen 003	NO (-46.8%)	NO
01_Management Office: Fluoro/IT (4)	NO (-66.9%)	NO
01_Management Office: US (4)	N/A	N/A
01_Measure Bay 001	N/A	N/A
01_Measure Bay 002	N/A	N/A
01_Medical Examiner Office	N/A	N/A
01_Meds Store/Prep	NO (-72.6%)	NO
01_Meeting Room	NO (-43.8%)	NO
01_Mohs lab	NO (-88.8%)	NO
01_MRI 001	NO (-69.7%)	NO
01_MRI 002	NO (-74.8%)	NO
01_MRI 003	NO (-72.9%)	NO
01_Multi Faith Room	NO (-73.7%)	NO
01_Muslin Prayer Room	NO (-70.4%)	NO
01_Office 001	N/A	N/A
01_Office 002	NO (-54.5%)	NO
01_Office 003	N/A	N/A
01_Office 004	N/A	N/A
01_Office 005	NO (-75.7%)	NO
01_Office 006	NO (-90.3%)	NO
01_Office 007	N/A	N/A
01_Office 008	N/A	N/A
01_Office 009	N/A	N/A
01_Office 010	NO (-93%)	NO
01_Office 011	NO (-72.9%)	NO
01_Office 012	NO (-26.1%)	NO
01_Office 013	NO (-76.4%)	NO
01_Office 014	NO (-41.3%)	NO
01_Office 015	NO (-85.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Office Managers	N/A	N/A
01_Office Vetting	N/A	N/A
01_Office/Resource Base	N/A	N/A
01_Office: Analysis	NO (-90.2%)	NO
01_Office: Manager	N/A	N/A
01_Office: Open Plan 001	N/A	N/A
01_Office: Open Plan 002	N/A	N/A
01_Ops Centre 001	N/A	N/A
01_Ops Centre 002	N/A	N/A
01_Opthalmic 001	NO (-85.4%)	NO
01_Opthalmic 002	N/A	N/A
01_Opthalmic 003	NO (-78.7%)	NO
01_Opthalmic 004	N/A	N/A
01_Opthamology: Lanes 001	N/A	N/A
01_Opthamology: Lanes 002	N/A	N/A
01_Oral Surgery	NO (-87.6%)	NO
01_Outpatient Pharmacy	N/A	N/A
01_Overseas Office	NO (-82.6%)	NO
01_PAC's Team	N/A	N/A
01_Pass	N/A	N/A
01_PFT Test 001	N/A	N/A
01_PFT Test 002	N/A	N/A
01_Phototherapy 001	NO (-90.9%)	NO
01_Phototherapy 002	NO (-90.8%)	NO
01_Plaster	NO (-89.9%)	NO
01_Plebotomy 001	N/A	N/A
01_Plebotomy 002	N/A	N/A
01_Plebotomy 003	N/A	N/A
01_Plebotomy 004	N/A	N/A
01_Pre-assessment	NO (-76.7%)	NO
01_Pre-op assessment	N/A	N/A
01_Prep/Recovery Stage 1 001	NO (-69%)	NO
01_Prep/Recovery Stage 1 002	NO (-69.2%)	NO
01_Prep/Recovery Stage 1 003	NO (-70.7%)	NO
01_Prep/Recovery Stage 1 004	NO (-70.4%)	NO
01_Prep/Recovery Stage 1 005	NO (-38.6%)	NO
01_Prep/Recovery Stage 1 006	N/A	N/A
01_Prep/Recovery Stage 1 007	NO (-72.8%)	NO
01_Prep/Recovery Stage 1 008	NO (-69.3%)	NO
01_Prep/Recovery Stage 1 009	NO (-68.2%)	NO
01_Prep/Recovery Stage 1 010	NO (-70.7%)	NO
01_Radioactive open/closed sources	N/A	N/A
01_Radiology Office (6 MR/CT)	NO (-69.6%)	NO
01_Radiology View/Report	N/A	N/A
01_Recap	N/A	N/A
01_Reception	N/A	N/A
01_Reception office	N/A	N/A
01_Reception/Wait 001	NO (-94.5%)	NO
01_Reception/Wait 002	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Reception/Wait 003	NO (-96.7%)	NO
01_Reception/Wait 004	NO (-98.6%)	NO
01_Reception/Wait 005	NO (-90.9%)	NO
01_Reception/Wait 006	N/A	N/A
01_Reception/Wait 007	N/A	N/A
01_Reception/Wait 008	NO (-68.1%)	NO
01_Reception/Wait 009	NO (-94.5%)	NO
01_Recovery 001	NO (-51.8%)	NO
01_Recovery 002	YES (+15.5%)	NO
01_Recovery 003	NO (-34.6%)	NO
01_Recovery 004	YES (+13.1%)	NO
01_Recovery 005	NO (-65.9%)	NO
01_Recovery 006	N/A	N/A
01_Recovery 007	NO (-80.2%)	NO
01_Recovery 008	NO (-18.2%)	NO
01_Recovery Stage 2	N/A	N/A
01_Repair Workshop	N/A	N/A
01_Reporting 001	N/A	N/A
01_Reporting 002	N/A	N/A
01_Reporting room: FLUORO	NO (-78.9%)	NO
01_Reporting room: Nuclear Medicine	N/A	N/A
01_Reporting room: Recovery	NO (-90.8%)	NO
01_Reporting Room: Ultrasound	N/A	N/A
01_Reporting Room: X-Ray	N/A	N/A
01_Reporting: Acute Team	N/A	N/A
01_RNIB	NO (-80.9%)	NO
01_Seminar	NO (-95.3%)	NO
01_Seminar/MDT 001	NO (-95.3%)	NO
01_Seminar/MDT 002	NO (-82.9%)	NO
01_Shop 001	N/A	N/A
01_Shop 002	N/A	N/A
01_Staff Base 001	N/A	N/A
01_Staff Base 002	N/A	N/A
01_Staff Base 003	NO (-98.7%)	NO
01_Staff Base 004	N/A	N/A
01_Staff Base 005	N/A	N/A
01_Staff Base 006	N/A	N/A
01_Staff Base 007	NO (-56%)	NO
01_Staff Base 008	NO (-98.7%)	NO
01_Staff Base 009	NO (-98.6%)	NO
01_Staff Base 010	NO (-99.2%)	NO
01_Staff Rest/Bev 001	N/A	N/A
01_Staff Rest/Bev 002	NO (-92.6%)	NO
01_Staff Rest/Bev 003	NO (-93.9%)	NO
01_Staff Rest/Bev 004	NO (-74.6%)	NO
01_Staff Rest/Bev (Combined)	NO (-84.7%)	NO
01_Sub-Wait	N/A	N/A
01_Therapies: Cardiac	NO (-95.6%)	NO
01_Therapy Female	NO (-79.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Therapy/Gym	NO (-87.8%)	NO
01_Therapy/Treat 001	NO (-77.6%)	NO
01_Therapy/Treat 002	N/A	N/A
01_Therapy/Treat 003	NO (-75.4%)	NO
01_Therapy/Treat 004	NO (-74.8%)	NO
01_Therapy/Treat 005	NO (-81.1%)	NO
01_Therapy/Treat 006	NO (-73.8%)	NO
01_Treat: Procedures	NO (-91.2%)	NO
01_Treatment 001	N/A	N/A
01_Treatment 002	N/A	N/A
01_Treatment 003	N/A	N/A
01_Treatment 004	N/A	N/A
01_Treatment 005	N/A	N/A
01_Treatment 006	N/A	N/A
01_Treatment (2-sided) 001	N/A	N/A
01_Treatment (2-sided) 002	N/A	N/A
01_Treatment (2-sided) 003	NO (-80.7%)	NO
01_Treatment (2-sided) 004	NO (-87.7%)	NO
01_Ultrasound 001	N/A	N/A
01_Ultrasound 002	N/A	N/A
01_Ultrasound 003	N/A	N/A
01_Ultrasound 004	N/A	N/A
01_Unit Pantry 001	N/A	N/A
01_Unit Pantry 002	NO (-58%)	NO
01_US/Mammography 001	N/A	N/A
01_US/Mammography 002	NO (-84.8%)	NO
01_Viewing/Teaching area	N/A	N/A
01_Virtual Booth 001	N/A	N/A
01_Virtual Booth 002	N/A	N/A
01_Wait 001	N/A	N/A
01_Wait 002	N/A	N/A
01_Wait 003	N/A	N/A
01_Wait 004	N/A	N/A
01_Wait 005	N/A	N/A
01_Wait 006	N/A	N/A
01_Waiting Zone IR: 5 places	YES (+1.9%)	NO
01_Waiting: 10 places 001	N/A	N/A
01_Waiting: 10 places 002	N/A	N/A
01_Waiting: 10 places 003	NO (-85.8%)	NO
01_Waiting: 12 places	NO (-91%)	NO
01_Waiting: 15 places	NO (-74.8%)	NO
01_Waiting: 20 places	NO (-96.5%)	NO
01_X-Ray 001	NO (-100%)	NO
01_X-Ray 002	N/A	N/A
01_X-Ray: Inpatient	N/A	N/A
02_4-Bed Bay 001	NO (-85.3%)	NO
02_4-Bed Bay 002	NO (-85.2%)	NO
02_Anaesthetic Room 001	N/A	N/A
02_Anaesthetic Room 002	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Anaesthetic Room 003	N/A	N/A
02_Anaesthetic Room 004	N/A	N/A
02_Anaesthetic Room 005	N/A	N/A
02_Anaesthetic Room 006	N/A	N/A
02_Anaesthetic Room 007	N/A	N/A
02_Bariatric Bedroom	NO (-95.3%)	NO
02_Blood Issue	N/A	N/A
02_Blood Transfusion	NO (-84.4%)	NO
02_Breakout Space 001	N/A	N/A
02_Breakout Space 002	N/A	N/A
02_Breakout Space 003	NO (-99.9%)	NO
02_Breakout Space 004	NO (-99.9%)	NO
02_Clean/Drug prep 001	N/A	N/A
02_Clean/Drug prep 002	N/A	N/A
02_Cold room	N/A	N/A
02_Control Point	N/A	N/A
02_Decont Unit	N/A	N/A
02_En-Suite Bariatric	N/A	N/A
02_Ensuite 001	N/A	N/A
02_Ensuite 002	NO (-86.8%)	NO
02_Ensuite 003	NO (-39.3%)	NO
02_Ensuite 004	NO (-73.8%)	NO
02_Ensuite 005	N/A	N/A
02_Ensuite 006	NO (-81.9%)	NO
02_Ensuite 007	NO (-86.1%)	NO
02_Ensuite 008	NO (-88.7%)	NO
02_Ensuite 009	NO (-96.5%)	NO
02_Ensuite 010	NO (-43.8%)	NO
02_Ensuite 011	N/A	N/A
02_Ensuite 012	N/A	N/A
02_Ensuite 013	NO (-82.6%)	NO
02_Ensuite 014	N/A	N/A
02_Ensuite 015	NO (-90.3%)	NO
02_Ensuite 016	NO (-91.9%)	NO
02_Ensuite 017	NO (-43.6%)	NO
02_Ensuite 018	NO (-86.9%)	NO
02_Ensuite 019	NO (-90.3%)	NO
02_Ensuite 020	N/A	N/A
02_Ensuite 021	N/A	N/A
02_Ensuite 022	N/A	N/A
02_Ensuite 023	N/A	N/A
02_Ensuite 024	NO (-96%)	NO
02_Ensuite oncall room	NO (-86.8%)	NO
02_Exam/Physical Therapy	NO (-82.5%)	NO
02_Family Room 001	NO (-93.2%)	NO
02_Family Room 002	NO (-93.4%)	NO
02_Hot Automated Laboratory	NO (-89%)	NO
02_Inpatient hold 001	N/A	N/A
02_Inpatient hold 002	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Inpatient hold 003	N/A	N/A
02_Inpatient hold 004	N/A	N/A
02_Inpatient hold 005	N/A	N/A
02_Interview 001	NO (-96.9%)	NO
02_Interview 002	N/A	N/A
02_Interview 003	N/A	N/A
02_Interview 004	N/A	N/A
02_Iso Lobby 001	N/A	N/A
02_Iso Lobby 002	N/A	N/A
02_Iso Lobby 003	N/A	N/A
02_Iso Lobby 004	N/A	N/A
02_Iso Lobby 005	N/A	N/A
02_Iso Lobby 006	N/A	N/A
02_Iso Lobby 007	N/A	N/A
02_Iso Lobby 008	N/A	N/A
02_Iso Single Bedroom 001	NO (-93.8%)	NO
02_Iso Single Bedroom 002	NO (-95.6%)	NO
02_Iso Single Bedroom 003	NO (-95%)	NO
02_Iso Single Bedroom 004	NO (-94.2%)	NO
02_Iso Single Bedroom 005	NO (-95.6%)	NO
02_Iso Single Bedroom 006	NO (-94.5%)	NO
02_Iso Single Bedroom 007	NO (-94.4%)	NO
02_Isolation Recovery Room (Stage 1) 001	N/A	N/A
02_Isolation Recovery Room (Stage 1) 002	NO (-86.3%)	NO
02_IT HUB 001	N/A	N/A
02_IT HUB 002	N/A	N/A
02_IT HUB 003	N/A	N/A
02_IT HUB 004	N/A	N/A
02_IT HUB 005	N/A	N/A
02_IT HUB 006	N/A	N/A
02_IV Fluid Store	N/A	N/A
02_Linen 002	NO (-85.3%)	NO
02_MDT Room 001	N/A	N/A
02_MDT Room 002	N/A	N/A
02_MDT Room 003	N/A	N/A
02_MDT Room 004	NO (-83.6%)	NO
02_Office 001	NO (-60.3%)	NO
02_Office 002	N/A	N/A
02_Office 003	N/A	N/A
02_Office 004	N/A	N/A
02_Office 005	N/A	N/A
02_Office - 3 person	NO (-88.3%)	NO
02_Office: 1 person + Microscope 003	NO (-96.9%)	NO
02_Office Morphology	NO (-93.6%)	NO
02_Office/Reception	N/A	N/A
02_Office: 1 person + Meeting Space + Microscope	NO (-81.9%)	NO
02_Office: 1 person + Microscope 001	NO (-56.3%)	NO
02_Office: 1 person + Microscope 002	NO (-66.7%)	NO
02_Office: 2 staff	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Office: 3 staff 001	N/A	N/A
02_Office: 3 staff 002	N/A	N/A
02_Office: 4 person	NO (-81.5%)	NO
02_Office: 6 person	NO (-79.2%)	NO
02_Office: Clinical Lead	N/A	N/A
02_Office: Manager	N/A	N/A
02_Office: Open Plan (Junior)	NO (-68.6%)	NO
02_Open Plan Office & Consultants	N/A	N/A
02_Operating Room 001	NO (-89.3%)	NO
02_Operating Room 002	NO (-80.3%)	NO
02_Operating Room 003	NO (-90.1%)	NO
02_Operating Room 004	NO (-84.5%)	NO
02_Operating Room Large 001	N/A	N/A
02_Operating Room Large 002	NO (-86.2%)	NO
02_Operating Room Large 003	NO (-87.1%)	NO
02_Photocopier Room	N/A	N/A
02_PoCT 001	N/A	N/A
02_PoCT 002	N/A	N/A
02_PoCT 003	N/A	N/A
02_PoCT 004	N/A	N/A
02_Prep Room 001	N/A	N/A
02_Prep Room 002	N/A	N/A
02_Prep Room 003	N/A	N/A
02_Prep Room 004	N/A	N/A
02_Prep Room 005	N/A	N/A
02_Prep Room 006	NO (-89.3%)	NO
02_Prep Room 007	N/A	N/A
02_Prep/Recovery (Stage 2) 001	NO (-89.9%)	NO
02_Prep/Recovery (Stage 2) 002	NO (-89.4%)	NO
02_Prep/Recovery (Stage 2) 003	NO (-84.9%)	NO
02_Prep/Recovery (Stage 2) 004	NO (-84.1%)	NO
02_Prep/Recovery (Stage 2) 005	NO (-93.9%)	NO
02_Prep/Recovery (Stage 2) 006	NO (-88.9%)	NO
02_Prep/Recovery (Stage 2) 007	N/A	N/A
02_Prep/Recovery (Stage 2) 008	NO (-82.5%)	NO
02_Prep/Recovery (Stage 2) 009	NO (-73.2%)	NO
02_Prep/Recovery (Stage 2) 010	NO (-84.3%)	NO
02_Prep/Recovery (Stage 2) 011	NO (-89.5%)	NO
02_Prep/Recovery (Stage 2) 012	NO (-91.7%)	NO
02_Prep/Recovery (Stage 2) 013	NO (-92.8%)	NO
02_Prep/Recovery (Stage 2) 014	NO (-89.8%)	NO
02_Prep/Recovery (Stage 2) 015	NO (-89.4%)	NO
02_Prep/Recovery (Stage 2) 016	N/A	N/A
02_Prep/Recovery (Stage 2) 017	N/A	N/A
02_Prep/Recovery (Stage 2) 018	N/A	N/A
02_Prep/Recovery (Stage 2) 019	N/A	N/A
02_Prep/Recovery (Stage 2) 020	N/A	N/A
02_Prep/Recovery (Stage 2) 021	NO (-89.5%)	NO
02_Prep/Recovery (Stage 2) 022	NO (-89.8%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Prep/Recovery (Stage 2) 023	NO (-95.6%)	NO
02_Prep/Recovery (Stage 2) 024	NO (-89.6%)	NO
02_Prep/Recovery (Stage 2) 025	N/A	N/A
02_Prep/Recovery (Stage 2) 026	NO (-81.7%)	NO
02_Quiet Workspace 001	N/A	N/A
02_Quiet Workspace 002	N/A	N/A
02_Reception 001	NO (-99.5%)	NO
02_Reception 002	NO (-95.6%)	NO
02_Recovery (Stage 1) 001	NO (-86.7%)	NO
02_Recovery (Stage 1) 002	NO (-86.6%)	NO
02_Recovery (Stage 1) 003	NO (-87.1%)	NO
02_Recovery (Stage 1) 004	NO (-86.6%)	NO
02_Recovery (Stage 1) 005	NO (-86.7%)	NO
02_Recovery (Stage 1) 006	NO (-86.3%)	NO
02_Recovery (Stage 1) 007	NO (-74.2%)	NO
02_Recovery (Stage 1) 008	NO (-64.2%)	NO
02_Recovery (Stage 1) 009	NO (-97.6%)	NO
02_Recovery (Stage 1) 010	NO (-98.8%)	NO
02_Recovery (Stage 1) 011	NO (-98.6%)	NO
02_Recovery (Stage 1) 012	N/A	N/A
02_Scrub 001	NO (-97.7%)	NO
02_Scrub 002	N/A	N/A
02_Scrub 003	NO (-97.3%)	NO
02_Scrub 004	N/A	N/A
02_Scrub 005	NO (-98.9%)	NO
02_Scrub 006	NO (-96.3%)	NO
02_Scrub 007	NO (-97.2%)	NO
02_Seminar 001	N/A	N/A
02_Seminar 002	NO (-70.9%)	NO
02_Seminar 003	N/A	N/A
02_Shared Admin (Combined)	NO (-86.5%)	NO
02_Single Bedroom 001	N/A	N/A
02_Single Bedroom 002	NO (-79.1%)	NO
02_Single Bedroom 003	NO (-82.7%)	NO
02_Single Bedroom 004	N/A	N/A
02_Single Bedroom 005	NO (-82.8%)	NO
02_Single Bedroom 006	NO (-85.1%)	NO
02_Single Bedroom 007	NO (-83%)	NO
02_Single Bedroom 008	N/A	N/A
02_Single Bedroom 009	NO (-83.4%)	NO
02_Single Bedroom 010	NO (-95%)	NO
02_Single Bedroom 011	NO (-77.1%)	NO
02_Single Bedroom 012	NO (-68.1%)	NO
02_Single Bedroom 013	NO (-76.3%)	NO
02_Single Bedroom 014	NO (-85.1%)	NO
02_Single Bedroom 015	NO (-84.5%)	NO
02_Single Bedroom 016	NO (-73.4%)	NO
02_Single Bedroom 017	NO (-90.9%)	NO
02_Single Bedroom 018	NO (-90.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Single Bedroom 019	NO (-30.9%)	NO
02_Single Bedroom 020	NO (-90.3%)	NO
02_Single Bedroom 021	NO (-73.8%)	NO
02_Single Bedroom 022	N/A	N/A
02_Single Bedroom 023	NO (-92.8%)	NO
02_Single Bedroom 024	NO (-81.9%)	NO
02_Single Bedroom 025	NO (-73.1%)	NO
02_Single Bedroom 026	NO (-95.6%)	NO
02_Single Bedroom 027	NO (-80.6%)	NO
02_Single Bedroom 028	NO (-58.4%)	NO
02_Single Bedroom 029	NO (-83.5%)	NO
02_Single Bedroom 030	N/A	N/A
02_Single Bedroom 031	NO (-42.5%)	NO
02_Single Bedroom 032	NO (-87.7%)	NO
02_Staff Base 001	NO (-96.8%)	NO
02_Staff Base 002	NO (-97.3%)	NO
02_Staff Base 003	NO (-96.6%)	NO
02_Staff Base 004	NO (-97.2%)	NO
02_Staff Base 005	N/A	N/A
02_Staff Base 006	NO (-98%)	NO
02_Staff Base 007	NO (-97%)	NO
02_Staff Base 008	NO (-98.2%)	NO
02_Staff Base 009	NO (-97.4%)	NO
02_Staff Base 010	NO (-97.1%)	NO
02_Staff Base 011	NO (-98.8%)	NO
02_Staff Base 012	NO (-98.7%)	NO
02_Staff Base 013	N/A	N/A
02_Staff Rest (Combined)	NO (-96.2%)	NO
02_Staff Rest Room (Night)	N/A	N/A
02_Staff Rest/Bev 001	NO (-61.1%)	NO
02_Staff Rest/Bev 002	NO (-75.3%)	NO
02_Staff Rest/Bev 003	N/A	N/A
02_Staff Rest/Bev 004	NO (-82.1%)	NO
02_Stage 2 Lounge	N/A	N/A
02_Sterile St Clean	N/A	N/A
02_Sterile St Supplies	NO (-93.5%)	NO
02_Treatment (2-sided)	N/A	N/A
02_Unit Pantry 001	N/A	N/A
02_Unit Pantry 002	N/A	N/A
02_Unit Pantry 003	N/A	N/A
02_Unit Pantry 004	NO (-84.9%)	NO
02_Unit Pantry 005	N/A	N/A
02_UPS 001	N/A	N/A
02_UPS 002	N/A	N/A
02_UPS 003	N/A	N/A
02_UPS 004	N/A	N/A
02_UPS 005	N/A	N/A
02_UPS 006	N/A	N/A
02_UPS 007	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Wait 001	N/A	N/A
02_Wait 002	N/A	N/A
02_Waiting: 20 Places	NO (-95.7%)	NO
03_2 Bed Bay 001	NO (-94.5%)	NO
03_2 Bed Bay 002	NO (-91.2%)	NO
03_2 Bed Bay 003	NO (-91.1%)	NO
03_4 Bed Bay 001	N/A	N/A
03_4 Bed Bay 002	NO (-86.8%)	NO
03_4 Bed Bay 003	NO (-86.6%)	NO
03_4 Bed Bay 004	NO (-86.6%)	NO
03_4 Bed Bay 005	NO (-86.6%)	NO
03_Bariatric Bedroom 001	NO (-94.5%)	NO
03_Bariatric Bedroom 002	NO (-75%)	NO
03_C.U. 001	N/A	N/A
03_C.U. 004	N/A	N/A
03_C.U./CSSD St.	N/A	N/A
03_Child Play 001	N/A	N/A
03_Child Play 002	N/A	N/A
03_Child Play 003	N/A	N/A
03_Clinical Psychology Office	N/A	N/A
03_Consult/Exam 001	NO (-85.3%)	NO
03_Consult/Exam 002	N/A	N/A
03_Consult/Exam 003	NO (-71.3%)	NO
03_Consult/Exam 004	N/A	N/A
03_Consult/Exam 005	N/A	N/A
03_Consult/Exam 006	NO (-71.1%)	NO
03_Consult/Exam (Larger)	N/A	N/A
03_Educational Area 001	NO (-91.8%)	NO
03_Educational Area 002	NO (-87.8%)	NO
03_En-Suite Bariatric 001	N/A	N/A
03_En-Suite Bariatric 002	N/A	N/A
03_Ensuite 001	NO (-20.5%)	NO
03_Ensuite 002	N/A	N/A
03_Ensuite 003	N/A	N/A
03_Ensuite 004	N/A	N/A
03_Ensuite 005	N/A	N/A
03_Ensuite 006	NO (-26.8%)	NO
03_Ensuite 007	NO (-86.1%)	NO
03_Ensuite 008	NO (-85.5%)	NO
03_Ensuite 009	NO (-90.8%)	NO
03_Ensuite 010	NO (-76.2%)	NO
03_Ensuite 011	NO (-95.4%)	NO
03_Ensuite 012	NO (-59.8%)	NO
03_Ensuite 013	N/A	N/A
03_Ensuite 014	N/A	N/A
03_Ensuite 015	N/A	N/A
03_Ensuite 016	N/A	N/A
03_Ensuite 017	N/A	N/A
03_Ensuite 018	NO (-29.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Ensuite 019	NO (-76.8%)	NO
03_Ensuite 020	NO (-84.6%)	NO
03_Ensuite 021	N/A	N/A
03_Ensuite 022	NO (-79.6%)	NO
03_Ensuite 023	NO (-14.1%)	NO
03_Ensuite 024	N/A	N/A
03_Ensuite 025	NO (-18.4%)	NO
03_Ensuite 026	NO (-15.2%)	NO
03_Ensuite 027	N/A	N/A
03_Ensuite 028	NO (-76.5%)	NO
03_Ensuite 029	NO (-62.9%)	NO
03_Ensuite 030	NO (-85%)	NO
03_Ensuite 031	N/A	N/A
03_Ensuite 032	N/A	N/A
03_Ensuite 033	N/A	N/A
03_Ensuite 034	N/A	N/A
03_Ensuite 035	NO (-62.4%)	NO
03_Ensuite 036	NO (-85.3%)	NO
03_Ensuite 037	N/A	N/A
03_Ensuite 038	N/A	N/A
03_Ensuite 039	NO (-72.7%)	NO
03_Ensuite 040	N/A	N/A
03_Ensuite 041	N/A	N/A
03_Ensuite 042	N/A	N/A
03_Ensuite 043	N/A	N/A
03_Ensuite 044	N/A	N/A
03_Ensuite 045	N/A	N/A
03_Ensuite 046	N/A	N/A
03_Ensuite 047	NO (-60.8%)	NO
03_Ensuite 048	NO (-78.5%)	NO
03_Ensuite 049	NO (-73.8%)	NO
03_Ensuite 050	N/A	N/A
03_Ensuite 051	NO (-86.4%)	NO
03_Ensuite 052	NO (-77.2%)	NO
03_Ensuite 053	NO (-74.7%)	NO
03_Ensuite 054	NO (-84.7%)	NO
03_Ensuite 055	N/A	N/A
03_Ensuite 056	NO (-78.7%)	NO
03_Ensuite 057	NO (-15.7%)	NO
03_Ensuite 058	N/A	N/A
03_Ensuite 059	N/A	N/A
03_Ensuite 060	NO (-21.7%)	NO
03_Ensuite 061	N/A	N/A
03_Ensuite 062	NO (-79.4%)	NO
03_Ensuite 063	N/A	N/A
03_Ensuite 064	NO (-63.2%)	NO
03_Ensuite 065	N/A	N/A
03_Ensuite 066	NO (-77%)	NO
03_Ensuite 067	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Ensuite 068	NO (-76.4%)	NO
03_Ensuite 069	N/A	N/A
03_Ensuite 070	NO (-96.4%)	NO
03_Ensuite 071	N/A	N/A
03_Ensuite 072	N/A	N/A
03_Ensuite 073	N/A	N/A
03_HDU Lobby 001	N/A	N/A
03_HDU Lobby 002	N/A	N/A
03_HDU Lobby 003	N/A	N/A
03_HDU Lobby 004	N/A	N/A
03_Interview 001	N/A	N/A
03_Interview 002	N/A	N/A
03_Interview 003	N/A	N/A
03_Interview 004	N/A	N/A
03_Interview 005	N/A	N/A
03_Iso Lobby 001	N/A	N/A
03_Iso Lobby 002	N/A	N/A
03_IT HUB 001	N/A	N/A
03_IT HUB 002	N/A	N/A
03_IT HUB 003	N/A	N/A
03_IT HUB 004	N/A	N/A
03_Larger Therapy Store	NO (-93.3%)	NO
03_MDT Room 001	NO (-96.2%)	NO
03_MDT Room 002	NO (-85.4%)	NO
03_MDT Room 003	NO (-85.4%)	NO
03_MDT Room 004	NO (-96.2%)	NO
03_NPT Lab	N/A	N/A
03_Office 001	N/A	N/A
03_Office 002	N/A	N/A
03_Office 003	NO (-76.2%)	NO
03_Office 004	N/A	N/A
03_Office: Open Plan 001	N/A	N/A
03_Office: Open Plan 002	NO (-91.3%)	NO
03_On-Call+Ensuite 001	N/A	N/A
03_On-Call+Ensuite 002	N/A	N/A
03_On-Call+Ensuite 003	N/A	N/A
03_Oncology Waiting	N/A	N/A
03_Pantry/Kitchen 002	N/A	N/A
03_Pantry/Kitchen 003	N/A	N/A
03_Patient Pods 001	NO (-67.5%)	NO
03_Patient Pods 002	NO (-69.2%)	NO
03_Patient Pods 003	NO (-70.5%)	NO
03_Patient Pods 004	NO (-67.9%)	NO
03_Patient Pods 005	NO (-70.8%)	NO
03_Patient Pods 006	NO (-67.5%)	NO
03_Patient Weigh/Assessment	N/A	N/A
03_Phebotomy Chair	N/A	N/A
03_Play	NO (-84.6%)	NO
03_Quiet room	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Quiet room/int	N/A	N/A
03_Reception	N/A	N/A
03_Resus Bay 004	N/A	N/A
03_Seminar	N/A	N/A
03_SERVER ROOM	N/A	N/A
03_Shared Admin	N/A	N/A
03_Shared Day Space	N/A	N/A
03_Single Bedroom 001	N/A	N/A
03_Single Bedroom 002	NO (-74.7%)	NO
03_Single Bedroom 003	N/A	N/A
03_Single Bedroom 004	NO (-51.5%)	NO
03_Single Bedroom 005	NO (-63.3%)	NO
03_Single Bedroom 006	NO (-57.4%)	NO
03_Single Bedroom 007	N/A	N/A
03_Single Bedroom 008	N/A	N/A
03_Single Bedroom 009	NO (-79.7%)	NO
03_Single Bedroom 010	NO (-85.4%)	NO
03_Single Bedroom 011	NO (-85.5%)	NO
03_Single Bedroom 012	NO (-86.1%)	NO
03_Single Bedroom 013	NO (-81.1%)	NO
03_Single Bedroom 014	NO (-86.4%)	NO
03_Single Bedroom 015	NO (-84.8%)	NO
03_Single Bedroom 016	NO (-98.3%)	NO
03_Single Bedroom 017	N/A	N/A
03_Single Bedroom 018	NO (-91.2%)	NO
03_Single Bedroom 019	NO (-70.9%)	NO
03_Single Bedroom 020	NO (-86.3%)	NO
03_Single Bedroom 021	NO (-81.1%)	NO
03_Single Bedroom 022	NO (-4.7%)	NO
03_Single Bedroom 023	NO (-85.7%)	NO
03_Single Bedroom 024	NO (-92.2%)	NO
03_Single Bedroom 025	NO (-79%)	NO
03_Single Bedroom 026	NO (-26.1%)	NO
03_Single Bedroom 027	NO (-78.3%)	NO
03_Single Bedroom 028	NO (-86.1%)	NO
03_Single Bedroom 029	N/A	N/A
03_Single Bedroom 030	NO (-64.5%)	NO
03_Single Bedroom 031	N/A	N/A
03_Single Bedroom 032	N/A	N/A
03_Single Bedroom 033	NO (-73.5%)	NO
03_Single Bedroom 034	NO (-94.3%)	NO
03_Single Bedroom 035	NO (-73.4%)	NO
03_Single Bedroom 036	N/A	N/A
03_Single Bedroom 037	NO (-76.7%)	NO
03_Single Bedroom 038	NO (-69.9%)	NO
03_Single Bedroom 039	NO (-72.3%)	NO
03_Single Bedroom 040	NO (-85.5%)	NO
03_Single Bedroom 041	NO (-73.5%)	NO
03_Single Bedroom 042	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Single Bedroom 043	N/A	N/A
03_Single Bedroom 044	NO (-84.2%)	NO
03_Single Bedroom 045	NO (-85.7%)	NO
03_Single Bedroom 046	NO (-86.8%)	NO
03_Single Bedroom 047	NO (-79.7%)	NO
03_Single Bedroom 048	N/A	N/A
03_Single Bedroom 049	N/A	N/A
03_Single Bedroom 050	NO (-93.2%)	NO
03_Single Bedroom 051	NO (-75.7%)	NO
03_Single Bedroom 052	NO (-4.6%)	NO
03_Single Bedroom 053	NO (-76.6%)	NO
03_Single Bedroom 054	NO (-79.3%)	NO
03_Single Bedroom 055	NO (-80%)	NO
03_Single Bedroom 056	N/A	N/A
03_Single Bedroom 057	NO (-87.6%)	NO
03_Single Room 001	NO (-33%)	NO
03_Single Room 002	NO (-79.7%)	NO
03_Single Room 003	NO (-5.8%)	NO
03_Single Room 004	NO (-71.6%)	NO
03_Single Room 005	NO (-96.5%)	NO
03_Single Room 006	N/A	N/A
03_Single room (HDU) 001	NO (-85.7%)	NO
03_Single room (HDU) 002	NO (-85.8%)	NO
03_Single room (HDU) 003	NO (-87.5%)	NO
03_Social Space/Dining 001	NO (-90.4%)	NO
03_Social Space/Dining 002	NO (-93.1%)	NO
03_Staff Base 001	N/A	N/A
03_Staff Base 002	N/A	N/A
03_Staff Base 003	N/A	N/A
03_Staff Base 004	N/A	N/A
03_Staff Base 005	N/A	N/A
03_Staff Base 006	N/A	N/A
03_Staff Base with Pneumt Tube 001	N/A	N/A
03_Staff Base with Pneumt Tube 002	NO (-98.9%)	NO
03_Staff Base with Pneumt Tube 003	N/A	N/A
03_Staff Base with Pneumt Tube 004	N/A	N/A
03_Staff Communal Changing Room 001	NO (-79.6%)	NO
03_Staff Rest/Base	NO (-87.6%)	NO
03_Staff Rest/Bev 001	NO (-87.6%)	NO
03_Staff Rest/Bev 002	N/A	N/A
03_Therapy Workbase	N/A	N/A
03_Treatment 001	N/A	N/A
03_Treatment 002	NO (-71.6%)	NO
03_Treatment (2-sided) 001	N/A	N/A
03_Treatment (2-sided) 002	N/A	N/A
03_Treatment Chemo	N/A	N/A
03_Unit Pantry 001	N/A	N/A
03_Unit Pantry 002	N/A	N/A
03_Wait 001	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Wait 002	N/A	N/A
03_Wait 003	N/A	N/A
03_Ward Managers Office 001	N/A	N/A
03_Ward Managers Office 002	N/A	N/A
04_2-Bed Bay w cot 001	NO (-90.8%)	NO
04_2-Bed Bay w cot 002	NO (-90.7%)	NO
04_4-cot bay 001	NO (-74.1%)	NO
04_4-cot bay 002	NO (-93.2%)	NO
04_Admin/Staff Base	NO (-82.6%)	NO
04_Anaesthetic Room 001	N/A	N/A
04_Anaesthetic Room 002	N/A	N/A
04_Bereavement: Labour 001	NO (-77.1%)	NO
04_Bereavement: Labour 002	NO (-76.8%)	NO
04_Bereavement: Neonates	NO (-76.8%)	NO
04_C/E 001	NO (-88.2%)	NO
04_C/E 002	N/A	N/A
04_C/E 003	N/A	N/A
04_C/E 004	NO (-87.6%)	NO
04_C/E 005	NO (-87.5%)	NO
04_C/E 006	N/A	N/A
04_C/E 007	N/A	N/A
04_C/E 008	NO (-72.5%)	NO
04_C/E 009	N/A	N/A
04_C/E 010	N/A	N/A
04_Cots: Single room 001	NO (-62.9%)	NO
04_Cots: Single room 002	NO (-80.8%)	NO
04_Cots: Single room 003	NO (-83%)	NO
04_Cots: Single room 004	NO (-88.3%)	NO
04_Cots: Single room 005	NO (-88.3%)	NO
04_Cots: Single room 006	NO (-93.8%)	NO
04_Cots: Single room 007	NO (-86.6%)	NO
04_Cots: Single room 008	NO (-87.4%)	NO
04_Cots: Single room 009	NO (-74.9%)	NO
04_Cots: Single room 010	NO (-68.1%)	NO
04_Delivery Room 001	NO (-78%)	NO
04_Delivery Room 002	NO (-80.1%)	NO
04_Delivery Room 003	NO (-78.2%)	NO
04_Delivery Room 004	NO (-80.2%)	NO
04_Delivery Room 005	NO (-78.2%)	NO
04_Delivery Room 006	NO (-78.2%)	NO
04_Delivery: Large 001	NO (-81.2%)	NO
04_Delivery: Large 002	NO (-82.4%)	NO
04_Delivery: Large 003	NO (-82.3%)	NO
04_Delivery: Large 004	NO (-81.7%)	NO
04_Delivery: Large 005	NO (-63.6%)	NO
04_Delivery: Large 006	NO (-81.3%)	NO
04_Delivery: Large 007	NO (-86%)	NO
04_Delivery: Large 008	NO (-88.2%)	NO
04_Delivery: Large 009	NO (-81.8%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Delivery: Large 010	N/A	N/A
04_Ensuite 001	N/A	N/A
04_Ensuite 002	NO (-87.2%)	NO
04_Ensuite 003	NO (-90.4%)	NO
04_Ensuite 004	N/A	N/A
04_Ensuite 005	NO (-85.5%)	NO
04_Ensuite 006	NO (-82.2%)	NO
04_Ensuite 007	N/A	N/A
04_Ensuite 009	NO (-79.8%)	NO
04_Ensuite 010	N/A	N/A
04_Ensuite 011	NO (-66.8%)	NO
04_Ensuite 012	NO (-72%)	NO
04_Ensuite 013	NO (-69.9%)	NO
04_Ensuite 014	N/A	N/A
04_Ensuite 015	N/A	N/A
04_Ensuite 016	N/A	N/A
04_Ensuite 017	N/A	N/A
04_Ensuite 018	N/A	N/A
04_Ensuite 019	NO (-50.7%)	NO
04_Ensuite 020	N/A	N/A
04_Ensuite 021	N/A	N/A
04_Ensuite 022	NO (-80.6%)	NO
04_Ensuite 023	N/A	N/A
04_Ensuite 024	N/A	N/A
04_Ensuite 025	NO (-84.6%)	NO
04_Ensuite 026	NO (-90.1%)	NO
04_Ensuite 027	N/A	N/A
04_Ensuite 028	N/A	N/A
04_Ensuite 029	N/A	N/A
04_Ensuite 030	N/A	N/A
04_Ensuite 031	N/A	N/A
04_Ensuite 032	N/A	N/A
04_Ensuite 033	NO (-65.9%)	NO
04_Ensuite 034	NO (-80.7%)	NO
04_Ensuite 035	N/A	N/A
04_Ensuite 036	NO (-69%)	NO
04_Ensuite 037	NO (-73%)	NO
04_Ensuite 038	N/A	N/A
04_Ensuite 039	NO (-73.6%)	NO
04_Ensuite 040	NO (-88.5%)	NO
04_Ensuite 041	N/A	N/A
04_Ensuite 042	N/A	N/A
04_Ensuite 043	N/A	N/A
04_Ensuite 044	N/A	N/A
04_Ensuite 045	NO (-77%)	NO
04_Ensuite 046	NO (-85.2%)	NO
04_Ensuite 047	N/A	N/A
04_Ensuite 048	N/A	N/A
04_Ensuite 049	NO (-81.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Ensuite 050	NO (-85.1%)	NO
04_Ensuite 051	NO (-58.9%)	NO
04_Ensuite 052	N/A	N/A
04_Ensuite 053	N/A	N/A
04_Ensuite 054	N/A	N/A
04_Ensuite 055	N/A	N/A
04_Ensuite 056	N/A	N/A
04_Ensuite 057	NO (-82%)	NO
04_Ensuite 058	N/A	N/A
04_Ensuite 059	N/A	N/A
04_Ensuite 060	N/A	N/A
04_Ensuite 061	N/A	N/A
04_Ensuite 062	N/A	N/A
04_Ensuite 063	N/A	N/A
04_Ensuite 064	NO (-76.3%)	NO
04_Ensuite 065	NO (-76.3%)	NO
04_Ensuite 066	N/A	N/A
04_Ensuite 068	N/A	N/A
04_Ensuite 069	NO (-51.8%)	NO
04_Ensuite 070	N/A	N/A
04_Ensuite 071	N/A	N/A
04_Ensuite 072	N/A	N/A
04_Ensuite 073	N/A	N/A
04_Ensuite 074	N/A	N/A
04_Ensuite 075	N/A	N/A
04_Ensuite 076	NO (-74.9%)	NO
04_Group Room	N/A	N/A
04_HDU Room	NO (-79.7%)	NO
04_Hearing test room 001	N/A	N/A
04_Hearing test room 002	N/A	N/A
04_Interview/Quiet Room	NO (-87.9%)	NO
04_Iso Lobby 003	N/A	N/A
04_Iso Lobby 004	N/A	N/A
04_IT HUB 001	N/A	N/A
04_IT HUB 002	N/A	N/A
04_IT HUB 003	N/A	N/A
04_Junior Doctor Office	NO (-79.8%)	NO
04_Office 001	NO (-83.7%)	NO
04_Office 002	NO (-87%)	NO
04_Office 003	NO (-91.4%)	NO
04_Office 004	NO (-84.8%)	NO
04_Office 005	N/A	N/A
04_Office 006	N/A	N/A
04_Office 007	N/A	N/A
04_Office 008	N/A	N/A
04_Office 009	N/A	N/A
04_Office 010	NO (-59.8%)	NO
04_Office 011	N/A	N/A
04_Office 012	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Office 013	NO (-88.3%)	NO
04_Office 014	N/A	N/A
04_Office 015	N/A	N/A
04_Office 016	N/A	N/A
04_Office 017	NO (-85%)	NO
04_Office - Manager	N/A	N/A
04_Office - reporting (4)	N/A	N/A
04_Office/Teams 001	N/A	N/A
04_Office/Teams 002	N/A	N/A
04_On-Call Room 001	N/A	N/A
04_On-Call Room 002	N/A	N/A
04_Parent's Kitchen/Dining Room	NO (-95.7%)	NO
04_Parent's Lounge	NO (-62.9%)	NO
04_Parents: ONS	NO (-70.7%)	NO
04_PoCT 001	N/A	N/A
04_PoCT 002	N/A	N/A
04_PoCT 003	N/A	N/A
04_PoCT 004	N/A	N/A
04_Prep Room	N/A	N/A
04_Reception	NO (-93.5%)	NO
04_Reception/Wait 001	N/A	N/A
04_Reception/Wait 002	N/A	N/A
04_Reception/Wait 003	NO (-92.2%)	NO
04_Reception/Wait 004	NO (-91.6%)	NO
04_Recovery (Stage 1) 001	NO (-73.5%)	NO
04_Recovery (Stage 1) 002	NO (-80%)	NO
04_Recovery (Stage 1) 003	NO (-94.6%)	NO
04_Recovery (Stage 1) 004	NO (-78.8%)	NO
04_Rooming-In	NO (-93.9%)	NO
04_Seminar 001	N/A	N/A
04_Seminar 002	NO (-86.6%)	NO
04_Seminar 003	N/A	N/A
04_Single bedroom AN 001	NO (-63.9%)	NO
04_Single bedroom AN 002	NO (-31.2%)	NO
04_Single bedroom AN 003	NO (-87.3%)	NO
04_Single bedroom AN 004	NO (-35.2%)	NO
04_Single bedroom AN 005	NO (-89.8%)	NO
04_Single bedroom AN 006	NO (-37.7%)	NO
04_Single bedroom AN 007	NO (-88.9%)	NO
04_Single bedroom AN 008	NO (-72.9%)	NO
04_Single bedroom AN 009	NO (-92.4%)	NO
04_Single bedroom w cot 001	NO (-86.5%)	NO
04_Single bedroom w cot 002	NO (-89.5%)	NO
04_Single bedroom w cot 003	NO (-35.3%)	NO
04_Single bedroom w cot 004	NO (-85%)	NO
04_Single bedroom w cot 005	N/A	N/A
04_Single bedroom w cot 006	NO (-76.3%)	NO
04_Single bedroom w cot 007	NO (-36.8%)	NO
04_Single bedroom w cot 008	NO (-74.5%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Single bedroom w cot 009	NO (-83%)	NO
04_Single bedroom w cot 010	N/A	N/A
04_Single bedroom w cot 011	NO (-83.7%)	NO
04_Single bedroom w cot 012	N/A	N/A
04_Single bedroom w cot 013	NO (-65.3%)	NO
04_Single bedroom w cot 014	NO (-74.8%)	NO
04_Single bedroom w cot 015	NO (-90.2%)	NO
04_Single bedroom w cot 016	NO (-91%)	NO
04_Single bedroom w cot 017	NO (-87.4%)	NO
04_Single bedroom w cot 018	NO (-83.9%)	NO
04_Single day space AN 001	NO (-87.3%)	NO
04_Single day space AN 002	NO (-87.3%)	NO
04_Single day space AN 003	NO (-70.3%)	NO
04_Single day space AN 004	NO (-70.3%)	NO
04_Single day space AN 005	NO (-84.9%)	NO
04_Single day space AN 006	NO (-84.9%)	NO
04_Skills Lab	NO (-73.9%)	NO
04_Staff Base 001	N/A	N/A
04_Staff Base 002	N/A	N/A
04_Staff Base 003	N/A	N/A
04_Staff Base 004	N/A	N/A
04_Staff Base 005	N/A	N/A
04_Staff Base 006	NO (-99.4%)	NO
04_Staff Base 007	NO (-99.6%)	NO
04_Staff Base 008	N/A	N/A
04_Staff Base 009	N/A	N/A
04_Staff Base 010	N/A	N/A
04_Staff Office	N/A	N/A
04_Staff Rest/Bev 001	NO (-85.3%)	NO
04_Staff Rest/Bev 002	NO (-64.1%)	NO
04_Staff Rest/Bev 003	NO (-84.7%)	NO
04_Staff Rest/Bev 004	NO (-89.6%)	NO
04_Staff Rest/Bev 005	N/A	N/A
04_Staff Rest/Bev 006	NO (-94.6%)	NO
04_TCU Office	N/A	N/A
04_TCU/single room w cot 001	NO (-86.6%)	NO
04_TCU/single room w cot 002	NO (-47.4%)	NO
04_TCU/single room w cot 003	NO (-31.3%)	NO
04_TCU/single room w cot 004	N/A	N/A
04_TCU/single room w cot 005	NO (-72.4%)	NO
04_TCU/single room w cot 006	NO (-88.5%)	NO
04_Theatre: C-section 001	N/A	N/A
04_Theatre: C-section 002	N/A	N/A
04_Treat: Procedures	N/A	N/A
04_Treatment (2-sided)	NO (-82.4%)	NO
04_Treatment: Phleb/Vacc 001	N/A	N/A
04_Treatment: Phleb/Vacc 002	N/A	N/A
04_Treatment: Phleb/Vacc 003	N/A	N/A
04_Treatment: Phleb/Vacc 004	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04_Triage 001	N/A	N/A
04_Triage 002	N/A	N/A
04_Triage 003	N/A	N/A
04_Triage 004	N/A	N/A
04_Triage 005	N/A	N/A
04_Ultrasound 001	NO (-92.1%)	NO
04_Ultrasound 002	NO (-92.2%)	NO
04_Ultrasound 003	NO (-83.9%)	NO
04_Ultrasound 004	NO (-79.2%)	NO
04_Ultrasound 005	NO (-54.2%)	NO
04_Ultrasound 006	NO (-82.2%)	NO
04_Unit Pantry 004	N/A	N/A
04_Unit Pantry 001	N/A	N/A
04_Unit Pantry 002	N/A	N/A
04_Unit Pantry 003	N/A	N/A
04_Waiting: 10 places 001	N/A	N/A
04_Waiting: 10 places 002	N/A	N/A
05_4-Bed Bay 001	NO (-86.7%)	NO
05_4-Bed Bay 002	NO (-86.7%)	NO
05_4-Bed Bay 003	NO (-86.7%)	NO
05_4-Bed Bay 004	NO (-86.7%)	NO
05_4-Bed Bay 005	NO (-86.7%)	NO
05_4-Bed Bay 006	NO (-86.7%)	NO
05_ARU Gym	N/A	N/A
05_Bariatric Bedroom 001	NO (-73.7%)	NO
05_Bariatric Bedroom 002	NO (-92.7%)	NO
05_Bariatric Bedroom 003	NO (-91.5%)	NO
05_En-suite Bariatric 001	N/A	N/A
05_En-suite Bariatric 002	N/A	N/A
05_En-suite Bariatric 003	N/A	N/A
05_Ensuite 001	N/A	N/A
05_Ensuite 002	NO (-42.5%)	NO
05_Ensuite 003	NO (-42.1%)	NO
05_Ensuite 004	N/A	N/A
05_Ensuite 005	N/A	N/A
05_Ensuite 006	N/A	N/A
05_Ensuite 007	N/A	N/A
05_Ensuite 008	NO (-93.3%)	NO
05_Ensuite 009	NO (-60.5%)	NO
05_Ensuite 010	NO (-38.3%)	NO
05_Ensuite 011	NO (-85.1%)	NO
05_Ensuite 012	NO (-90.5%)	NO
05_Ensuite 013	NO (-73.4%)	NO
05_Ensuite 014	NO (-82.4%)	NO
05_Ensuite 015	N/A	N/A
05_Ensuite 016	NO (-47.8%)	NO
05_Ensuite 017	NO (-72.1%)	NO
05_Ensuite 018	N/A	N/A
05_Ensuite 019	NO (-59.7%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
05_Ensuite 020	N/A	N/A
05_Ensuite 021	N/A	N/A
05_Ensuite 022	NO (-84.8%)	NO
05_Ensuite 023	NO (-90.3%)	NO
05_Ensuite 024	N/A	N/A
05_Ensuite 025	NO (-81.1%)	NO
05_Ensuite 026	NO (-84.2%)	NO
05_Ensuite 027	NO (-93.5%)	NO
05_Ensuite 028	NO (-37.2%)	NO
05_Ensuite 029	N/A	N/A
05_Ensuite 030	N/A	N/A
05_Ensuite 031	NO (-60.9%)	NO
05_Ensuite 032	NO (-67.3%)	NO
05_Ensuite 033	N/A	N/A
05_Ensuite 034	NO (-60.2%)	NO
05_Ensuite 035	NO (-21.8%)	NO
05_Ensuite 036	N/A	N/A
05_Ensuite 037	NO (-70.9%)	NO
05_Ensuite 038	N/A	N/A
05_Ensuite 039	N/A	N/A
05_Ensuite 040	NO (-68.3%)	NO
05_Ensuite 041	NO (-73.7%)	NO
05_Ensuite 042	NO (-94.7%)	NO
05_Ensuite 043	N/A	N/A
05_Ensuite 044	NO (-83%)	NO
05_Ensuite 045	NO (-71.6%)	NO
05_Ensuite 046	N/A	N/A
05_Ensuite 047	NO (-83.2%)	NO
05_Ensuite 048	NO (-72.8%)	NO
05_Ensuite 049	NO (-68.6%)	NO
05_Ensuite 050	N/A	N/A
05_Ensuite 051	NO (-90%)	NO
05_Ensuite 052	N/A	N/A
05_Ensuite 053	N/A	N/A
05_Ensuite 054	NO (-73.3%)	NO
05_Ensuite 055	NO (-62.1%)	NO
05_Ensuite 056	NO (-70.9%)	NO
05_Ensuite 057	NO (-71%)	NO
05_Interview 001	N/A	N/A
05_Interview 002	NO (-92.6%)	NO
05_Interview 003	NO (-92.6%)	NO
05_Interview 004	N/A	N/A
05_Interview 005	N/A	N/A
05_Interview 006	N/A	N/A
05_Iso Lobby 001	N/A	N/A
05_Iso Lobby 002	N/A	N/A
05_Iso Lobby 003	N/A	N/A
05_IT HUB 001	N/A	N/A
05_IT HUB 002	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
05_IT HUB 003	N/A	N/A
05_IT HUB 004	N/A	N/A
05_IT HUB 005	N/A	N/A
05_MDT Room 001	NO (-89.9%)	NO
05_MDT Room 002	NO (-95.4%)	NO
05_MDT Room 003	NO (-95.6%)	NO
05_MDT Room 004	NO (-87.7%)	NO
05_MDT Room 005	NO (-85.4%)	NO
05_MDT Room 006	NO (-85.4%)	NO
05_Meds Store/Prep 001	N/A	N/A
05_Meds Store/Prep 002	N/A	N/A
05_Meds Store/Prep 003	N/A	N/A
05_Meeting Room	N/A	N/A
05_Office 001	N/A	N/A
05_Office 002	N/A	N/A
05_Office 003	N/A	N/A
05_OT Office: 6 Workstations	N/A	N/A
05_Physio office: 6 workstations	N/A	N/A
05_Resus Bay 002	N/A	N/A
05_Shared Admin 001	N/A	N/A
05_Shared Admin 002	N/A	N/A
05_Shared Day Space	N/A	N/A
05_Single Bedroom 001	NO (-89%)	NO
05_Single Bedroom 002	NO (-73.5%)	NO
05_Single Bedroom 003	NO (-53.9%)	NO
05_Single Bedroom 004	NO (-46.6%)	NO
05_Single Bedroom 005	NO (-79.8%)	NO
05_Single Bedroom 006	NO (-96.1%)	NO
05_Single Bedroom 007	NO (-52%)	NO
05_Single Bedroom 008	NO (-29.2%)	NO
05_Single Bedroom 009	NO (-90.4%)	NO
05_Single Bedroom 010	NO (-44.9%)	NO
05_Single Bedroom 011	N/A	N/A
05_Single Bedroom 012	NO (-86.5%)	NO
05_Single Bedroom 013	NO (-88.6%)	NO
05_Single Bedroom 014	NO (-59.3%)	NO
05_Single Bedroom 015	NO (-54%)	NO
05_Single Bedroom 016	N/A	N/A
05_Single Bedroom 017	N/A	N/A
05_Single Bedroom 018	NO (-86.3%)	NO
05_Single Bedroom 019	NO (-70.7%)	NO
05_Single Bedroom 020	NO (-73.3%)	NO
05_Single Bedroom 021	NO (-87.5%)	NO
05_Single Bedroom 022	NO (-67.8%)	NO
05_Single Bedroom 023	NO (-48.3%)	NO
05_Single Bedroom 024	NO (-61.9%)	NO
05_Single Bedroom 025	NO (-81.3%)	NO
05_Single Bedroom 026	NO (-86.5%)	NO
05_Single Bedroom 027	NO (-29.1%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
05_Single Bedroom 028	N/A	N/A
05_Single Bedroom 029	NO (-85.6%)	NO
05_Single Bedroom 030	NO (-26.4%)	NO
05_Single Bedroom 031	NO (-82.6%)	NO
05_Single Bedroom 032	NO (-81.8%)	NO
05_Single Bedroom 033	NO (-81.5%)	NO
05_Single Bedroom 034	NO (-72.8%)	NO
05_Single Bedroom 035	NO (-71.6%)	NO
05_Single Bedroom 036	NO (-44.4%)	NO
05_Single Bedroom 037	NO (-69.4%)	NO
05_Single Bedroom 038	NO (-53.9%)	NO
05_Single Bedroom 039	NO (-34.6%)	NO
05_Single Bedroom 040	NO (-82.9%)	NO
05_Single Bedroom 041	NO (-70.8%)	NO
05_Single Bedroom 042	NO (-82.1%)	NO
05_Single Bedroom 043	NO (-88.7%)	NO
05_Single Bedroom 044	N/A	N/A
05_Single Bedroom 045	NO (-67.7%)	NO
05_Single Bedroom 046	NO (-81.6%)	NO
05_Single Bedroom 047	NO (-32.5%)	NO
05_Single Bedroom 048	NO (-81.8%)	NO
05_Single Bedroom 049	NO (-81.5%)	NO
05_Single Bedroom 050	N/A	N/A
05_Single Bedroom 051	N/A	N/A
05_Single Bedroom 052	NO (-68.8%)	NO
05_Single Bedroom 053	N/A	N/A
05_Single Bedroom 054	N/A	N/A
05_Single Bedroom 055	NO (-59.1%)	NO
05_Single Bedroom 056	NO (-55.8%)	NO
05_Single Bedroom 057	NO (-97.4%)	NO
05_Staff Base 001	N/A	N/A
05_Staff Base 002	NO (-95.9%)	NO
05_Staff Base 003	NO (-100%)	NO
05_Staff Base 004	NO (-100%)	NO
05_Staff Base 005	N/A	N/A
05_Staff Base 006	N/A	N/A
05_Staff Base 007	N/A	N/A
05_Staff Base 008	NO (-100%)	NO
05_Staff Rest/Bev 001	NO (-87.7%)	NO
05_Staff Rest/Bev 002	NO (-89.5%)	NO
05_Staff Rest/Bev 003	NO (-89.6%)	NO
05_Treatment (2-sided) 001	N/A	N/A
05_Treatment (2-sided) 002	N/A	N/A
05_Treatment (2-sided) 003	N/A	N/A
05_Unit Pantry 001	N/A	N/A
05_Unit Pantry 002	N/A	N/A
05_Unit Pantry 003	N/A	N/A
06_4 Bed bay 001	NO (-85%)	NO
06_4 Bed bay 002	NO (-85%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
06_4 Bed bay 003	NO (-85%)	NO
06_4 Bed bay 004	NO (-85%)	NO
06_4 Bed bay 005	NO (-85%)	NO
06_4 Bed bay 006	NO (-85%)	NO
06_Bariatric Bedroom 001	NO (-91.9%)	NO
06_Bariatric Bedroom 002	NO (-66.3%)	NO
06_Bariatric Bedroom 003	NO (-89.1%)	NO
06_Clinical Psychology Office	N/A	N/A
06_Corporate Office 001	N/A	N/A
06_Corporate Office 002	N/A	N/A
06_Corporate Office 003	N/A	N/A
06_Corridor 009	NO (-93.4%)	NO
06_Ensuite 001	NO (-63.9%)	NO
06_Ensuite 002	NO (-89.4%)	NO
06_Ensuite 003	N/A	N/A
06_Ensuite 004	NO (-58.7%)	NO
06_Ensuite 005	NO (-63.1%)	NO
06_Ensuite 006	NO (-40.2%)	NO
06_Ensuite 007	NO (-84.2%)	NO
06_Ensuite 008	NO (-41.5%)	NO
06_Ensuite 009	NO (-52.5%)	NO
06_Ensuite 010	NO (-39%)	NO
06_Ensuite 011	NO (-57.6%)	NO
06_Ensuite 012	NO (-88.9%)	NO
06_Ensuite 013	NO (-92.4%)	NO
06_Ensuite 014	NO (-60.6%)	NO
06_Ensuite 015	NO (-63%)	NO
06_Ensuite 016	NO (-52%)	NO
06_Ensuite 017	N/A	N/A
06_Ensuite 018	NO (-39.2%)	NO
06_Ensuite 019	NO (-82.6%)	NO
06_Ensuite 020	NO (-82.5%)	NO
06_Ensuite 021	NO (-93.3%)	NO
06_Ensuite 022	NO (-68.5%)	NO
06_Ensuite 023	NO (-14.8%)	NO
06_Ensuite 024	NO (-58.2%)	NO
06_Ensuite 025	NO (-78.8%)	NO
06_Ensuite 026	N/A	N/A
06_Ensuite 027	N/A	N/A
06_Ensuite 028	N/A	N/A
06_Ensuite 029	N/A	N/A
06_Ensuite 030	N/A	N/A
06_Ensuite 031	N/A	N/A
06_Ensuite 032	NO (-72.4%)	NO
06_Ensuite 033	N/A	N/A
06_Ensuite 034	NO (-83.6%)	NO
06_Ensuite 035	NO (-35.5%)	NO
06_Ensuite 036	NO (-36.7%)	NO
06_Ensuite 037	NO (-90.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
06_Ensuite 038	N/A	N/A
06_Ensuite 039	N/A	N/A
06_Ensuite 040	N/A	N/A
06_Ensuite 041	N/A	N/A
06_Ensuite 042	N/A	N/A
06_Ensuite 043	NO (-81.5%)	NO
06_Ensuite 044	N/A	N/A
06_Ensuite 045	NO (-72.7%)	NO
06_Ensuite 046	NO (-82.3%)	NO
06_Ensuite 047	N/A	N/A
06_Ensuite 048	N/A	N/A
06_Ensuite 049	N/A	N/A
06_Ensuite 050	N/A	N/A
06_Ensuite 051	NO (-71.5%)	NO
06_Ensuite 052	NO (-63.1%)	NO
06_Ensuite 053	N/A	N/A
06_Ensuite 054	N/A	N/A
06_Ensuite 055	NO (-90.4%)	NO
06_Ensuite 056	NO (-40.7%)	NO
06_Ensuite 057	NO (-67.8%)	NO
06_Ensuite Bariatric 001	N/A	N/A
06_Ensuite Bariatric	N/A	N/A
06_Ensuite Bariatric	N/A	N/A
06_Food Court Seating	NO (-75.8%)	NO
06_Interview 001	N/A	N/A
06_Interview 002	N/A	N/A
06_Interview 003	N/A	N/A
06_Interview 004	N/A	N/A
06_Interview 005	N/A	N/A
06_Interview 006	NO (-90.4%)	NO
06_Iso Lobby 001	N/A	N/A
06_Iso Lobby 002	N/A	N/A
06_Iso Lobby 003	N/A	N/A
06_Iso Lobby 004	N/A	N/A
06_Iso Lobby 005	N/A	N/A
06_Iso Lobby 006	N/A	N/A
06_Iso Single Bedroom 001	NO (-86%)	NO
06_Iso Single Bedroom 002	NO (-93.3%)	NO
06_Iso Single Bedroom 003	NO (-93.5%)	NO
06_IT HUB 001	N/A	N/A
06_IT HUB 002	N/A	N/A
06_IT HUB 003	N/A	N/A
06_Kitchens and Servery	NO (-91.2%)	NO
06_MDT Room 001	NO (-83.6%)	NO
06_MDT Room 002	NO (-74.4%)	NO
06_MDT Room 003	NO (-87%)	NO
06_MDT Room 004	NO (-94.8%)	NO
06_MDT Room 005	NO (-94.4%)	NO
06_MDT Room 006	NO (-83.8%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
06_MDT Room 007	NO (-83.6%)	NO
06_MDT Room 008	NO (-87%)	NO
06_Meeting Room 001	NO (-69.3%)	NO
06_Meeting Room 002	N/A	N/A
06_Meeting Room 003	N/A	N/A
06_Office 001	N/A	N/A
06_Office 002	N/A	N/A
06_Office 003	N/A	N/A
06_Office 004	N/A	N/A
06_Office 005	N/A	N/A
06_On-Call Room 001	NO (-70.4%)	NO
06_On-Call Room 002	N/A	N/A
06_Open Plan for 14 people 001	NO (-84.7%)	NO
06_Open Plan for 14 people 002	NO (-80.3%)	NO
06_Open Plan for 6 people	N/A	N/A
06_POD	NO (-93.5%)	NO
06_Resus Bay 001	N/A	N/A
06_Resus Bay 002	NO (-96.2%)	NO
06_Shared Admin 001	NO (-74.6%)	NO
06_Shared Admin 002	N/A	N/A
06_Shared Admin 003	NO (-69.7%)	NO
06_Shared Admin 004	NO (-74.1%)	NO
06_Shared Admin 005	NO (-71.7%)	NO
06_Shared Day Space	N/A	N/A
06_Single Bedroom 001	N/A	N/A
06_Single Bedroom 002	N/A	N/A
06_Single Bedroom 003	NO (-95.9%)	NO
06_Single Bedroom 004	NO (-41.1%)	NO
06_Single Bedroom 005	NO (-88%)	NO
06_Single Bedroom 006	N/A	N/A
06_Single Bedroom 007	NO (-37.1%)	NO
06_Single Bedroom 008	NO (-36.9%)	NO
06_Single Bedroom 009	NO (-85.5%)	NO
06_Single Bedroom 010	NO (-86.2%)	NO
06_Single Bedroom 011	NO (-85.1%)	NO
06_Single Bedroom 012	NO (-25.9%)	NO
06_Single Bedroom 013	N/A	N/A
06_Single Bedroom 014	NO (-84.3%)	NO
06_Single Bedroom 015	NO (-77.6%)	NO
06_Single Bedroom 016	N/A	N/A
06_Single Bedroom 017	NO (-36%)	NO
06_Single Bedroom 018	N/A	N/A
06_Single Bedroom 019	NO (-63.5%)	NO
06_Single Bedroom 020	NO (-68.2%)	NO
06_Single Bedroom 021	NO (-60%)	NO
06_Single Bedroom 022	NO (-60.3%)	NO
06_Single Bedroom 023	NO (-38.1%)	NO
06_Single Bedroom 024	NO (-77.3%)	NO
06_Single Bedroom 025	NO (-38.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
06_Single Bedroom 026	NO (-68.9%)	NO
06_Single Bedroom 027	NO (-65.7%)	NO
06_Single Bedroom 028	NO (-66.1%)	NO
06_Single Bedroom 029	NO (-85.2%)	NO
06_Single Bedroom 030	NO (-76.9%)	NO
06_Single Bedroom 031	NO (-77%)	NO
06_Single Bedroom 032	NO (-40.7%)	NO
06_Single Bedroom 033	NO (-85.5%)	NO
06_Single Bedroom 034	NO (-38.9%)	NO
06_Single Bedroom 035	NO (-26%)	NO
06_Single Bedroom 036	NO (-66.1%)	NO
06_Single Bedroom 037	NO (-85.5%)	NO
06_Single Bedroom 038	NO (-77.2%)	NO
06_Single Bedroom 039	N/A	N/A
06_Single Bedroom 040	NO (-47.8%)	NO
06_Single Bedroom 041	NO (-79.4%)	NO
06_Single Bedroom 042	NO (-62.5%)	NO
06_Single Bedroom 043	NO (-32.1%)	NO
06_Single Bedroom 044	NO (-59.7%)	NO
06_Single Bedroom 045	NO (-77.8%)	NO
06_Single Bedroom 046	N/A	N/A
06_Single Bedroom 047	NO (-30.8%)	NO
06_Single Bedroom 048	NO (-49.8%)	NO
06_Single Bedroom 049	N/A	N/A
06_Single Bedroom 050	NO (-96%)	NO
06_Single Bedroom 051	NO (-37%)	NO
06_Single Bedroom 052	NO (-24.1%)	NO
06_Single Bedroom 053	NO (-87.4%)	NO
06_Single Bedroom 054	NO (-81.1%)	NO
06_Staff Base 001	NO (-96.6%)	NO
06_Staff Base 002	N/A	N/A
06_Staff Base 003	N/A	N/A
06_Staff Base 004	N/A	N/A
06_Staff Base 005	N/A	N/A
06_Staff Base 006	N/A	N/A
06_Staff Breakout	NO (-79%)	NO
06_Staff Rest (wellbeing)	NO (-77.8%)	NO
06_Staff Rest/Bev 001	NO (-88.1%)	NO
06_Staff Rest/Bev 002	NO (-88.3%)	NO
06_Staff Rest/Bev 003	NO (-88.1%)	NO
06_Therapy Assmnt & Treat 001	N/A	N/A
06_Therapy Assmnt & Treat 002	N/A	N/A
06_Therapy Office: 6 workstations 001	N/A	N/A
06_Therapy Office: 6 workstations 002	N/A	N/A
06_Treatment (2 sided) 001	N/A	N/A
06_Treatment (2 sided) 002	N/A	N/A
06_Treatment (2 sided) 003	N/A	N/A
06_TSU Gym	NO (-88.4%)	NO
06_Unit Pantry 001	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
06_Unit Pantry 002	N/A	N/A
06_Unit Pantry 003	N/A	N/A
06_Virtual Booth 001	N/A	N/A
06_Virtual Booth 002	NO (-72%)	NO
06_Virtual Booth 003	N/A	N/A
07_IT Hub 001	N/A	N/A
07_IT Hub 002	N/A	N/A
07_IT Store	N/A	N/A
B1_Bulk Fluid Store	N/A	N/A
B1_Cold St.	N/A	N/A
B1_Dispensary	N/A	N/A
B1_Drug Cupboard Secure	N/A	N/A
B1_IT HUB 001	N/A	N/A
B1_IT HUB 002	N/A	N/A
B1_IT HUB 003	N/A	N/A
B1_IT HUB 004	N/A	N/A
B1_IT HUB 005	N/A	N/A
B1_IT HUB 006	N/A	N/A
B1_Management	N/A	N/A
B1_MEP PLANT 003	N/A	N/A
B1_MEP PLANT 004	N/A	N/A
B1_MEP PLANT 005	N/A	N/A
B1_MEP PLANT 006	N/A	N/A
B1_MEP PLANT 008	N/A	N/A
B1_MEP PLANT 009	N/A	N/A
B1_MEP PLANT 010	N/A	N/A
B1_MEP PLANT 011	N/A	N/A
B1_MEP PLANT 013	N/A	N/A
B1_MEP PLANT 014	N/A	N/A
B1_MEP PLANT 015	N/A	N/A
B1_MEP PLANT 016	N/A	N/A
B1_MEP PLANT 017	N/A	N/A
B1_MEP PLANT 018	N/A	N/A
B1_MEP PLANT 019	N/A	N/A
B1_MEP PLANT 020	N/A	N/A
B1_MEP PLANT 021	N/A	N/A
B1_MEP PLANT 023	N/A	N/A
B1_MEP PLANT 024	N/A	N/A
B1_Office	NO (-75.9%)	NO
B1_Office (Admin) 001	N/A	N/A
B1_Office (Admin) 002	N/A	N/A
B1_Office (Managnt) 001	N/A	N/A
B1_Office (Managnt) 002	N/A	N/A
B1_Office (Managnt) 003	N/A	N/A
B1_Office (Managnt) 004	N/A	N/A
B1_Office (Managnt) 005	N/A	N/A
B1_Office: Open Plan 001	NO (-83%)	NO
B1_Office: Open Plan 002	NO (-40.9%)	NO
B1_Office; Medical Examiner	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B1_Patient Handling/Body Store	NO (-99.1%)	NO
B1_Post Room	N/A	N/A
B1_Prep: Diet Bay	N/A	N/A
B1_Preparation Area	N/A	N/A
B1_Regeneration	N/A	N/A
B1_Staff Rest/Bev 001	N/A	N/A
B1_Staff Rest/Bev 002	NO (-91.4%)	NO
B1_Staff Rest/Bev 003	N/A	N/A
B1_Viewing Room	N/A	N/A
B1_Visitor Entrace/Wait	N/A	N/A
B1_Wash Area	N/A	N/A
B1_Workspace	N/A	N/A
CP_00_Cafe	YES (+37.4%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	74511.4	74511.4
External area [m^2]	56229.4	56476.2
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	3
Average conductance [W/K]	12798.5	21791.6
Average U-value [W/m^2K]	0.23	0.39
Alpha value* [%]	10.19	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
99	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
1	**Others: Miscellaneous 24hr activities**
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

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

	Actual	Notional
Heating	1.14	1.9
Cooling	10.67	15.17
Auxiliary	27.5	21.2
Lighting	29.69	41.06
Hot water	27.62	20.12
Equipment*	125.98	125.98
TOTAL**	**96.63**	**99.44**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	2.19	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	203.29	202.62
Primary energy* [kWh/m^2]	289.23	297.12
Total emissions [kg/m^2]	47.8	50.3

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Constant volume system (fixed fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	5.4	338.5	0.5	18.8	95.3	2.84	5	3.15	5.56
	Notional	10.9	304.1	1.2	29.7	92.6	2.56	2.84	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	118.9	271.8	14.7	32.3	30.9	2.25	2.34	2.5	2.6
	Notional	34.8	156.8	3.8	11.5	11.5	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	1130.9	0	62.8	16.3	2.84	5	3.15	5.56
	Notional	0	1033.9	0	75.8	9.8	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0.1	904.7	0	50.2	32.3	2.84	5	3.15	5.56
	Notional	0.5	862	0.1	63.2	36.4	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	2813.3	0	156.2	29.6	2.84	5	3.15	5.56
	Notional	0	2774.4	0	203.4	60.2	2.56	3.79	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	9.3	738.9	0.9	41	65.6	2.84	5	3.15	5.56
	Notional	11.5	761.4	1.2	55.8	44.6	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	2280.4	0	126.6	9.6	2.84	5	3.15	5.56
	Notional	0	1831.5	0	134.3	5.8	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	2.2	1284	0.2	71.3	28.1	2.84	5	3.15	5.56
	Notional	2.7	1119.2	0.3	82	34.7	2.56	3.79	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	24.9	234	2.4	13	67.2	2.84	5	3.15	5.56
	Notional	41.8	233	4.5	22.8	45.1	2.56	2.84	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	44.4	0	4.4	0	4.9	2.84	0	3.15	0
	Notional	60.3	0	6.5	0	6.2	2.56	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.15	00000007:Surf[0]
Floor	0.2	0.15	00000007:Surf[6]
Roof	0.15	0.13	0000002F:Surf[0]
Windows, roof windows, and rooflights	1.5	0.15	030000FB:Surf[0]
Personnel doors	1.5	0.9	000000C0:Surf[2]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	1

Appendix C Part L2A report for Hospital Redevelopment

AECOM

Hillingdon Hospital

Design Stage Energy Assessment

Project number: 60642181

March 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
AM Graduate Sustainability Consultant DC Principal Consultant	EW Principal Engineer	MA Technical Director	PS Regional Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

The Hillingdon Hospitals NHS Foundation Trust

Prepared by:

Alva Murphy
Graduate Sustainability Consultant
E: alva.murphy@aecom.com

AECOM Limited
5th Floor, 2 City Walk
Leeds LS11 9AR
United Kingdom

T: +44 (0)113 391 6800
aecom.com

Table of Contents

Figures

Tables

Executive Summary

This report discusses a preliminary Part L2A (2013) Criteria 1 and 3 assessment for the proposed Hillingdon Hospital for the purposes of demonstrating compliance with the GLA London Plan Policy 5.2. This assessment has been completed based on the RIBA Stage 2 Concept Design information and will be updated at the subsequent RIBA Stages.

Since the government published “Our Energy Future – Energy White Paper” in February 2003, which aims to “bring environmental concerns to the heart of energy policy”, the building regulation Part L has been updated to align with both the Energy White Paper in the UK and the Energy Performance of Buildings Directive applicable to all European member countries.

Hillingdon Hospital will need to comply with the requirements of Part L 2021, coming into force on 15 June 2022; however, at the time of writing (March 2022), the software to assess the building against the requirements of this regulation is not yet available. Therefore, once the software is available, the design will need to be assessed against the requirements of the new regulation to ensure its compliance.

This report discusses the performance of the building against the current (2013) version of Part L, as required to demonstrate compliance with Policy 5.2 of The London Plan. The results presented in this report do not form the As Designed Part L assessment as required by Building Control.

Energy assessment results

	Whole Site	Main Hospital	Cark Park Cafe
Building Emissions Rate (BER)	47.8 $kgCO_2/m^2.yr$	47.8 $kgCO_2/m^2.yr$	37.9 $kgCO_2/m^2.yr$
Target Emissions Rate (TER)	50.3 $kgCO_2/m^2.yr$	50.2 $kgCO_2/m^2.yr$	77.5 $kgCO_2/m^2.yr$
Part L2A (2014) Criterion 1 Result	Pass (5.0%)	Pass (4.8%)	Pass (51.1%)

Table 1: Energy Assessment Results for Hillingdon Hospital

The building has also been assessed against Criterion 3, the following rooms have been found to fail, indicating there may be excessive solar gains in a small number of occupied spaces:

- 01_Imaging: IR
- 01_Recovery 002 and 004
- 01_Waiting Zone IR: 5 places
- CP_00_Cafe

While this Criteria is not mandatory, options for reducing excessive solar in these spaces includes adding additional external solar shading, reducing glazed areas or g-values, and the inclusion of internal blinds (depending on NHS clinical requirements).

1. Introduction

Hillingdon Hospital has been assessed against the requirements of Part L2A (2013) in order to demonstrate its compliance with the London Plan Policy 5.2.

The information presented within this report can only be used for the purposes of demonstrating compliance with this planning policy, and does not form part of the information required by Building Control.

Hillingdon Hospital will need to comply with the upcoming Part L 2021, coming into force on 15 June 2022; however, at the time of writing this report (March 2022) the software for assessing against the new version of the regulations is not available. It is strongly recommended that as soon as the assessment software becomes available, the building is assessed against the requirements of Part L 2021 to ensure that it is able to achieve regulatory compliance.

2. Our Approach

Hillingdon Hospital includes a main hospital building, comprised of examination/treatment rooms, multi bed wards, single bedrooms, operating rooms, laboratories, rooms with specialist technology (i.e. CT, X-Ray), a coffee shop, dining area, office spaces and other ancillary spaces. The separate car park includes a café space, which is assessed against the requirements of Part L. The total floor area of the proposed buildings are approximately 80,300m².

This assessment has been completed based on the currently available design information; details of which are included in Appendix A.

2.1 Energy and CO_2 performance

The GLA London Plan requires that buildings demonstrate performance exceeding that required by Part L 2013. The London Plan requires that buildings follow a “Lean, clean, green” approach, such that passive energy efficiency measures are maximised before active and renewable energy measures are included.

The energy assessment uses the “actual” building’s CO_2 emissions (known as the Building Emissions Rate or BER) and the Target Emissions Rate (TER). The TER and BER must be calculated using one of the calculation tools specified in Part L2A (2013) and in this case AECOM have used approved “dynamic thermal modelling” software; namely <Virtual Environment> v.2021 software suite, from Integrated Environmental Solutions Ltd.

3. Modelling Methodology

To carry out the Part L simulations for the energy assessment, AECOM uses the industry standard <Virtual Environment> v.2021 software suite, from Integrated Environmental Solutions Ltd. The IES <VE> is an integrated suite of applications based around one 3D geometrical model. The modules used for this assessment are “SunCast” for solar shading analysis and “Apache-Sim” for thermal simulation calculations for Part L2A (2013) Criteria 1 and 3 assessments.

SunCast generates shadows and internal solar insolation from any sun position defined by date, time, orientation, site latitude and longitude. This shading information is stored in a database and is used to take account of shading from surroundings in subsequent thermal simulation calculations.

Apache-Sim is a dynamic thermal simulation program based on first-principles mathematical modelling of the heat transfer processes within and around a building. It qualifies as a Dynamic Model in the CIBSE system of model classification and exceeds the requirements of such a model in many areas. The program provides an environment for the detailed evaluation of building and system designs, allowing them to be optimised with regard to comfort criteria and energy use. A three-dimensional thermal model of the building was created based on drawings provided (see Appendix A for full details). The building fabric, activity profiles and HVAC servicing strategy were entered into each zone of the thermal model based on the inputs described in this report.

IES v.2021 contains an automatic function that creates the notional building thermal model based on the “actual” building geometry. The notional building is used in Criterion 1 of Part L2A to derive the Target Emissions Rate (TER) against which the actual Building Emissions Rate (BER) is compared.

(a) (b)

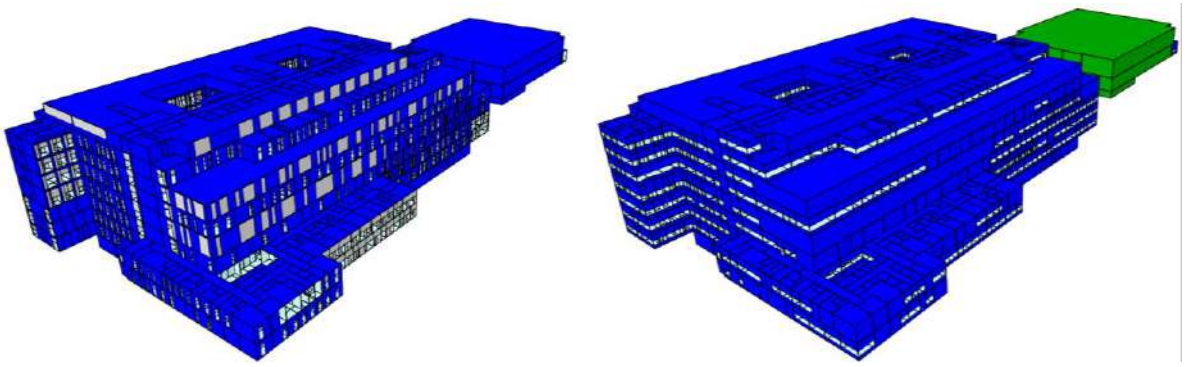


Figure 1: Screenshots of the IES thermal model of the (a) Actual and (b) Notional Buildings, used in the Part L2A (2013) Assessment

4. Energy Assessment Results

Based on the current design specification, as described in Appendix A, the following CO_2 emission rates were calculated for Hillingdon Hospital.

Energy Assessment Results

	Whole Site	Main Hospital	Cark Park Cafe
Building Emissions Rate (BER)	47.8 $kgCO_2/m^2.yr$	47.8 $kgCO_2/m^2.yr$	37.9 $kgCO_2/m^2.yr$
Target Emissions Rate (TER)	50.3 $kgCO_2/m^2.yr$	50.2 $kgCO_2/m^2.yr$	77.5 $kgCO_2/m^2.yr$
Part L2A (2014) Criterion 1 Result	Pass (5.0%)	Pass (4.8%)	Pass (51.1%)

Table 2: Energy Assessment Results for Hillingdon Hospital

As the BER is less than the TER for both buildings they are deemed to **pass** Criterion 1 of Part L2A (2013). The following figure shows the breakdown of the carbon emissions in the building by source.

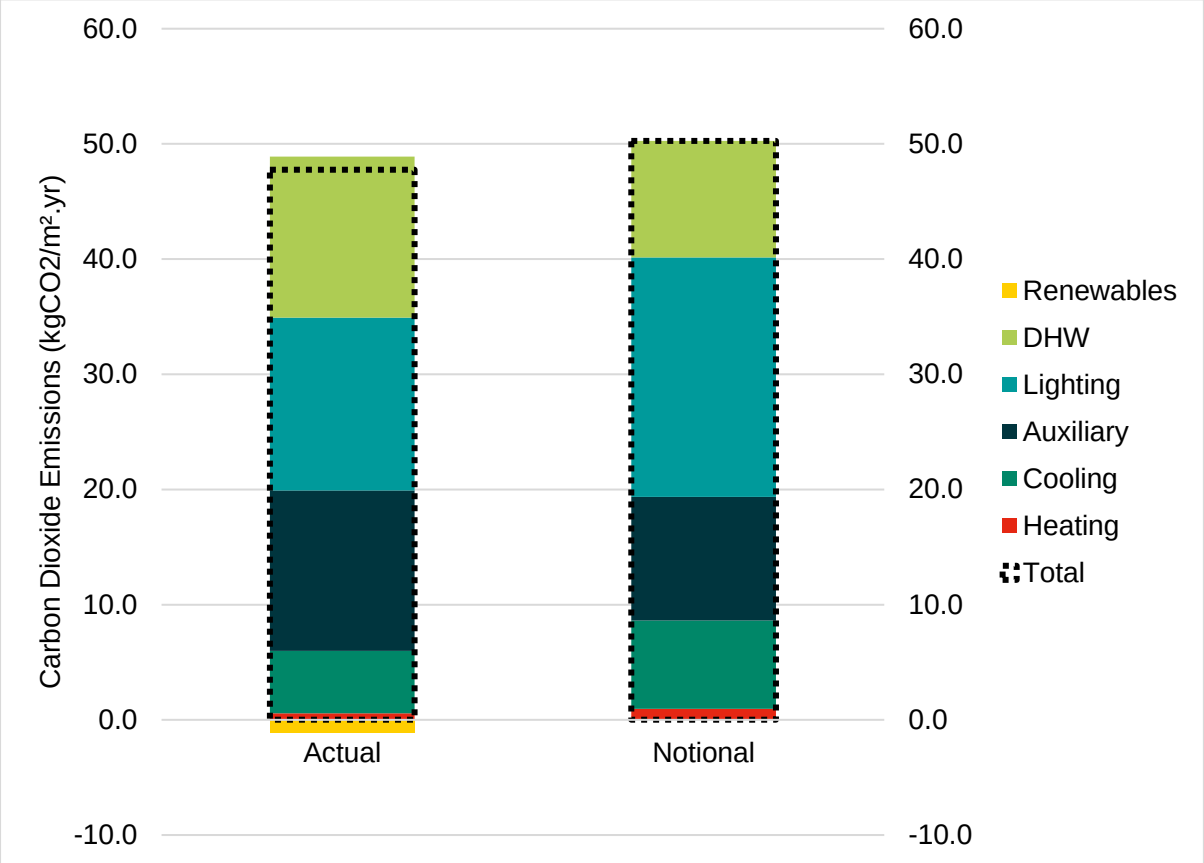


Figure 2: Breakdown of Carbon Emissions from the Actual and Notional Building by Source.

Appendix A Model Inputs

A.1 Location

- Site name/location: Hillingdon Hospital, Uxbridge, London
- Latitude: 51.53ºN
- Longitude: 0.46ºW
- Altitude: 44m
- Model Orientation: As shown below

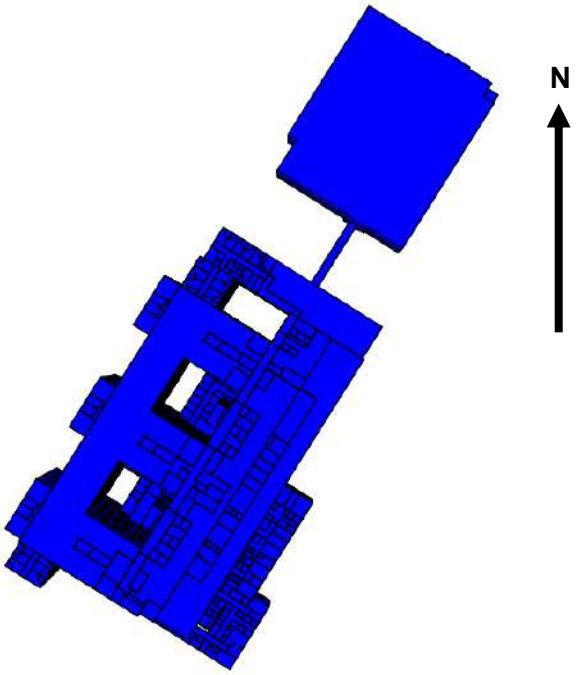


Figure 3: Building Orientation

A.2 Weather Data

The CIBSE weather tape for London (LondonTRY05) has been used for this assessment.

A.3 Building Form

The building geometry was produced from drawing's extracted from IBI's Revit model on 28th January 2022.

	Drawing Title	Date Received
Main Hospital	FloorPlan-BASEMENT1Architect	28/01/22
	FloorPlan-LEVEL00Architect	28/01/22
	FloorPlan-LEVEL01Architect	28/01/22
	FloorPlan-LEVEL02Architect	28/01/22
	FloorPlan-LEVEL03Architect	28/01/22
	FloorPlan-LEVEL04Architect	28/01/22
	FloorPlan-LEVEL05Architect	28/01/22
	FloorPlan-LEVEL06Architect	28/01/22
	FloorPlan-LEVEL07Architect	28/01/22
	Elevation-NorthBIM360	14/02/22
	Elevation-SouthBIM360	14/02/22
	Section-GL4	14/02/22
	Section-GL5	14/02/22
	Section-GL7	14/02/22
	Section-GLE	14/02/22
	Section-GLGG	14/02/22
	Section-GLH	14/02/22
	Section-GLK	14/02/22
	Section-GLN	14/02/22
	Section-GLQ	14/02/22
	THHR_01-ACM-WB-ZZ-M3-BS-000001 - Elevation - East BIM360	02/03/22
	THHR_01-ACM-WB-ZZ-M3-BS-000001 - Elevation - West BIM360	02/03/22
Car Park	THHR_02-IBI-WB-00-DR-A-200000 - MSCP - LEVEL 0	08/03/22
	THHR_02-IBI-WB-01-DR-A-200001 - MSCP - LEVEL 1	08/03/22
	THHR_02-IBI-WB-01-DR-A-200002 - MSCP - LEVEL 2	08/03/22
	THHR_02-IBI-WB-01-DR-A-200003 - MSCP - LEVEL 3	08/03/22
	THHR_02-IBI-WB-01-DR-A-200004 - MSCP - LEVEL 4	08/03/22
	THHR_02-IBI-WB-01-DR-A-200005 - MSCP - LEVEL 5	08/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - North MSCP	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - South	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - East	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - West	09/03/22

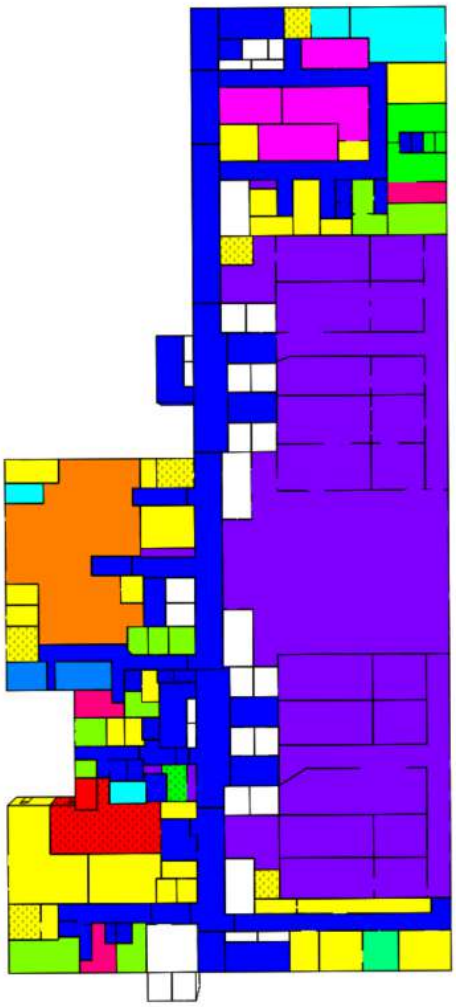
Table 3: Drawings Used to Create IES Model Geometry

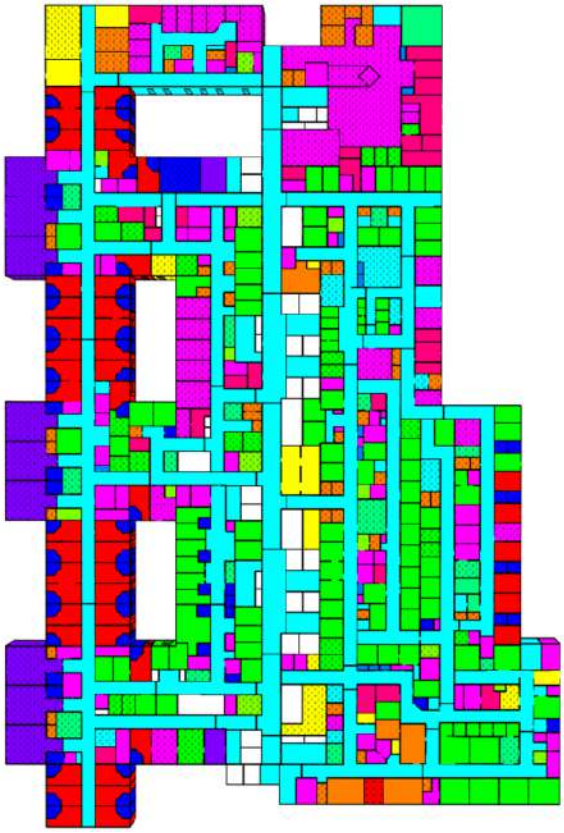
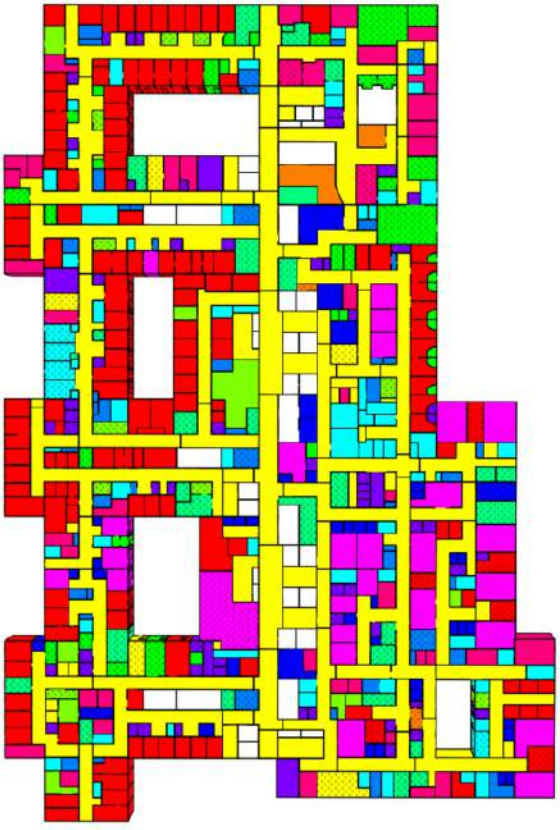
A.4 Building Air Permeability

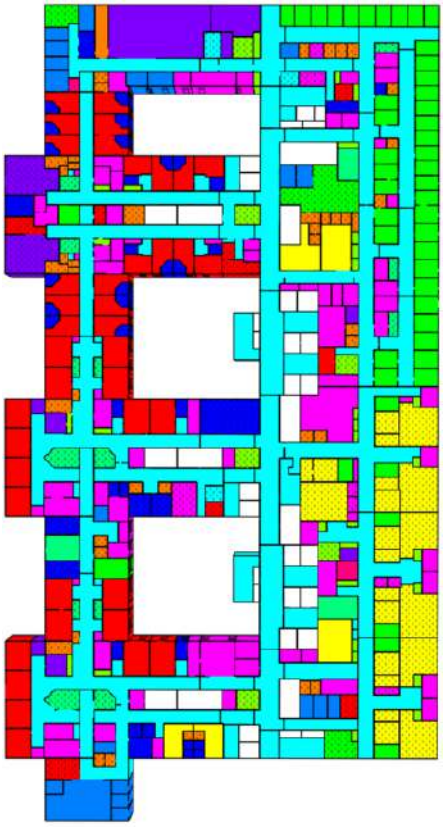
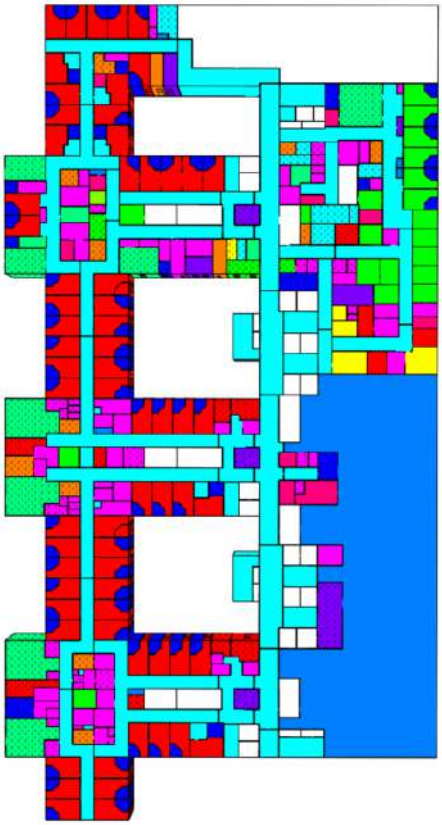
Hillingdon hospital is targeting an air pressure test result of **1m³/m².hr at 50Pa**

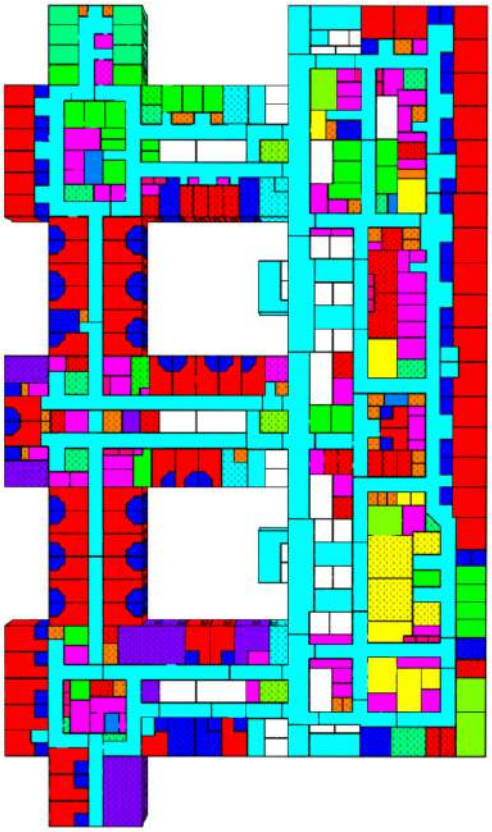
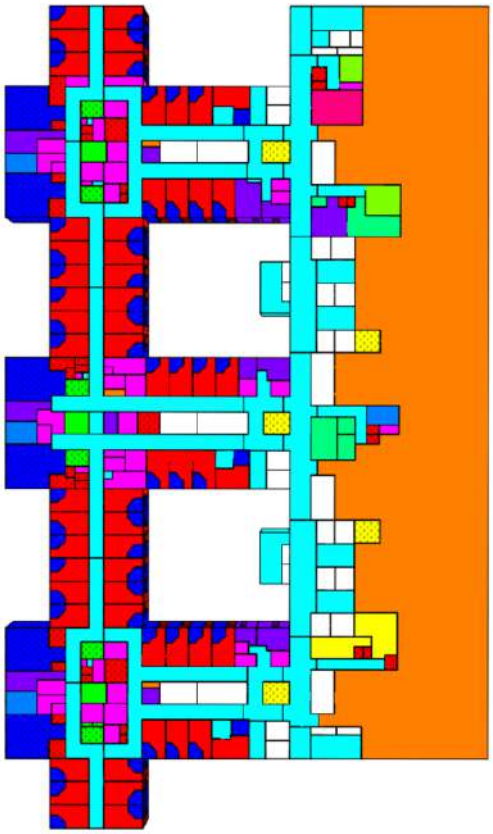
A.5 Building Usage and NCM Activities

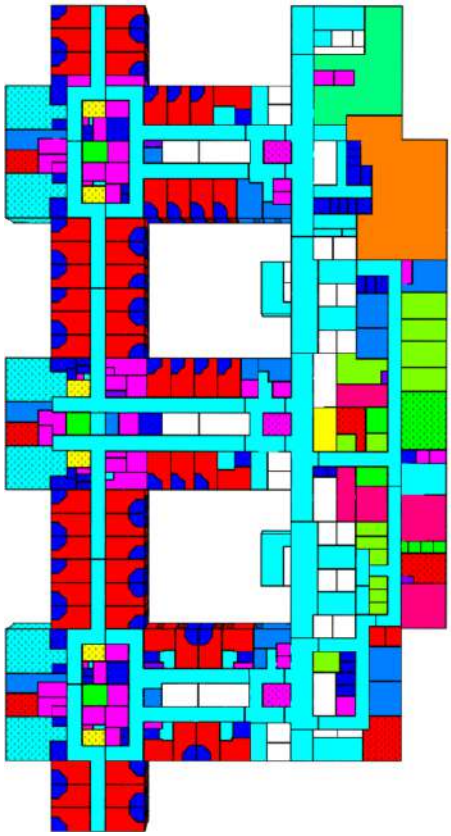
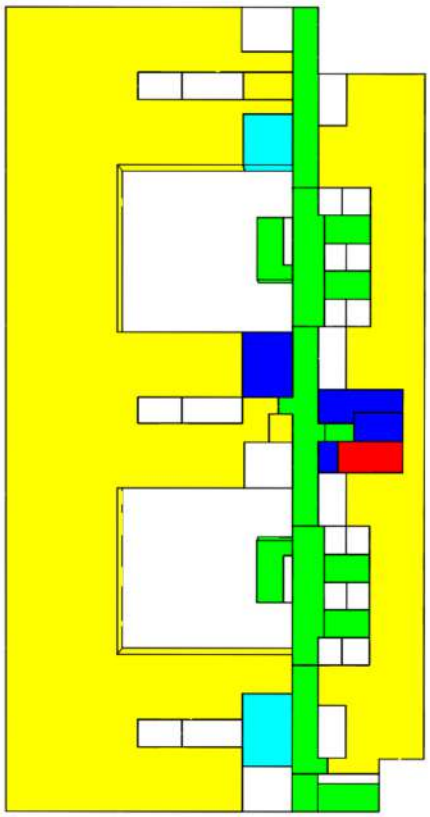
The NCM methodology requires that each room within the thermal model to be assigned a specific “building type” and activity. The building type has been set as “C2: Hospital (Hospital)” and the following images illustrate the NCM activities assigned to each room in the building. White spaces are voids.

Floor Plan	Legend
Basement 	

Floor Plan	Legend
Ground Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Diagnostic Imaging NCM Hosp: Food preparation area NCM Hosp: Hall/lecture theatre/assembly area NCM Hosp: Laboratory NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: IT) NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Reception NCM Hosp: Reception (Hospital: Waiting) NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room
First Floor 	NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Diagnostic Imaging NCM Hosp: Eating/drinking area NCM Hosp: Food preparation area NCM Hosp: Hall/lecture theatre/assembly area NCM Hosp: Laboratory NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: IT) NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Operating theatre NCM Hosp: Physiotherapy Studio NCM Hosp: Reception NCM Hosp: Reception (Hospital: Waiting) NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Misc24Hr: Server room NCM Ret: Sales area - general

Floor Plan	Legend
Second Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Cupboard (Hospital: Storage - cold) NCM Hosp: Hall/lecture theatre/assembly area NCM Hosp: Laboratory NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: IT) NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Operating theatre NCM Hosp: Reception NCM Hosp: Reception (Hospital: Waiting) NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room
Third Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Eating/drinking area NCM Hosp: Food preparation area NCM Hosp: Hall/lecture theatre/assembly area NCM Hosp: Laboratory NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Reception NCM Hosp: Reception (Hospital: Waiting) NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room

Floor Plan	Legend
Fourth Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Cupboard (Hospital: Storage - cold) NCM Hosp: Diagnostic Imaging NCM Hosp: Food preparation area NCM Hosp: Hall/lecture theatre/assembly area NCM Hosp: Laboratory NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Operating theatre NCM Hosp: Reception NCM Hosp: Reception (Hospital: Waiting) NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room
Fifth Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Physiotherapy Studio NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room

Floor Plan	Legend
Sixth Floor 	NCM Hosp: 24x7 Bedroom unit NCM Hosp: A&E consulting/treatment/work areas NCM Hosp: Bathroom NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Eating/drinking area NCM Hosp: Food preparation area NCM Hosp: Light plant room NCM Hosp: Office NCM Hosp: Office (Hospital: Meeting) NCM Hosp: Office (Hospital: Open) NCM Hosp: Office (Hospital: Tea) NCM Hosp: Physiotherapy Studio NCM Hosp: Toilet NCM Hosp: Wards (Offices) NCM Hosp: Wards (Patient) NCM Misc24Hr: Server room
Seventh Floor 	NCM Hosp: Changing facilities NCM Hosp: Circulation area NCM Hosp: Cupboard NCM Hosp: Light plant room NCM Misc24Hr: Server room

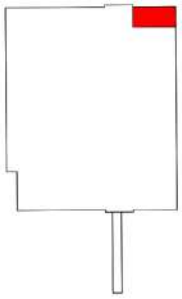
Floor Plan	Legend
Car Park 	NCM Hosp: Eating/drinking area

Table 4: NCM Activities Assigned to Rooms in the Hillingdon Hospital Part L2A (2013) Model

A.6 Construction Details

Construction Element	U-Value (W/m²K)
Ground Floor	0.15
Roof	0.13
Thermal Line Roof	0.13
External Wall	0.15
Opaque Curtain Wall	0.50
Thermal Line Wall	0.15
Opaque Pedestrian Doors	1.20
Louvre	0.15

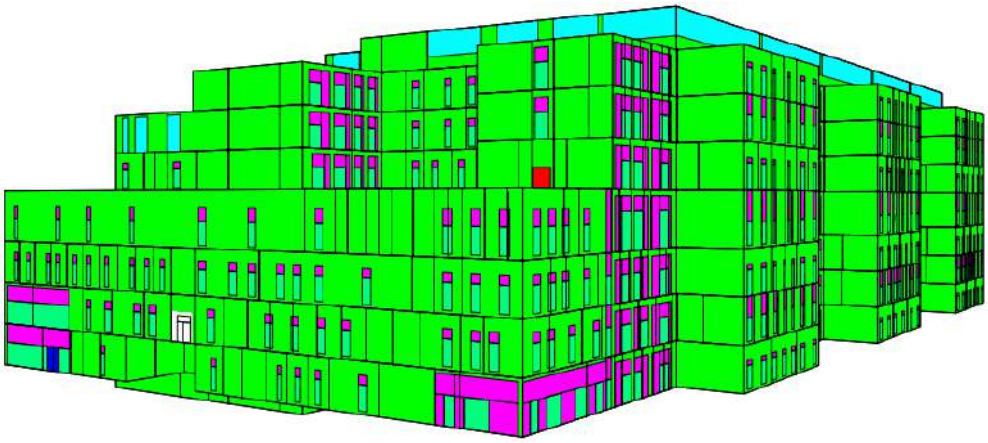
Table 5: Description of the Performance of the Opaque Building Fabric for Hillingdon Hospital

Glazing Type	U-Value (W/m²K)	G-Value (%)	Light Transmittance (%)	Frame Percentage (%)
External Window	0.9	0.26	0.56	10
Glazed Door	0.9	0.26	0.56	10

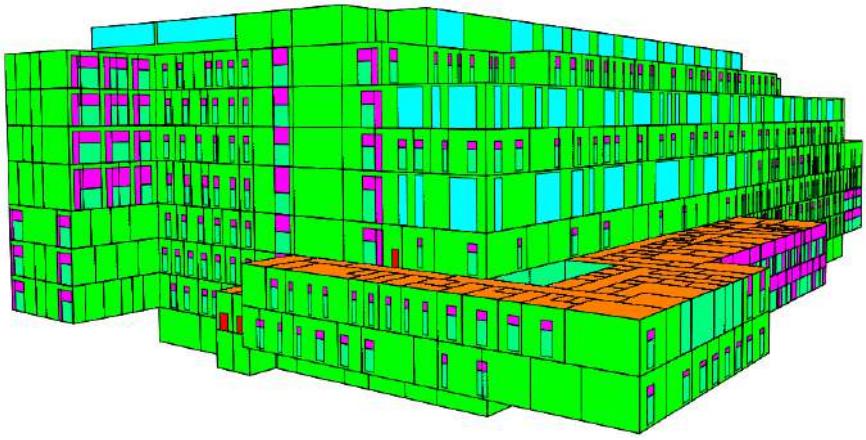
Table 6: Description of the Performance of the Glazed Building Fabric for Hillingdon Hospital

The following sets of images illustrate where the constructions are applied on the main hospital building (Figure 4) and the adjacent car park (Figure 5).

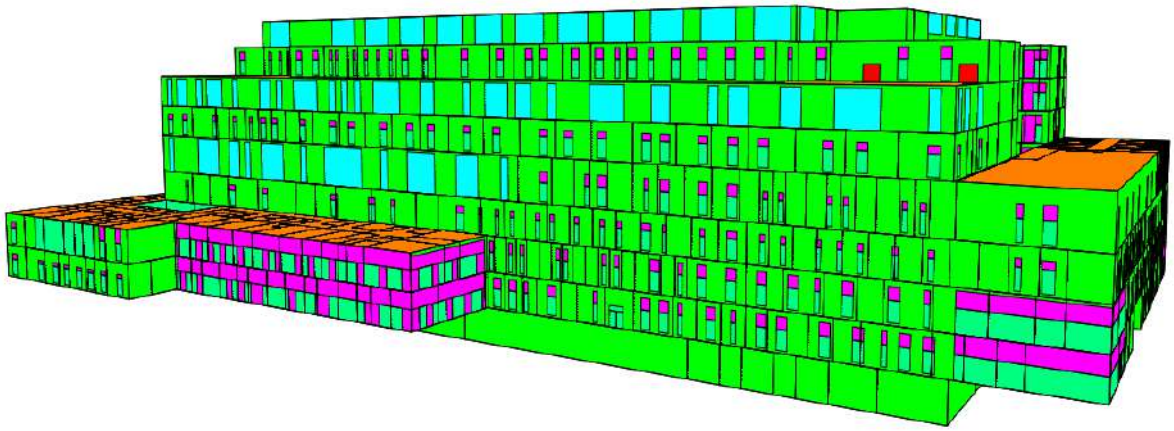
North



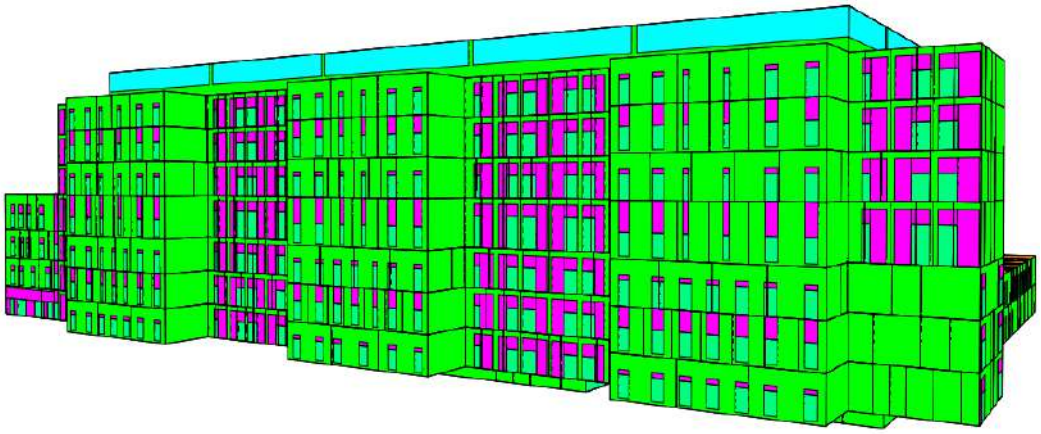
South



East



West



Legend

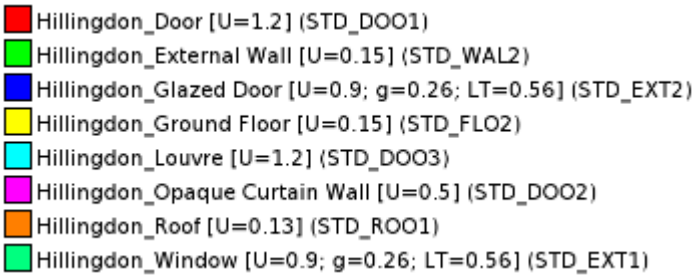


Figure 4: Screenshots to Illustrate Where Each Construction is Applied to the Main Hospital Building

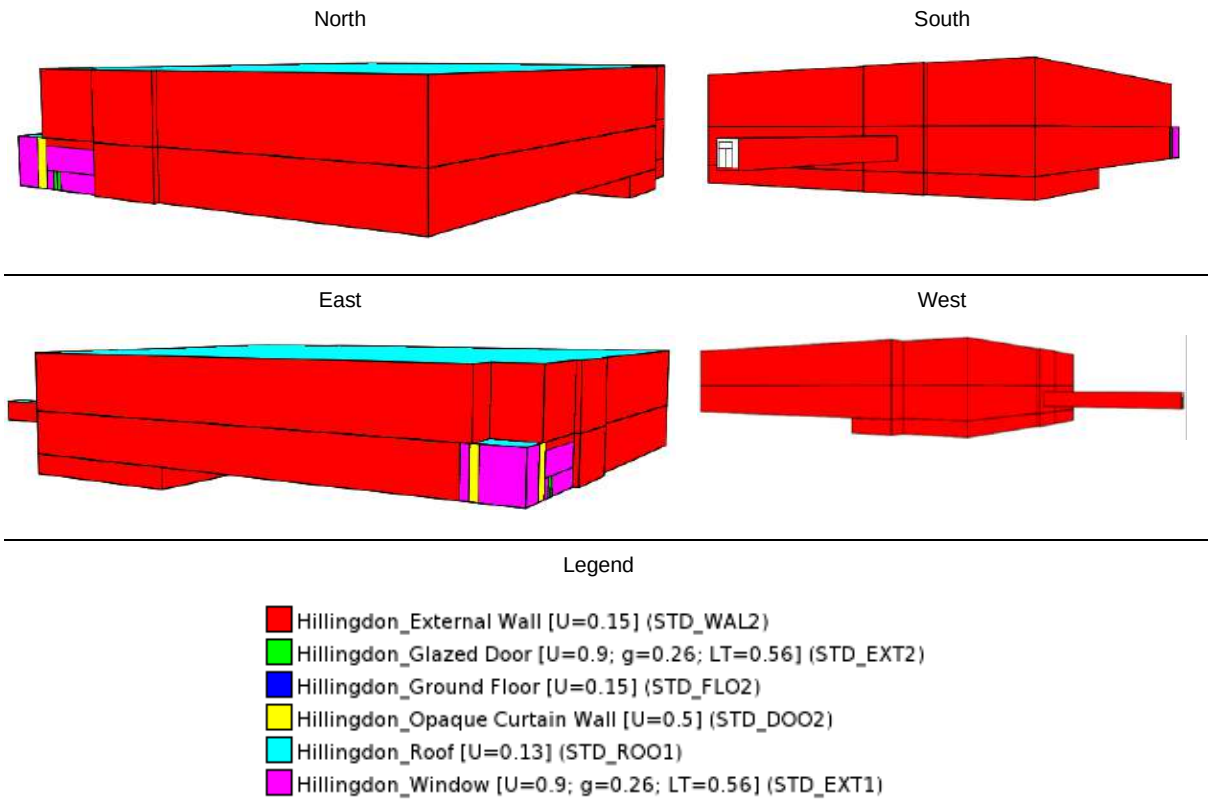


Figure 5: Screenshots to Illustrate Where Each Construction is Applied to the Car Park

A.7 Heating, Ventilation and Air Conditioning Systems

The heating, ventilation and cooling systems applied to the IES model are set out in Table 7 and Table 8.

Heating Efficiency

An ambient loop system is used to provide the space heating and domestic hot water in the building as shown in schematics 'THHR_01-ACM-ZZ-XX-DR-M-567201' and 'THHR_01-ACM-ZZ-XX-DR-M-567202'. They show that the heat demand is met by a combination of heat sources as well as heat rejected from various cooling sources.

The ambient loop is kept at a temperature of 35°C using the waste heat from cooling and a combination of ASHPs and GHSPs. The COP of the GSHP is assumed to remain constant at 4.5 but the COP of the ASHP varies with outside temperature between a COP of 3.1 at -5°C and 6.43 at 30°C. The usage split of GSHPs and ASHPs varies throughout the year based on whichever is most efficient at the time. A set of WSHPs are used to increase the temperature to 70°C for use in space heating and DHW. The WSHPs have a COP of 4.01.

The overall heating COP of the ambient loop was calculated via the following method using hourly data for a whole year:

- Space heating and DHW loads were taken from the Part L model to calculate the total heating load in the building throughout the year to give a total load for the year of approximately 6,705MWh.
- The total heating load and WSHP efficiency were used to calculate the heat needed in the ambient loop prior to stepping up by the WSHP. The ambient loop load in a year is calculated to be approximately 5,033MWh.
- The heat rejected from cooling was based on the cooling load requirements in the thermal comfort model for individually cooled rooms, combined with a calculation of the heat extracted from the incoming supply air to ensure that it is tempered to 20°C as per the design. The total heat rejected in a year is approximately 4,127MWh.
- The remaining heat needed in the ambient loop is provided by the ASHPs and GSHPs. At each hour in the year the ASHP COP is calculated and if it is higher than the COP of the GSHP then it is assumed that it provides the remaining heat in the network. If the air temperature is too low and the ASHP COP is below that of the GSHP then it is assumed the GSHP meets the remaining heat load. The electricity consumed by the heat pumps to supply the remaining heat was calculated using this and the COPs of the heat pumps at each hour of the year. The yearly total is calculated to be 323MWh of electricity to supply the remaining heat in the ambient loop network.
- The ambient loop pump electricity consumption was also included, based on 1 pump shown in the schematic associated with the ambient loop (all other pumps are assumed to be included in the relevant system auxiliary energy) assumed to be running constantly with a rated power of 15kW, giving a total electricity consumption of 131MWh for the year.
- The overall annual heating efficiency was then calculated using the total electricity consumed (2,127MWh) and total heat generated (6,705MWh) to give **COP = 3.15**.

Cooling Efficiency

Cooling will be provided by a combination of ground and air source heat pumps, at a 40/60% split respectively. The resulting cooling efficiencies were calculated as follows:

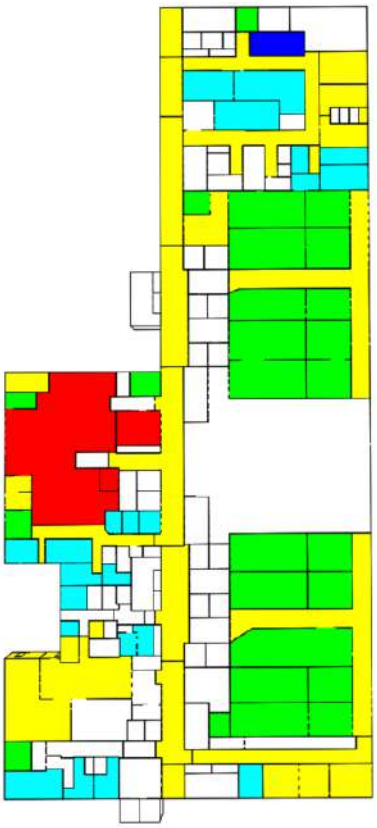
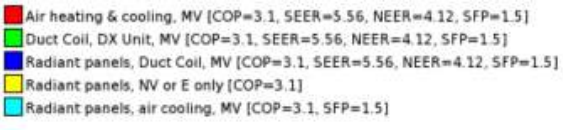
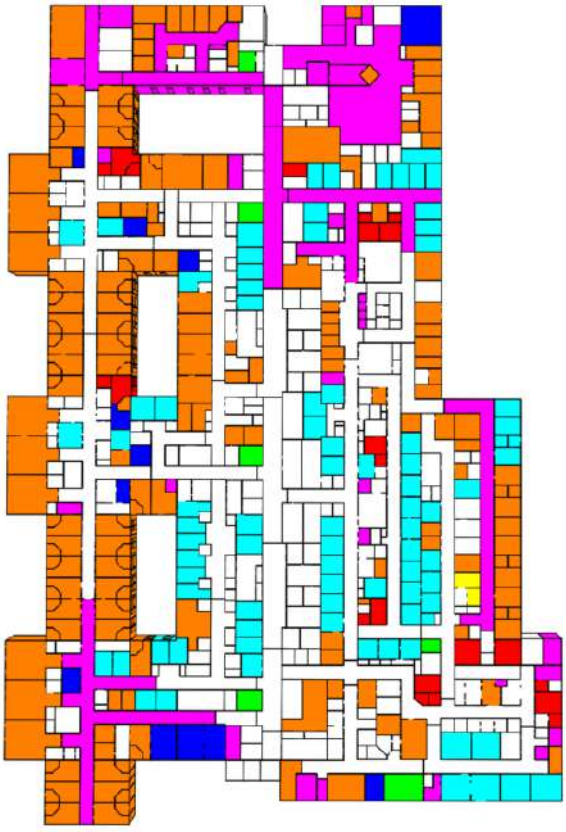
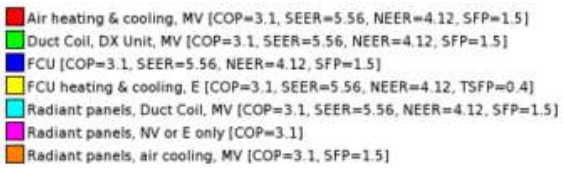
- Cooling: EER = (40% x 5.06) + (60% x 3.49) = 4.118 = **4.12**, SEER = (40% x 6.67) + (60% x 4.82) = **5.56**

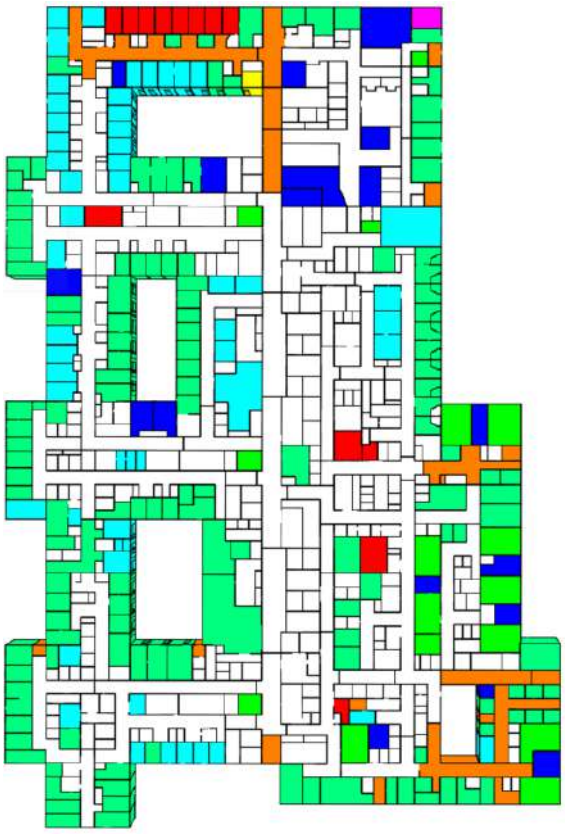
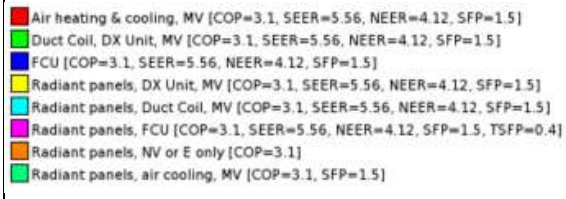
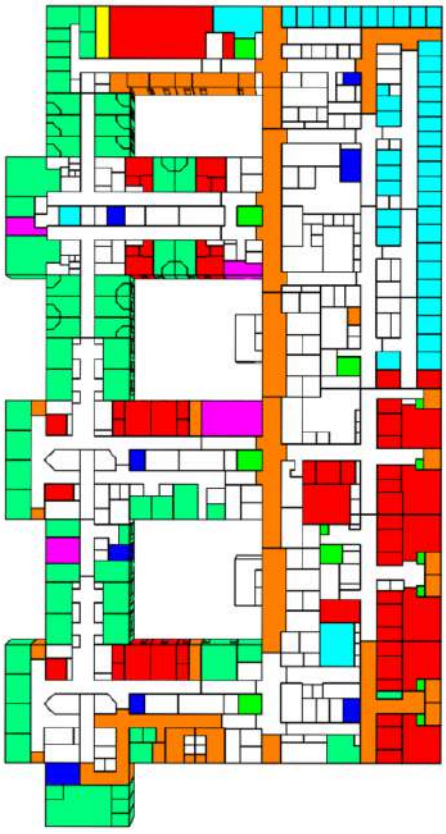
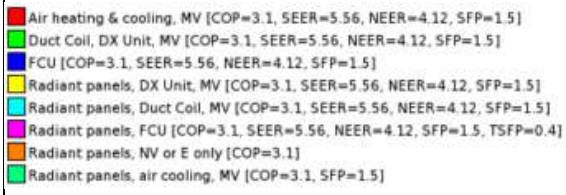
System Name:		Air heating and cooling with MV	Duct Coil, DX Unit, MV	FCU	FCU Heating and Cooling, E	Radiant panels, Duct Coil, MV
NCM System Type:		Constant volume system (fixed fresh air rate)	Split or multi-split system	Fan coil systems	Split or multi-split system	Constant volume system (fixed fresh air rate)
Heating	Heating Generator Fuel:	Electricity	Electricity	Electricity	Electricity	Electricity
	Heat Source:	Heat pump: air source	Heat pump: air source	Heat pump: air source	Heat pump: air source	Heat pump: air source
	Heating Generator Seasonal Efficiency:	3.15	3.15	3.15	3.15	3.15
	Heating Delivery Efficiency:	0.90	0.90	0.90	0.90	0.90
	Ventilation Heat Recovery Effectiveness:	0.78	0.78	0.78	0.78	0.78
Cooling	Cooling Mechanism:	Air Conditioning	Air Conditioning	Air Conditioning	Air Conditioning	Air Conditioning
	Cooling Fuel:	Electricity	Electricity	Electricity	Electricity	Electricity
	Nominal EER:	4.12	4.12	4.12	4.12	4.12
	Seasonal EER:	5.56	5.56	5.56	5.56	5.56
	Cooling Delivery Efficiency:	0.90	0.90	0.90	0.90	0.90
	Cooling SSEER:	3.022	3.022	3.022	3.022	3.022
	Is this a CMM system?	Yes	No	No	No	No
	Heat Rejection Pump and Fan Power:	0	0	0	0	0
Auxiliary Energy	Air Supply Mechanism:	Centralised Balanced A/C or mech vent system	Centralised Balanced A/C or mech vent system	Centralised Balanced A/C or mech vent system	Zonal extract with remote fan	Centralised Balanced A/C or mech vent system
	AHU Specific Fan Power:	1.5	1.5	1.5	-	1.5
	Terminal Unit Specific Fan Power:	-	-	0.2	0.2	-
	Pump Type:	-	-	Variable speed with multiple pressure sensors	-	-

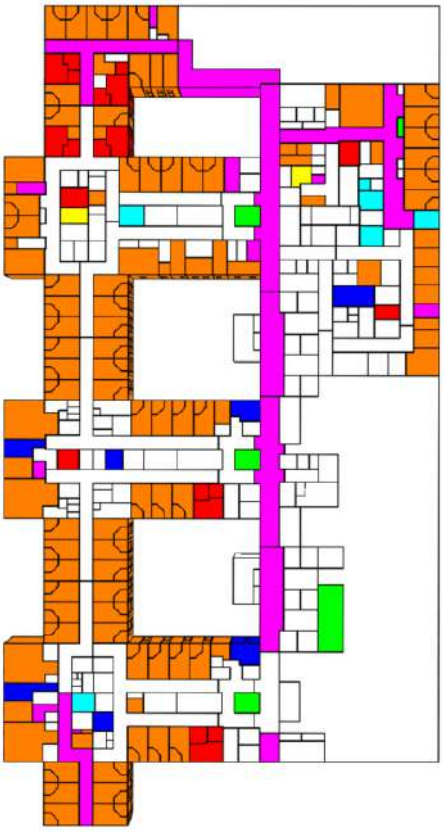
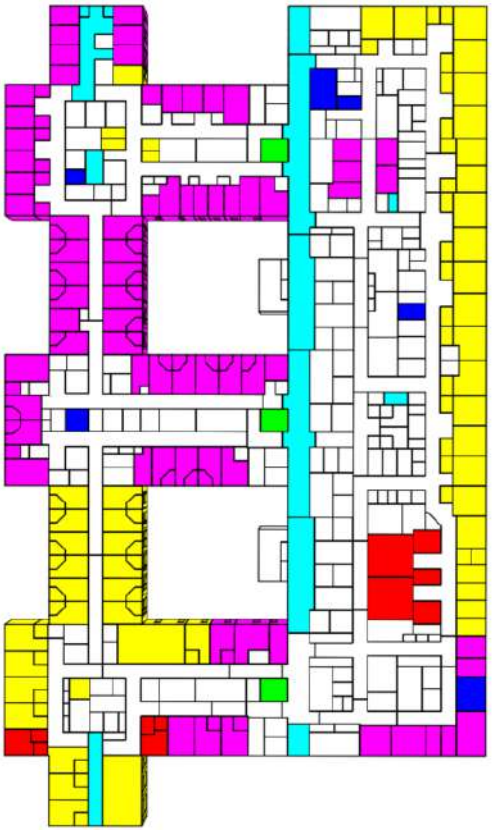
Table 7: HVAC Systems Assigned to the Hillingdon Hospital

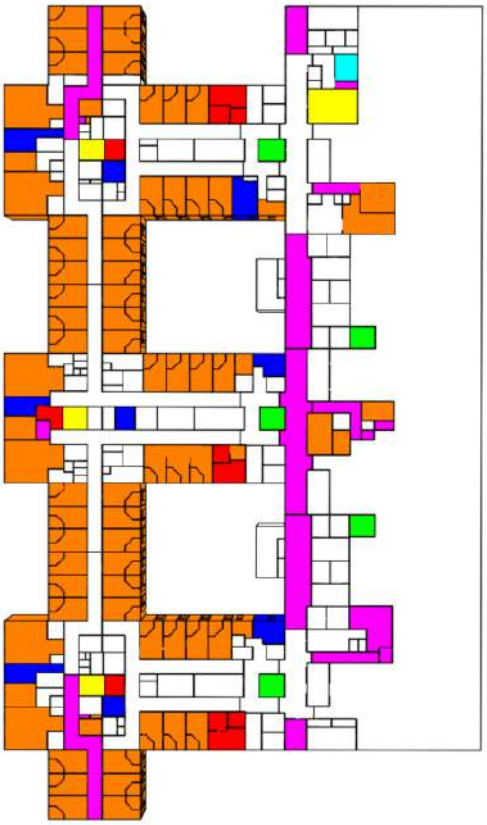
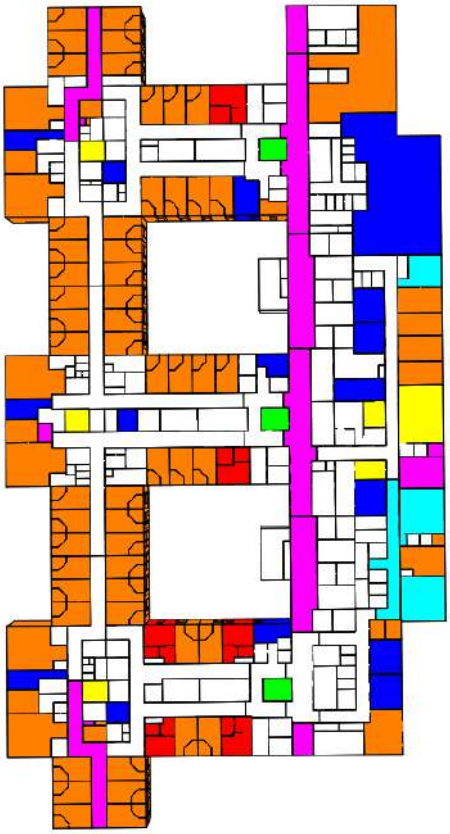
System Name:		Radiant panels, DX Unit, MV	Radiant panels, FCU	Radiant panels, Air Cooling, MV	Radiant panels, NV or E only	Car Park DX heating & cooling
NCM System Type:		Split or multi-split system	Fan coil systems	Constant volume system (fixed fresh air rate)	Central heating using water: radiators	Split or multi-split systems
Heating	Heating Generator Fuel:	Electricity	Electricity	Electricity	Electricity	Electricity
	Heat Source:	Heat pump: air source	Heat pump: air source	Heat pump: air source	Heat pump: air source	Heat pump: air source
	Heating Generator Seasonal Efficiency:	3.15	3.15	3.15	3.15	2.50
	Heating Delivery Efficiency:	0.90	0.90	0.90	0.90	0.90
	Ventilation Heat Recovery Effectiveness:	0.78	0.78	0.78	-	-
Cooling	Cooling Mechanism:	Air Conditioning	Air Conditioning	Air Conditioning	Nat Vent	Air conditioning
	Cooling Fuel:	Electricity	Electricity	Electricity	-	Electricity
	Nominal EER:	4.12	4.12	4.12	-	2.60
	Seasonal EER:	5.56	5.56	5.56	-	2.60
	Cooling Delivery Efficiency:	0.90	0.90	0.90	-	0.90
	Cooling SSEER:	3.022	3.022	3.022	-	2.34
	Is this a CMM system?	No	No	Yes	-	No
	Heat Rejection Pump and Fan Power:	0	0	0	-	0
Auxiliary Energy	Air Supply Mechanism:	Centralised Balanced A/C or mech vent system	Centralised Balanced A/C or mech vent system	Centralised Balanced A/C or mech vent system	None	Centralised Balanced A/C or mech vent system
	AHU Specific Fan Power:	1.5	1.5	1.5	-	1.5
	Terminal Unit Specific Fan Power:	-	0.2	-	-	-
	Pump Type:	-	Variable speed with multiple pressure sensors	-	Variable speed with multiple pressure sensors	-

Table 8: HVAC Systems Assigned to the Hillingdon Hospital

Floor Plan	Legend
Basement 	
Ground Floor 	

Floor Plan	Legend
First Floor 	
Second Floor 	

Floor Plan	Legend
Third Floor 	Air heating & cooling, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Duct Coil, DX Unit, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] FCU [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] FCU heating & cooling, E [COP=3.1, SEER=5.56, NEER=4.12, TSFP=0.4] Radiant panels, Duct Coil, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, NV or E only [COP=3.1] Radiant panels, air cooling, MV [COP=3.1, SFP=1.5]
Fourth Floor 	Air heating & cooling, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Duct Coil, DX Unit, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] FCU [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, Duct Coil, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1. Radiant panels, NV or E only [COP=3.1] Radiant panels, air cooling, MV [COP=3.1, SFP=1.5]

Floor Plan	Legend
Fifth Floor 	Air heating & cooling, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Duct Coil, DX Unit, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] FCU [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, Duct Coil, MV [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, FCU [COP=3.1, SEER=5.56, NEER=4.12, SFP=1.5, TSFP=0.4] Radiant panels, NV or E only [COP=3.1] Radiant panels, air cooling, MV [COP=3.1, SFP=1.5]
Sixth Floor 	Air heating & cooling, MV [COP=3.15, SEER=5.56, NEER=4.12, SFP=1.5] Duct Coil, DX Unit, MV [COP=3.15, SEER=5.56, NEER=4.12, SFP=1.5] FCU [COP=3.15, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, Duct Coil, MV [COP=3.15, SEER=5.56, NEER=4.12, SFP=1.5] Radiant panels, FCU [COP=3.15, SEER=5.56, NEER=4.12, SFP=1.5, TSFP=0.4] Radiant panels, NV or E only [COP=3.15] Radiant panels, air cooling, MV [COP=3.15, SFP=1.5]

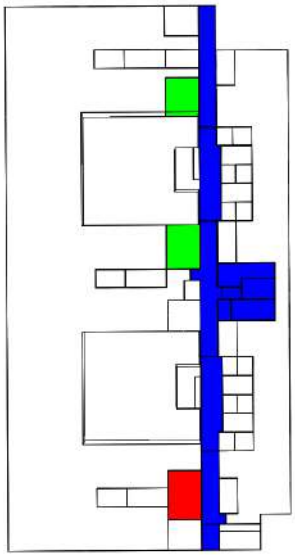
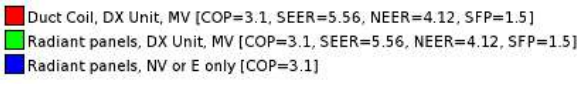
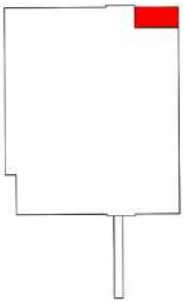
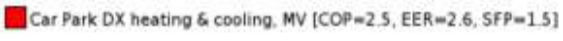
Floor Plan	Legend
Seventh Floor 	
Car Park 	

Figure 6: HVAC Systems Assigned to Rooms in the Hillingdon Hospital Part L2A (2013) Model

The following table sets out the flow rates and SFPs for the room types where extract was applied.

Room Type	Type	Flow rate	SFP
WC/Changing/Ensuite	Extract Only	6ach	0.4
Dirty Utility	Extract Only	6ach	0.4
Cleaners	Extract Only	6ach	0.4
Disposal	Extract Only	6ach	0.4
Milk Kitchen	Extract Only	6ach	0.4
Store	Extract Only	6ach	0.4
Bev Bay	Extract Only	6ach	0.4
Exam/treat	Supply & Extract	6ach	1.5
Lab/pharma	Extract Only	10ach	0.4
Laundry	Extract Only	6ach	0.4
Photocopier	Extract Only	6ach	0.4
Office	Supply & Extract	12 l/s/person	1.5

Table 9: Extract Rates and SFPs Applied at Room Level to the Hillingdon Model

A.8 Domestic Hot Water

The heating of the DHW is provided through the ambient loop system as described in Appendix 0, and gives a COP of 3.15.

There were no design details for the secondary circulation in the main hospital. The length was estimated using the as built loop length from The Clatterbridge Cancer Centre (TCC) hospital (15,448m) and floor areas of both buildings (TCC=27,500m^2, Hillingdon=80,340m^2). IES limits the loop length to 10,000m and as the length

calculated was over this, the circulation losses per m were adjusted to give the same overall circulation loss. The calculation is shown below:

- Loop length = (TCC loop length/TCC area)*Hillingdon area = (15,477/27500)*80,340 = 45,130 m
- Total losses of loop = Loop length * losses per m = 45,130*6 = 270,782 W
- Losses per m for loop length 10,000m = Total losses of loop/10,000 = 270,782/10,000 = 27.08 W/m

Pump power was calculated from the loop length using SBEM rules of thumb.

- Pump power = (0.25*Loop length + 42)/500 = (0.25*45,130 + 42)/500 = 22.65kW

Domestic Hot Water System:	Main Hospital DHW	Car Park DHW
DHW Generator:	Heat pump: air source (electricity)	PoU Electric
SCoP:	3.27	1.0
Storage Details:	Capacity – 16,000L Insulation type – Factory insulated Insulation thickness – 100mm	Capacity – 20L Insulation type – Factory insulated Insulation thickness – 25mm
Secondary Circulation Details:	Circulation Losses – 27.08W/m Loop Length – 10,000m Pump Power – 4kW Time switch – No	N/A

Table 10: Performance of the DHW Systems in Hillingdon Hospital

A.9 Management Features

- Power Factor Correction to achieve PF>0.95
- HVAC systems **do have** provision for metering, and metering systems **do** warn ‘out of range’ values
- Lighting systems **do have** provision for metering, and metering systems **do** warn ‘out of range’ values

A.10 Lighting

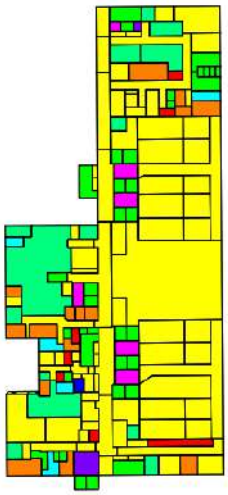
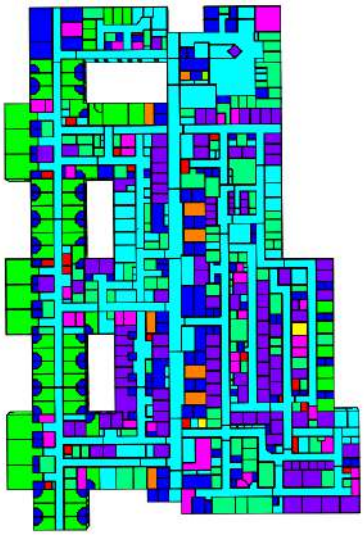
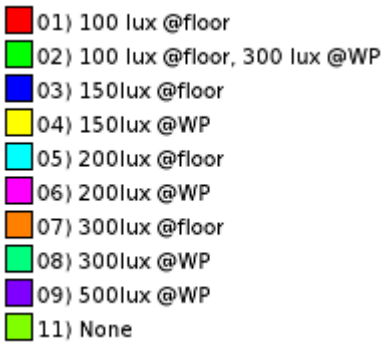
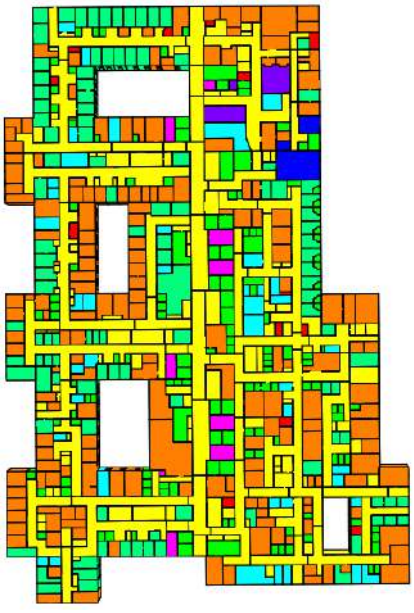
The following section describes the performance of the lighting it's control strategy at the Hillingdon Hospital.

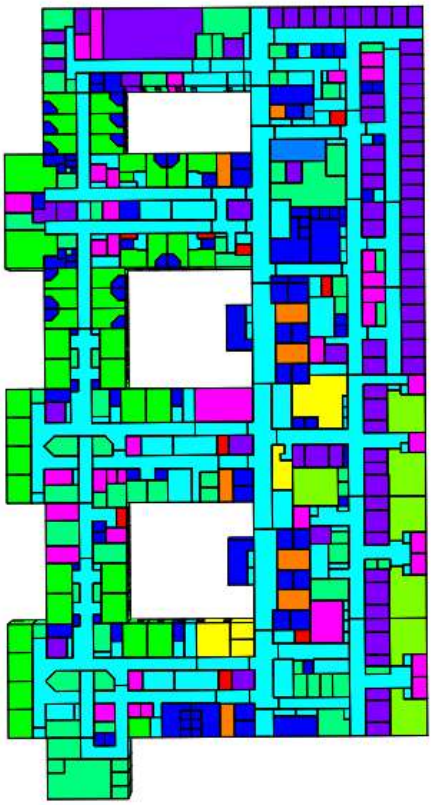
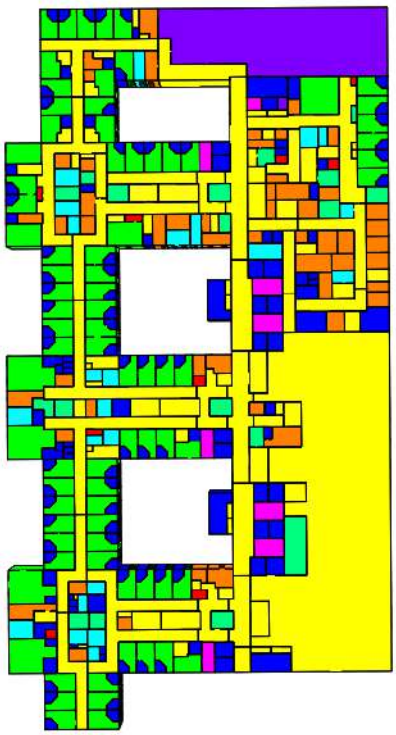
The lux levels were applied from the set of schematics listed in Table 11. Display lighting was assumed to achieve a lamp efficacy of 60lm/W.

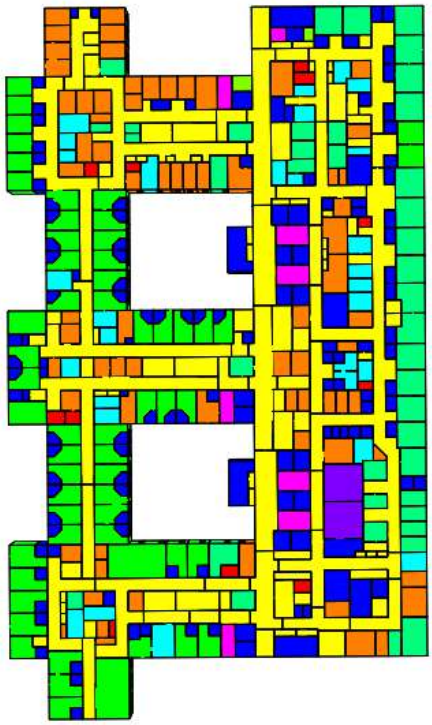
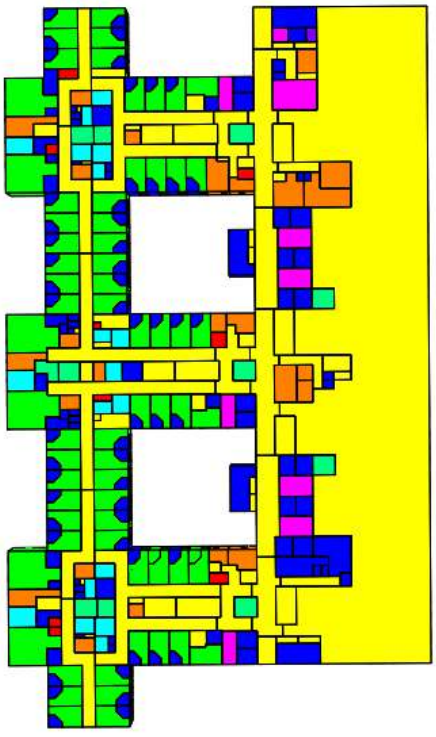
Floor	Schematic	Date Received
Basement	THHR_01-ACM-ZZ-00-DR-E-633709	04/03/22
Ground	THHR_01-ACM-ZZ-00-DR-E-633700	04/03/22
First	THHR_01-ACM-ZZ-00-DR-E-633701	04/03/22
Second	THHR_01-ACM-ZZ-00-DR-E-633702	04/03/22
Third	THHR_01-ACM-ZZ-00-DR-E-633703	04/03/22
Fourth	THHR_01-ACM-ZZ-00-DR-E-633704	04/03/22
Fifth	THHR_01-ACM-ZZ-00-DR-E-633705	04/03/22
Sixth	THHR_01-ACM-ZZ-00-DR-E-633706	04/03/22
Seventh	THHR_01-ACM-ZZ-00-DR-E-633707	04/03/22

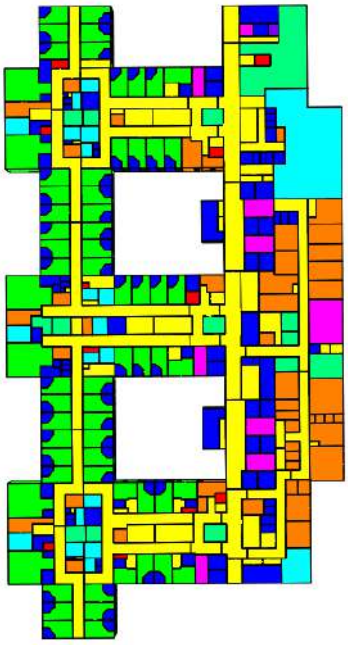
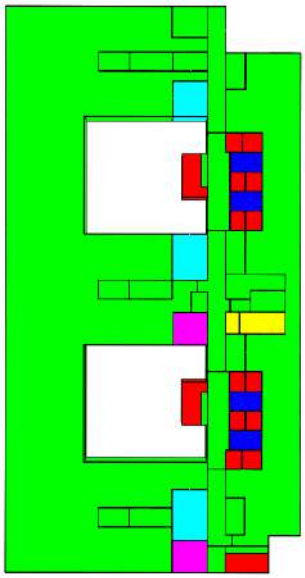
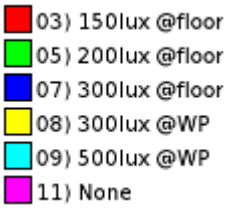
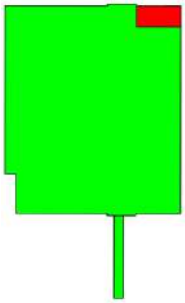
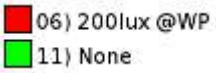
Table 11: Lighting lux levels schematics for Hillingdon hospital

The following images illustrate where the lux levels have been applied.

Floor Plan	Legend
Basement 	
Ground Floor 	
First Floor 	

Floor Plan	Legend
Second Floor 	01) 100 lux @floor 02) 100 lux @floor, 300 lux @WP 03) 150lux @floor 04) 150lux @WP 05) 200lux @floor 06) 200lux @WP 07) 300lux @floor 08) 300lux @WP 09) 500lux @WP 10) 1000lux @WP 11) None
Third Floor 	01) 100 lux @floor 02) 100 lux @floor, 300 lux @WP 03) 150lux @floor 05) 200lux @floor 06) 200lux @WP 07) 300lux @floor 08) 300lux @WP 09) 500lux @WP 11) None

Floor Plan	Legend
Fourth Floor 	01) 100 lux @floor 02) 100 lux @floor, 300 lux @WP 03) 150lux @floor 05) 200lux @floor 06) 200lux @WP 07) 300lux @floor 08) 300lux @WP 09) 500lux @WP 10) 1000lux @WP 11) None
Fifth Floor 	01) 100 lux @floor 02) 100 lux @floor, 300 lux @WP 03) 150lux @floor 05) 200lux @floor 06) 200lux @WP 07) 300lux @floor 08) 300lux @WP 09) 500lux @WP 11) None

Floor Plan	Legend
Sixth Floor 	
Seventh Floor 	
Car Park 	

Lighting power density

The power densities have been applied by room type, as shown in Table 12.

Room type	Lighting Power Density (W/m^2/100lux)
Changing room	3.08
Circulation	2.40
Clean/Dirty Utility	2.71
Cleaners	2.71
Disposal	2.71
Distribution Board/Elec Cup	None
Eating/Drinking	2.70
Elec/Mec. Riser	None
Ensuite/Shower	3.44
Exam/Treat Room	1.54
Gym	1.54
IT Hub	0.89
Interview	1.73
Kitchen	2.08
Lab and pharma	2.02
Laundry	4.42
Lift and voids	None
MDT Room	1.98
Multi-bed Ward	2.34
Office – IT	1.84
Office – cellular	1.77
Office – common	1.98
Office – meeting	1.98
Office – open plan	1.47
Operating Room	1.47
Plant	2.56
Reception	1.67
Retail	5.20
Seminar	1.47
Single Bedroom	1.64
Specialist Tech (CT, Xray etc)	1.68
Staff Base	2.22
Stair	2.99
Store	2.71
Toilets	3.36
Waiting	2.06

Table 12: Lighting power densities applied to the Hillingdon Hospital model by room type

Lighting controls

The lighting controls were applied from the set of schematics listed in Table 13. The schematics showed eleven types of lighting control. These were input to IES as follows:

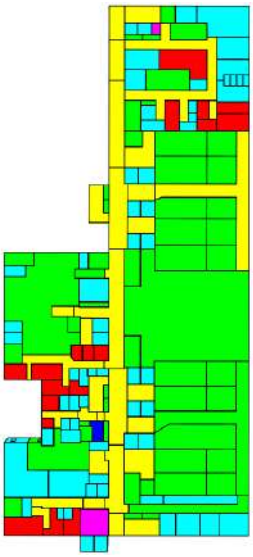
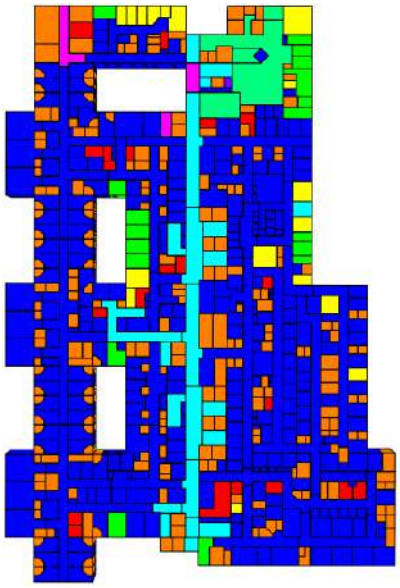
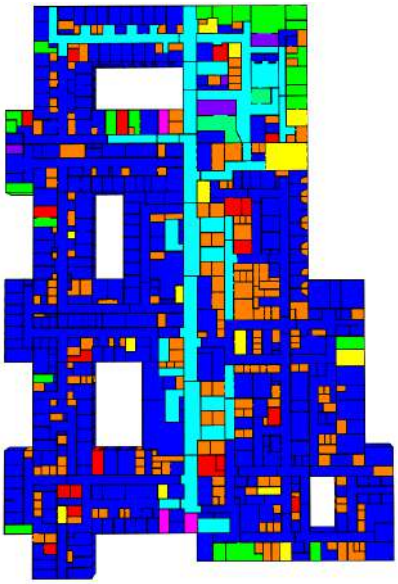
- Type 1 Absence Detection = Man-On-Auto-Off
- Type 2 Absence Detection, Daylight Dimming = Man-On-Auto-Off, Daylight Dimming
- Type 3 Lighting Controlled Via Surgeons Control Pane = None
- Type 4 Manual = None
- Type 5 Manual, Daylight Dimming = None, Daylight Dimming
- Type 6 Manual, Dimmable = None
- Type 7 Manual Timed Presence/Daylight Dimming: None, Daylight Dimming
- Type 8 Presence (Microwave) Detection (Public Circulation, Lift Lobbies, Stairs, Main escape route areas to drop to reduced lighting levels when no presence detected) = Auto-On-Dimmed
- Type 9 Presence (Microwave) Detection, Daylight Dimming = Auto-On-Off, Daylight Dimming
- Type 10 Presence Detection = Auto-On-Off
- Type 11 Timed / Daylight Dimming/Scene = None, Daylight Dimming

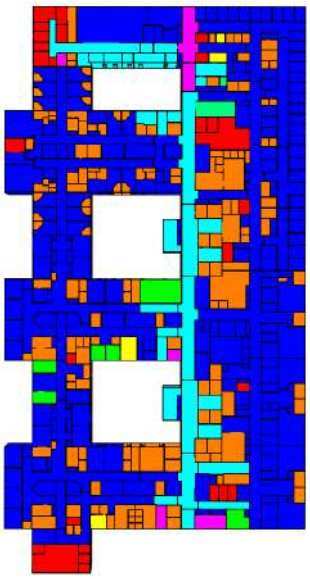
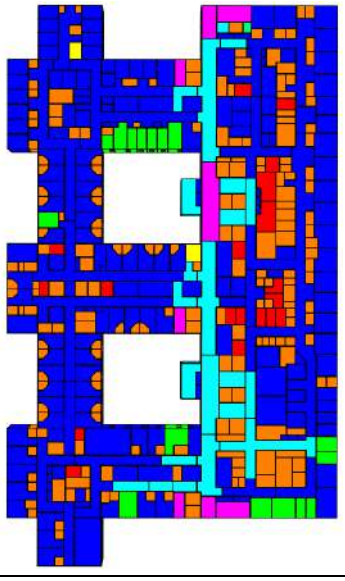
It is assumed that the parasitic power associated with the automatic lighting control system in Hillingdon Hospital is 0.06W/m², and that there is no time-switch control on the parasitic load.

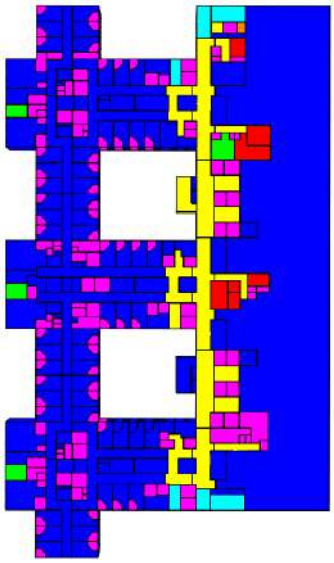
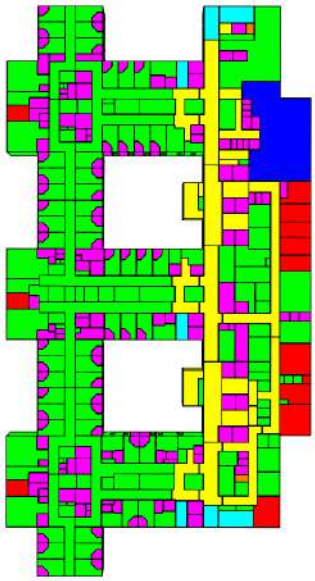
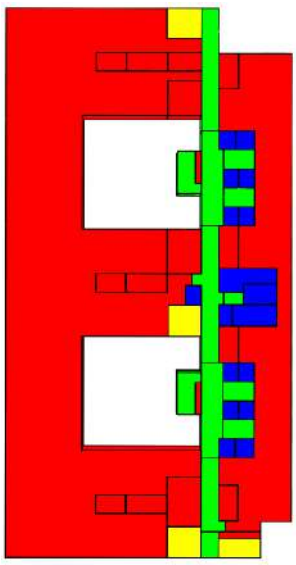
Floor	Schematic	Date Received
Basement	THHR_01-ACM-ZZ-00-DR-E-633509	04/03/22
Ground	THHR_01-ACM-ZZ-00-DR-E-633500	04/03/22
First	THHR_01-ACM-ZZ-00-DR-E-633501	04/03/22
Second	THHR_01-ACM-ZZ-00-DR-E-633502	04/03/22
Third	THHR_01-ACM-ZZ-00-DR-E-633503	04/03/22
Fourth	THHR_01-ACM-ZZ-00-DR-E-633504	04/03/22
Fifth	THHR_01-ACM-ZZ-00-DR-E-633505	04/03/22
Sixth	THHR_01-ACM-ZZ-00-DR-E-633506	04/03/22
Seventh	THHR_01-ACM-ZZ-00-DR-E-633507	04/03/22

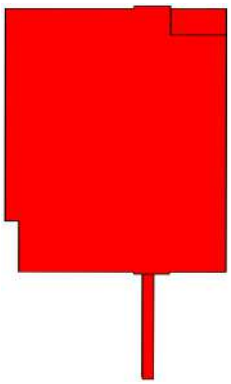
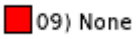
Table 13: Lighting control schematics for Hillingdon hospital

The following images illustrate where the lighting controls have been applied.

Floor Plan	Legend
Basement 	01) T1: Absence [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 07) T10: Presence [AUTO-ON-OFF] 09) None
Ground Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 08) T11: Timed/DD/Scene 09) None
First Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 08) T11: Timed/DD/Scene 09) None

Floor Plan	Legend
Second Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 09) None
Third Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 09) None
Fourth Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 09) None

Floor Plan	Legend
Fifth Floor 	01) T1: Absence [MAN-ON-AUTO-OFF] 02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 09) None
Sixth Floor 	02) T2: Absence, DD [MAN-ON-AUTO-OFF] 03) T3/T4/T6: Manual [NONE] 04) T5/7: Manual, DD [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 06) T9: Presence, DD [AUTO-ON-OFF] 07) T10: Presence [AUTO-ON-OFF] 09) None
Seventh Floor 	03) T3/T4/T6: Manual [NONE] 05) T8: Presence, Dimmable [MAN-ON-DIMMED] 07) T10: Presence [AUTO-ON-OFF] 09) None

Floor Plan	Legend
Car Park 	

A.11 Renewable Energy Systems

PV panels will be installed on both the main hospital building and the car park. The assumed performance of the panels is outlined below.

Roof Mounted PV Panels

PV Panel Area	820 m² (Main Building), 149 m² (Car park)
PV Type:	Monocrystalline Silicon
Module Nominal Efficiency:	20 %
Nominal Cell Temperature (NOCT)	42 ºC
Reference Irradiance for NOCT	1000 W/m²
Temperature Coefficient for Module Efficiency	0.36 /K
Degradation Factor	0.99
Electrical Conversion (Inverter) Efficiency	95 %
Azimuth	212 º clockwise from North
Inclination	10 º from horizontal
Shading Factor	1.0 (unshaded)

Table 14: Assumed Performance of Roof Mounted PV Array

Appendix B BRUKL Document

Whole Site

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Hillingdon Hospital_Be Green As designed

Date: Mon Mar 28 23:00:23 2022

Administrative information

Building Details

Address: London,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: AECOM Ltd.

Telephone number:

Address: , ,

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	50.3
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	50.3
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	47.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	00000007:Surf[0]
Floor	0.25	0.15	0.15	00000007:Surf[6]
Roof	0.25	0.13	0.13	0000002F:Surf[0]
Windows***, roof windows, and rooflights	2.2	0.63	1.6	0100015C:Surf[3]
Personnel doors	2.2	1.11	2.2	0100015C:Surf[4]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

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

* There might be more than one surface where the maximum U-value occurs.

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

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Page 1 of 129

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	74511.4	74511.4
External area [m²]	56229.4	56476.2
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	1	3
Average conductance [W/K]	12798.5	21791.6
Average U-value [W/m²K]	0.23	0.39
Alpha value* [%]	10.19	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
99	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
1	**Others: Miscellaneous 24hr activities**
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.14	1.9
Cooling	10.67	15.17
Auxiliary	27.5	21.2
Lighting	29.69	41.06
Hot water	27.62	20.12
Equipment*	125.98	125.98
TOTAL**	**96.63**	**99.44**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	2.19	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	203.29	202.62
Primary energy* [kWh/m²]	289.23	297.12
Total emissions [kg/m²]	47.8	50.3

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

Main Hospital

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Hillingdon Hospital_Main Hospital

As designed

Date: Tue Mar 29 15:11:20 2022

Administrative information

Building Details

Address: London,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: AECOM Ltd.

Telephone number:

Address: , ,

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	50.2
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	50.2
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	47.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	00000007:Surf[0]
Floor	0.25	0.15	0.15	00000007:Surf[6]
Roof	0.25	0.13	0.13	0000002F:Surf[0]
Windows***, roof windows, and rooflights	2.2	0.62	1.6	0100015C:Surf[3]
Personnel doors	2.2	1.12	2.2	0100015C:Surf[4]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [$W/(m^2K)$]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

$U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.

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

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	74393.3	74393.3
External area [m²]	55931.7	55941.8
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	1	3
Average conductance [W/K]	12657.8	21625.6
Average U-value [W/m²K]	0.23	0.39
Alpha value* [%]	10.19	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
99	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
1	**Others: Miscellaneous 24hr activities**
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.12	1.89
Cooling	10.63	15.17
Auxiliary	27.5	21.21
Lighting	29.66	41.1
Hot water	27.41	19.87
Equipment*	126.01	126.01
TOTAL**	**96.32**	**99.25**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	1.86	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	203	202.63
Primary energy* [kWh/m²]	288.3	297.09
Total emissions [kg/m²]	47.8	50.2

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

Car Park Cafe

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Hillingdon Hospital_MSCP

As designed

Date: Tue Mar 29 10:53:18 2022

Administrative information

Building Details

Address: London,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: AECOM Ltd.

Telephone number:

Address: , ,

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	77.5
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	77.5
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	37.9
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	CP000000:Surf[9]
Floor	0.25	0.15	0.15	CP000000:Surf[0]
Roof	0.25	0.13	0.13	CP000000:Surf[1]
Windows***, roof windows, and rooflights	2.2	0.84	0.9	CP000000:Surf[2]
Personnel doors	2.2	0.9	0.9	CP000000:Surf[3]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.

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

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	118.1	118.1
External area [m²]	297.7	534.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	1	5
Average conductance [W/K]	140.72	173.54
Average U-value [W/m²K]	0.47	0.32
Alpha value* [%]	10	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
100	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	14.68	4.3
Cooling	32.26	10.98
Auxiliary	30.95	11.51
Lighting	52.01	14.2
Hot water	163.38	177.92
Equipment*	105.85	105.85
TOTAL**	**293.28**	**218.91**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	212.86	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	390.66	189.35
Primary energy* [kWh/m²]	877.87	318.39
Total emissions [kg/m²]	37.9	77.5

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

aecom.com

Appendix D Representative Heat Pump Data Sheets for Hospital Redevelopment

Unit Specification

Configuration

Model: WFN3602°AZ°°°°G

sid: 871PyGTZXX0TvHWvtMTàXASTNxWòV_VXWPyG_òXZUtSUUUUz

Code	WFN
Size	3602
Model	° - Heat pumps with reversible water side
Version	A - High efficiency
Working fields	Z - Double electronic thermostatic valve (outlet water temperature from -8 °C to +10 °C)
Set-up	° - Standard
Heat recovery	° - Without heat recovery
Evaporator	° - Standard and in compliance to PED directions
Power supply	° - 400V/3/50Hz with fuses
Refrigerant	G - R513A (XP10)

Images are for reference purposes only and may not represent exactly the configured model in this document.

Certifications

Aermec participates in the Eurovent Certification Programme. The certified data of certified models are listed in the Eurovent Directory.

Notes

Data in accordance to EN 14511:2018

Data shown is calculated without soft-starter and/or power factor correction devices.

The unit is suitable for the following energy applications:

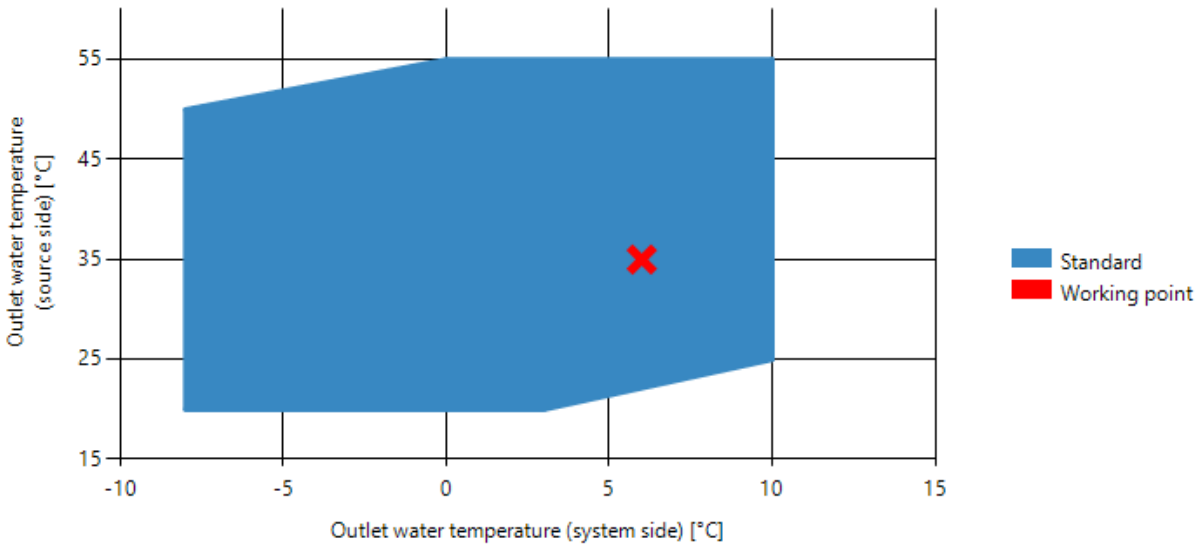
- Low temperature comfort (12 / 7 °C)

- High temperature process (12 / 7 °C)

- Low temperature heating (35 °C)

Cooling

Capacity	kW	1,018.8
Input power	kW	201.5
Input current	A	322
EER	W/W	5.06
Source side circuit		
Inlet water temperature	°C	30.0
Outlet water temperature	°C	35.0
Temperature difference	°C	5.0
Ethylene glycol	%	23
Water flow rate	l/s	61.4575
Pressure drops	kPa	65
Fouling factor	(m² K)/W	0.00005
System side circuit		
Inlet water temperature	°C	12.0
Outlet water temperature	°C	6.0
Temperature difference	°C	6.0
Ethylene glycol	%	0
Water flow rate	l/s	40.5469
Pressure drops	kPa	87
Fouling factor	(m² K)/W	0.00005



Seasonal energy performance - Cooling mode

ηsc	12 / 7 °C	%	263.80
SEER	12 / 7 °C	W/W	6.67
SEPR	12 / 7 °C		8.00

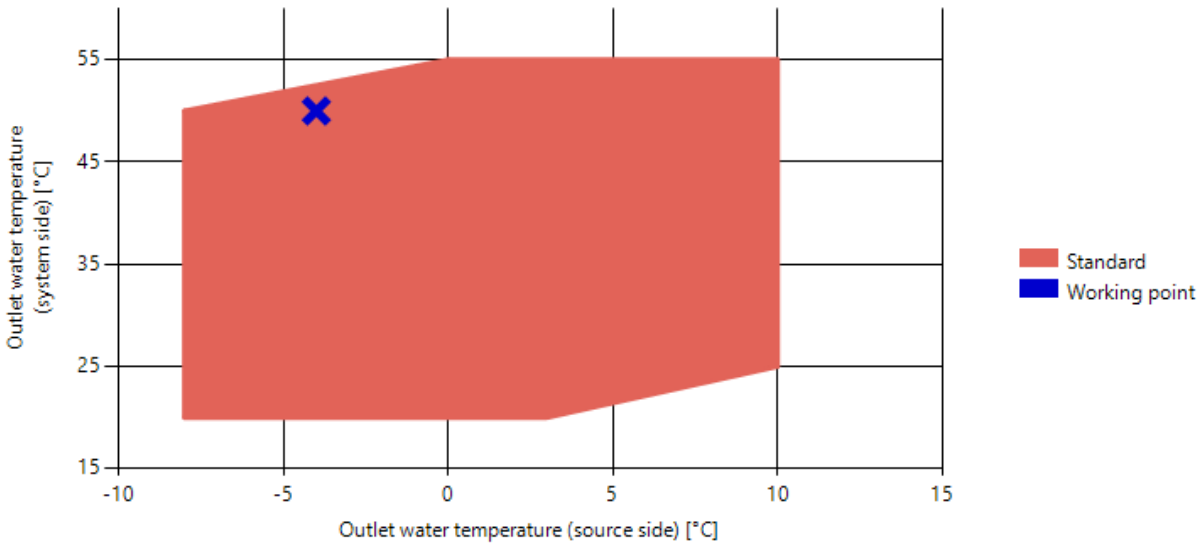
Calculation performed in accordance with EN 14825:2018

SEER (12 / 7 °C): variable water flow, variable outlet water temperature.

SEPR (12 / 7 °C): variable water flow.

Heating

Capacity	kW	812.7
Input power	kW	262.0
Input current	A	431
COP	W/W	3.10
System side circuit		
Inlet water temperature	°C	45.0
Outlet water temperature	°C	50.0
Temperature difference	°C	5.0
Ethylene glycol	%	0
Water flow rate	l/s	39.2844
Pressure drops	kPa	24
Fouling factor	(m² K)/W	0.00005
Source side circuit		
Inlet water temperature	°C	0.0
Outlet water temperature	°C	-4.0
Temperature difference	°C	4.0
Ethylene glycol	%	23
Water flow rate	l/s	36.8467
Pressure drops	kPa	83
Fouling factor	(m² K)/W	0.00005



General data

Refrigerant circuit data

Refrigerant			R513A (XP10)
Driver			On-Off
Compressor type			Screw
Number of compressors		n.	2
Number of cooling circuits		n.	2
Refrigerant gas charge	C1	kg	71
	C2	kg	71
Oil charge	C1	l	30
	C2	l	30

Water circuit data (source side)*

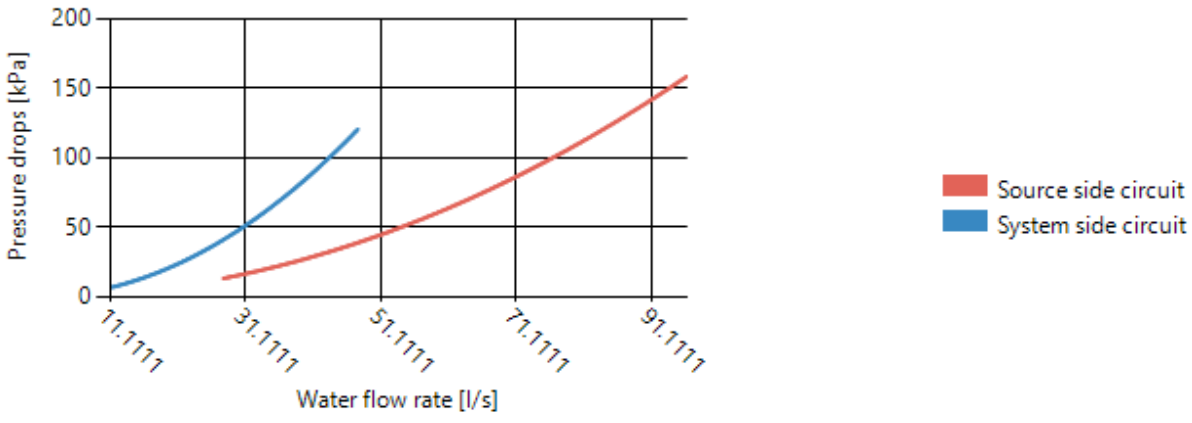
Exchanger type		Shell and tube
Number of exchangers	n.	2
Water content	l	249
Connections type		Grooved joints
Water connections of exchanger	inlet	-
	outlet	-

** = referred to cooling mode*

Water circuit data (system side)*

Exchanger type		Shell and tube
Number of exchangers	n.	1
Water content	l	576
Connections type		Grooved joints
Water connections of exchanger	inlet	-
	outlet	-

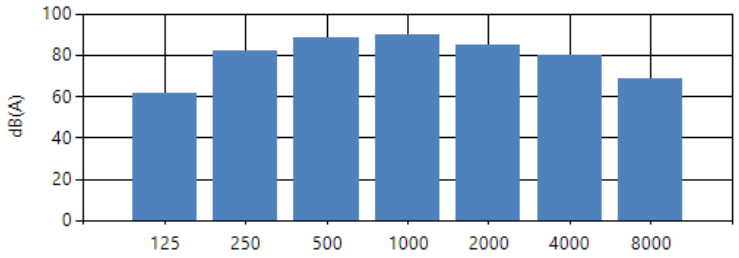
** = referred to cooling mode*



Sound data (nominal cooling data)

Sound power – Lw	dB(A)	94.5
Sound pressure at 10 m	dB(A)	62.3

Hz	Lw [dB]	Lw [dB(A)]
125	77.82	61.72
250	90.59	81.99
500	91.49	88.29
1000	90.22	90.22
2000	84.16	85.36
4000	79.18	80.18
8000	69.61	68.51



The sound levels are given at full load, without pumps (if available) and at nominal conditions (external circuit water temperature (in/out): 30.0/35.0 °C, users circuit water temperature (in/out): 12.0/7.0 °C).

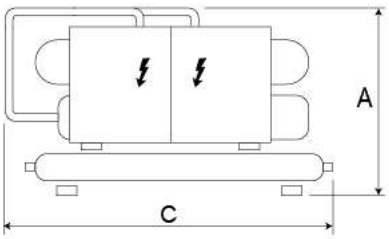
Electric data

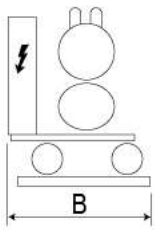
Full Load Amps (FLA)	A	561.00
Locked Rotor Amps (LRA)	A	749.00
Power supply		400V/3/50Hz with fuses

Dimensions and weights

A[m]	B[m]	C[m]	Empty weight[kg]	Working weight[kg]
2.2	1.58	4.38	5,750	6,494

The dimensions and weight refer to the unit without packaging. For these data, consult the installation manual.





Technical description

Series
Indoor unit with high-efficiency compressors.

The base, the structure and the panels are made of steel treated with rustproof polyester paint.
The machine allows operation in cooling or heating mode via cycle reverse on the hydraulic side.

Nominal powers
Cooling capacity: 1,018.8 kW (water system side 12.0 °C / 6.0 °C, water source side 30.0 °C / 35.0 °C)
Heating capacity: 812.7 kW (water system side 45.0 °C / 50.0 °C, water source side 0.0 °C / -4.0 °C)

Model
Heat pumps with reversible water side

Version
High-efficiency version obtained by appropriately sizing the condensing surface through the use of an adequate number of cooling modules.

Refrigerant
R513A (XP10), this is characterised by low ODP (ozone depletion potential) and is classified A1 within the safety group in accordance with the ASHRAE 34-1997 standard.

Cooling circuit
- Made with a copper pipe with welded silver alloy joints.
- Electronic expansion valve that modulates the gas flow according to the refrigeration load.
- Filter-drier: it can collect debris and any traces of humidity in the refrigerant circuit.
- Sight glass: used to check the refrigerating gas load and any humidity in the refrigerant circuit.
- Liquid and pressing line taps: allow the refrigerant to be intercepted in the event of extraordinary maintenance.

Circuit number: 2
Compressor number: 2

Bearing structure
Supporting structure made of hot-dipped galvanised steel sheets, painted with polyester powders, built to guarantee easy accessibility for service and maintenance.

Compressor
Positive displacement compressor with double screw rotors in steel alloys with semi-hermetic construction type with electric motor cooled by suction gas.

The compressor is equipped with electric heating to heat the oil: this prevents the refrigerant from becoming excessively soluble in the oil, thus reducing viscosity, and is automatically powered when the unit is stopped.

User side exchanger
Dry expansion shell and tube exchanger with pipes side refrigerant passage and case side water passage. Case side with baffles to increase the turbulence and therefore the efficiency of the heat exchange. Steel case covered with closed cell expanded elastomer anti-condensation covering. The shell and tube is realised with copper pipes grooved internally to favour heat exchange.

External side exchanger
Shell and tube exchanger with pipes side water passage and case side refrigerant. Steel case and shell and tube realised with internally and externally

grooved copper pipes in order to favour heat exchange.
Water connections (inlet - outlet): - - -

Power supply
400V/3/50Hz with fuses

Electrical panel
It contains the power section, the management of the controls and safety devices and the on-board control panel.

It is equipped with a door-lock disconnecting switch to disconnect the power supply by using the opening lever itself. This lever can be blocked with padlocks during maintenance to prevent the machine from being accidentally powered.

All the cables are numbered so they can be immediately recognised.

Safety devices and protections
- High-pressure switch (one for each circuit): factory-calibrated, installed downstream of the compressor with the function of stopping machine operation in the event of abnormal pressure.
- Refrigerant circuit safety valve on the high pressure side: it kicks in by releasing overpressure in the event of abnormal

working pressure levels.
- Refrigerant circuit safety valve on the low pressure side: it kicks in by releasing overpressure in the event of abnormal working pressure levels.
- Electric control board access door interlock system.
- Compressor protection fuses or circuit breakers.

Transducers
- The unit is supplied equipped with water temperature probes at the exchanger inlet and outlet.
- Low-pressure transducer (one per circuit): it makes it possible to show the value of the compressor intake pressure on the microprocessor electronic card display; it is installed on the low pressure side of the refrigerant circuit and shuts down compressor operation in the case of abnormal operating pressure.
- High-pressure transducer (one per circuit): it makes it possible to show the value of the compressor delivery pressure on the microprocessor electronic card display; it is installed on the high pressure side of the refrigerant circuit and shuts down compressor operation in the case of abnormal operating pressure.

Electronic regulation
- Control board with microprocessor.
- Control panel.
- Remote ON/OFF with external contact without voltage.
- Multi-language menu.
- Independent control of the individual compressors.
- Amperometric transformer.
- Cumulative faults block signal.
- Historical alarms function.
- Daily/weekly programming.
- Temperature display of the input and output water.
- Alarms display.
- Integral proportional adjustment of the output water temperature (precision up to ±0.1K).
- Function with double set-point linked to an external contact.
- Always Working function. In the case of critical conditions (e.g. an environmental temperature that is too high) the machine does not stop but can adjust itself and supply the maximum power in those conditions.
- PDC "Pull Down Control" function for preventing the activation of the power steps when the temperature of the water quickly approaches the set-point. Optimises machine functioning when working normally and in the presence of load variation, ensuring the best efficiency of the machine in all situations.
- Compensation of the set-point on the basis of the external temperature or from external analogue signal (4-20 mA).
- Compressor rotation management.

Heat recovery unit
Without heat recovery units.

Accessories
- For the list and the accessories compatibility see the product data sheet.

Conformity
Inside every unit there is the declaration of CE conformity with reference to the serial number of the appliance.
The unit complies with the following harmonised standards:
- IEC EN 61000-6-2 and IEC EN 61000-6-4 (Immunity and electromagnetic emissions for industrial environments)
- EN378 (Refrigerating systems and heat pumps - Safety and environmental requirements)
- EN12735 (Copper and copper alloys - Seamless, round copper tubes for air conditioning and refrigeration)
- UNI1285-68 Calculation of resistance of metal pipes subject to internal pressure
- EN60204-1 (Safety of machinery - Electrical equipment on machines)

The unit is in compliance with the following directives:
- LVD Directive: 2014/95/EC
- Electromagnetic Compatibility Directive 2014/30/EC
- Machinery Directive 2006/42/EC
- PED Directive regarding pressurised devices 2014/68/EC

The product satisfies the Total Quality Assurance procedure (form H) with certificate no.06/270-QT3664 Rev.10 issued by notified body no.1131 CEC via Pisacane 46, Legnano (MI) - Italy.

AERMEC air conditioning

AERMEC UNITED KINGDOM

CONDITIONS OF SALE

1. APPLICABILITY

[i] These conditions alone shall govern and be incorporated in every contract for the sale on its own account of goods by Aermec UK Limited [the Company] to any customer but not where the Company sells as agent and shall prevail over any other item contained in any document of the customer.

[ii] No addition to or cancellation, variation, qualification or waiver of any of these conditions or to or of any other term of a contract in which they are incorporated shall be applicable or shall have any legal effect whatsoever [whether acted on by the customer in any way or not] unless it is so agreed in writing by a Director of the Company.

[iii] Prior the Company's formal acceptance of any order no quotation or written or oral communication made by the Company to the customer nor any information about the price, availability, delivery, design, specification, importation or description of the goods given to the customer shall have any contractual effect. On the Company's formal acceptance of such order such quotation, communication or information shall only be incorporated in any contract for the sale of goods in so far and to the extent that conditions 2, 3, 4 and 5 below expressly allow.

2. PRICE

[i] At any time before delivery of goods by the customer has been completed the Company shall be entitled to vary the price or prices of such goods in order to take all or any of the following factors into account:

- [a] any change in the exchange rates for the pound sterling;
- [b] any increase in the cost of materials, goods or services to be supplied to the Company in respect of such goods before delivery to the customer;
- [c] any increase in cost as a result of any of the matters specified in condition 7 below;
- [d] any increase of any nature in the cost to the Company as a result of its importing such goods into the UK.

[ii] The prices given in any quotation by the Company are for the quantities expressed in conjunction with them. Any variation in quantity may entail a variation in the price of the goods.

[iii] The price shall be paid by the customer without any deduction whatsoever and payment shall be made within 30 days from the date of the Company's invoice. Until payment of the price in full is received by the Company, the property in the goods supplied by the Company shall not pass from the Company and the Company shall after the expiration of 30 days from the date of the invoice be entitled to charge the customer interest at the rate of 2.5% per month or part of a month on the whole or any balance of the sum from time to time outstanding and due.

[iv] The customer shall not under any circumstances be entitled to retain or set off the whole or any part of any amount due to the Company.

[v] The price payable under any contract for the sale of goods by the Company shall not, unless otherwise stated, include the provision of packing cases or the supply or use of tools, scaffolding cranes or any other equipment for which a separate quotation will be given by the Company if so desired by the customer.

[vi] Unless otherwise stated, any price quoted is subject to the addition of Value Added Tax at the appropriate rate.

3. DELIVERY

[i] In the absence of any stated delivery date the Company shall use its best endeavours to make delivery within 3 calendar months after the date of written confirmation by the Company of a written order or the date of receipt by the Company of all necessary information to enable it to fulfil the order [whichever is the later]. Any delivery dates stated in quotations or confirmations of orders are reasonable estimates only and the Company will endeavour to maintain the delivery date given. In the event of its failure for any reason to make delivery by the due date the Company shall be under no liability whatsoever for loss or damage [including consequential loss or damage] unless it has, expressly and in writing, guaranteed due delivery by a given date in which event the liability of the Company shall [subject to these conditions] be limited to the contract price of the goods to which failure relates.

[ii] Where the Company is not liable under paragraph [i] above the customer shall, despite any delay and in the absence of any other reason entitling refusal of the goods, accept or procure acceptance of the goods on delivery. The Company shall not in any event be under any liability whatsoever for loss or damage [including consequential loss or damage] or the reimbursement of any fine in the event of any delay in transit or delivery through or arising out of any stoppage or work, strike, lock-out or other industrial dispute or any accident or other cause beyond its control. If delivery is delayed beyond the due date for delivery for any such reason for a period exceeding four months the Company shall have the right to cancel the contract and refund any payments made by the customer under the contract and in that event all liability of the Company and the customer in respect of the contract shall cease. If in such circumstances the Company does not exercise this right the time of delivery for the purposes of these conditions shall be postponed by a period equal to that during which the cause of delay continues.

[iii] Subject to the provision of paragraphs [i] and [ii] above, if:

- [a] the customer shall stipulate upon placing the order that delivery shall be made on a specific date or specific dates; and
- [b] this stipulation is accepted in writing the Company; and
- [c] the goods ordered by the customer are available for delivery on such date or dates but the customer requests at any time after the Company has confirmed the order but before delivery of the goods that delivery shall be delayed for any period and for any reason, then the Company shall have the right to be indemnified by the customer for the costs incurred in storing the goods on behalf of the customer and all and any other costs incidental thereto but the Company shall be entitled to invoice the customer for such goods on the specific date or dates on which delivery would [but for such request on the part of the customer] have taken place.

4. NON-DELIVERY

The Company must receive notification of the non-receipt of goods within ten days from the date of its advice note. The Company will be under no liability whatsoever for loss or damage [including consequential loss or damage] in respect of delayed delivery or non-delivery if such notification is not received in accordance with the terms of this condition.

5. RISK AND INSURANCE

[i] The risk in the goods supplied to the customer shall, subject to paragraph [ii] of this condition, pass to the customer on delivery. Pending the passing of the property in the goods to the customer, and so long as the risk in goods consigned to a third party in accordance with paragraph [ii] below is in the customer, the customer shall effect all necessary insurance against loss or damage and shall procure that the Company's interest shall be noted on the relevant policy or policies.

[ii] Any goods consigned to a third party nominated by the customer shall at all times be at the customer's risk and goods alleged to be damaged or defective before delivery cannot be exchanged or allowed for after acceptance by such party [which for the purposes of these conditions shall be treated as acceptance by the customer].

6. CARRIAGE

Unless otherwise agreed in writing all prices quoted by the Company are "ex Docks" duty paid and do not include any costs and expense incurred by the Company in respect of delivery [which shall be charged to the customer].

7. GUARANTEE

[i] If and when goods are stated as being sold under guarantee, the Company undertakes to make good or replace free of charge any part returned, carriage paid, within 18 months [or in the event of the guarantee being given by the manufacturer for a period shorter than 18 months then within the period of such manufacturer's guarantee only] from the date of despatch by the manufacturer or within 12 months [or such shorter period as aforesaid] from the date of commencement of operation of the goods concerned whichever period expires first, and found to be defective owing to faulty material or workmanship [fair wear and tear excepted] the Company shall be under no further liability whatsoever under this paragraph in respect of such goods.

[ii] Subject to paragraph [i] above all warranties and conditions on the part of the Company, express or implied, statutory or otherwise, are hereby expressly excluded save in so far as such exclusion may be made void by statute.

8. ALTERATIONS

The Company reserves the right to alter or modify a design and all orders will be executed with current models. The Company also reserves the right to employ, if necessary, alternative materials or methods of construction at higher charges.

9. CANCELLATION

A contract may be cancelled provided it is so agreed in writing by a Director of the Company and the Company receives a full indemnity for any loss or damage occasioned as a result of such cancellation.

10. CLAIMS

The Company shall not under any circumstances be under any liability whatsoever in respect of any contract unless notice in writing of a claim has been received by it within the following times:

[i] under paragraph [i] of condition 7, within 7 days of the time when the defect or other reason for a claim under any guarantee was or should reasonably have been discovered;

[ii] in the case of damages to any part of the goods during the course of transportation, within 7 days of the receipt of the goods by the customer or, in the case of delivery to a third party in accordance with paragraph [ii] of condition 5, the third party [subject to the provisions of the said paragraph].

11. TERMINATION

Without prejudice to its rights to recover any amount due or to recover damages and without prejudice to any other right which it may have the Company shall be entitled to treat any contract as repudiated:

[i] If the customer defaults in payment of any sum due thereunder;

[ii] If any of the following events shall occur:

- [a] any distress is executed upon the customer, his property or assets;
- [b] the customer makes or offers to make any composition with his creditors;
- [c] a receiver is appointed of the undertaking and assets of the customer;
- [d] a petition is filed or made or an effective resolution passed for winding up the customer [except for the purposes of reconstruction or amalgamation];
- [e] the customer commits any act of bankruptcy; or
- [f] any petition for a receiving order is presented against the customer.

12. LAW

Every contract for the sale of goods by the Company shall be construed and governed according to English Law and the customer hereby agrees to submit to the jurisdiction of the Supreme Court of Judicature in England.

13. HEADINGS

The headings to these conditions are for convenience of reference only and shall not affect the construction of these conditions in any way.

i-FX-N-G05 /SL-A /1152

Software version: ELCA World 1.4.7.0
Database version: 1.5.7.0
User: Hall Nigel
Print data: 27/11/2020 14:13
Calculation type: EN 14511 - EN 14825

Check ongoing validity of certificate: www.eurovent-certification.com

HEATING COOLING EC FAN SCREW R513A

Code		i-FX-N-G05 /SL-A /1152
Version		SL-A
Size		1152
UNIT DESCRIPTION		Reversible unit, air source, VSD screw compressors and EC fans, for outdoor installation.
Power supply	V/ph/Hz	400/3/50

PERFORMANCE AT DESIGNED CONDITIONS

RUNNING CONDITIONS

COOLING

HEAT EXCHANGER USER SIDE

Fluid inlet temperature (cooling mode)	°C	12.00
Fluid outlet temperature (cooling mode)	°C	6.00
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000

OUTDOOR CONDITION

Air temperature (cooling mode)	°C	35.0

HEATING

HEAT EXCHANGER USER SIDE

Fluid inlet temperature (heating mode)	°C	30.00
Fluid outlet temperature (heating mode)	°C	35.00
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000

OUTDOOR CONDITION

Air temperature (heating mode)	°C	-5.0

COOLING (EN 14511)

Capacity control	%	100.0
Cooling capacity	kW	1081
Compressors power input	kW	372.1
Fans power input (cooling mode)	kW	16.80
Total power input	kW	390.3
EER	kW/kW	2.770
ESEER EN 14511 (referiment)	kW/kW	4.550

HEATING (EN14511)

% Capacity control on heating	%	100.0
Total heating capacity	kW	754.7
Compressors power input (heating mode)	kW	235
Fan power input (heating mode)	kW	16.80
Total power input	kW	247.4
COP	kW/kW	3.050

SEER

SEER Official (Reg. EU 2016/2281)

i-FX-N-G05 /SL-A /1152

Software version: ELCA World 1.4.7.0
Database version: 1.5.7.0
User: Hall Nigel
Print data: 27/11/2020 14:13
Calculation type: EN 14511 - EN 14825

Check ongoing validity of certificate: www.eurovent-certification.com

HEATING COOLING EC FAN SCREW R513A

Fan coil (12/7)

Type climate		Average
Temp. Plant side		Fan coil (12/7)
Type flow		Variable
Type Temperature		Variable
Prated,c	kW	1113
T Design		35.00
Qce		138621.86
SEER		4.82
Performance ηs	%	190

SEER Editable (EN 14825)

Fan coil (12/7)

Type climate		Average
Temp. Plant side		Fan coil (12/7)
Type flow		Variable
Type Temperature		Variable
Prated,c	kW	1113.00
T Design		35.00
Qce		138621.86
SEER		4.82
Performance ηs	%	190

EFFICIENCIES

ESEER (EN 14511 VALUE)

Load	%	100	75	50	25
Outdoor air temperature	°C	35.0	30.0	25.0	20.0
Temp. evaporator inlet	°C	12.00	10.75	9.50	8.25
Temp. evaporator outlet	°C	7.00	7.00	7.00	7.00
Evaporator water flow	l/s	53.26	53.26	53.26	53.26
Cooling capacity	kW	1113	834.8	556.5	278.3
Total power input	kW	398.5	218.9	113.7	53.00
EER	kW/kW	2.790	3.810	4.890	5.250
ESEER EN14511 CALCULATED	kW/kW		4.550		
ESEER	kW/kW		4.550		

PART LOAD DATA

COOLING PARTIAL LOADS

Load	%	100.0	90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	10.0
Outdoor air temperature	°C	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Cooling load	kWh	1081	973	865	757	649	541	433	324	216	108
Fans power input (cooling mode)	kW	16.80	16.80	16.80	16.80	16.80	15.04	12.00	12.00	3.97	2.78
Total power input	kW	390.5	326.4	273.5	229.7	185.7	152.0	126.3	94.70	71.20	33.00
Temp. evaporator inlet	°C	12.00	11.40	10.80	10.20	9.60	9.00	8.40	7.80	7.20	6.81
Temp. evaporator outlet	°C	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Evaporator water flow	l/s	43.11	43.11	43.11	43.11	43.11	43.11	43.11	43.11	43.11	43.11
EER	kW/kW	2.770	2.980	3.160	3.300	3.490	3.560	3.420	3.420	3.040	3.270

HEATING PART LOAD

Load	%	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8
Outdoor air temp.	°C	-5.0	-3.0	0.0	5.0	10.0	15.0	20.0	25.0	30.0	-5.0
Heating load	kWh	700	700	700	700	700	700	700	700	700	700
Total power input	kW	225.7	218.4	205.9	174.1	151.5	134.3	116.1	112.5	108.9	225.7
Condenser input temperature	°C	30.36	30.34	30.30	30.63	30.84	30.84	30.84	30.84	30.84	30.36
Condenser output temperature	°C	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Condenser fluid flow	l/s	40.52	40.52	40.52	40.52	40.52	40.52	40.52	40.52	40.52	40.52
COP	kW/kW	3.100	3.210	3.400	4.020	4.620	5.220	6.030	6.220	6.430	3.100

i-FX-N-G05 /SL-A /1152

Software version: ELCA World 1.4.7.0
Database version: 1.5.7.0
User: Hall Nigel
Print data: 27/11/2020 14:13
Calculation type: EN 14511 - EN 14825

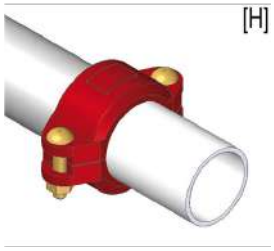
Check ongoing validity of certificate: www.eurovent-certification.com

HEATING COOLING EC FAN SCREW R513A

EXCHANGERS

HEAT EXCHANGER USER SIDE

Typology		SHELL&TUBE
Quantity	N°	1
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000
Type of connections		[H] - Grooved coupling with weld end counter-pipe user side
Diameter of connections		8"
Min flow	l/s	27.78
Max flow	l/s	75.00
K pressure drop		0.95
Water content	l	400



COOLING

Fluid inlet temperature (cooling mode)	°C	12.00
Fluid outlet temperature (cooling mode)	°C	6.00
Water flow	l/s	43.11
Pressure drop at the heat exchanger	kPa	22.9
Available unit head	kPa	0.00

HEATING

Fluid inlet temperature (heating mode)	°C	30.00
Fluid outlet temperature (heating mode)	°C	35.00
Water flow	l/s	40.52
Pressure drop at the heat exchanger	kPa	20.2
Available unit head	kPa	0.00

FANS

Fans type		EC FAN
Fans number	N°	24
Fans power input	kW	0.70
F.L.I.	kW	1.950
F.L.A.	A	3

COOLING

Fans number	N°	24
Fans power input	kW	0.70
Air flow	m³/s	81.09
Available static pressure	Pa	0

HEATING

Quantity	N°	24
Fans power input	kW	0.70
Air flow	m³/s	81.09
Fan available static pressure	Pa	0

i-FX-N-G05 /SL-A /1152

Software version: ELCA World 1.4.7.0
Database version: 1.5.7.0
User: Hall Nigel
Print data: 27/11/2020 14:13
Calculation type: EN 14511 - EN 14825

Check ongoing validity of certificate: www.eurovent-certification.com

HEATING COOLING EC FAN SCREW R513A

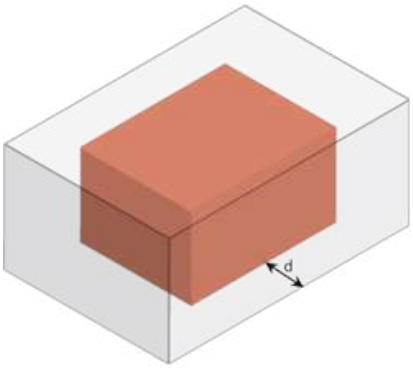
COMPRESSORS

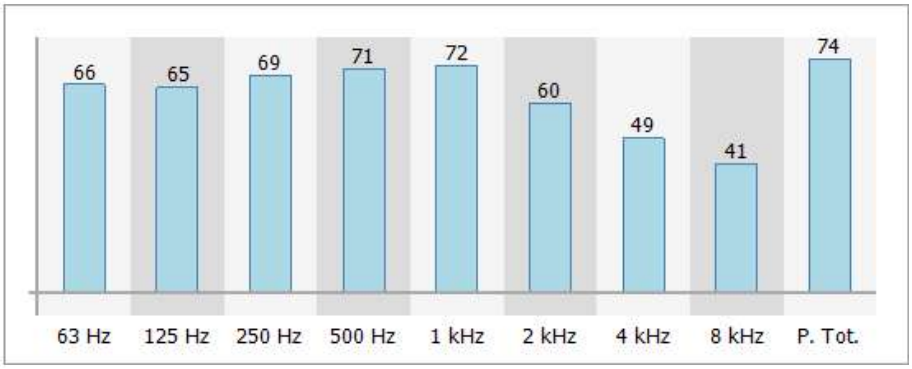
Compressor type		SCREW
Compressors nr.	N°	2
No. Circuits	N°	2
Refrigerant		R513A
Number of capacity steps	N°	0
Min. capacity step	%	
Regulation		STEPLESS
Oil charge	kg	60.0
Refrigerant charge	kg	598
F.L.I. - Max absorbed power	kW	2 x 231
F.L.A. - Max absorbed current	A	2 x 371
L.R.A. - Locked rotor amperes for single compressor	A	2 x 20

NOISE DATA

SOUND DATA COLD

Frequencies	Hz	63	125	250	500	1000	2000	4000	8000
Sound power (spectrum)	dB	89	88	92	94	95	83	72	64
Sound power level in cooling	dB(A)				97				
Sound pressure level (spectrum)	dB	66	65	69	71	72	60	49	41
Sound Pressure	dB(A)				74				





SOUND DATA OUTDOOR HOT

Sound power level in heating	dB(A)	98

Note

Distance	m	1
Note		Average sound pressure level at 1 m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level. Sound power on the basis of measurements taken in compliance with ISO 9614.

ELECTRICAL DATA

Power supply	V/ph/Hz	400/3/50
F.L.I. - Max absorbed power	kW	509.0
F.L.A. - Max absorbed current	A	821
S.A. - Inrush current	A	-

i-FX-N-G05 /SL-A /1152

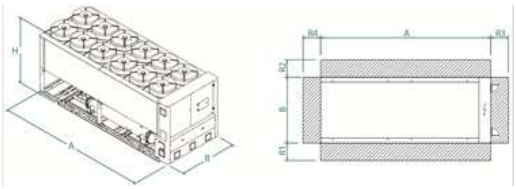
Software version: ELCA World 1.4.7.0
Database version: 1.5.7.0
User: Hall Nigel
Print data: 27/11/2020 14:13
Calculation type: EN 14511 - EN 14825

Check ongoing validity of certificate: www.eurovent-certification.com

HEATING COOLING EC FAN SCREW R513A

WEIGHT & DIMENSIONS

A	mm	11800
B	mm	2260
H	mm	2580
Operating weight	kg	15158
R1	mm	2000
R2	mm	2000
R3	mm	1800
R4	mm	1500



Appendix E Overheating Risk Analysis for the Hospital Redevelopment

Hillingdon Hospital

Design Stage 2 Overheating Risk Analysis

Project number: 60642181

April 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
DC Principal Sustainability Consultant	AI Principal Engineer	MA Technical Director	RM Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
01	25/04/2022	Issue 1	RM	RM	Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

The Hillingdon Hospitals NHS Foundation Trust

Prepared by:

Daniel Cooke
Principal Sustainability Consultant
M: +44-(0)7741-549-122
E: daniel.cooke@aecom.com

AECOM Limited
1 New York Street
Manchester M1 4HD
United Kingdom

T: +44 161 601 1700
aecom.com

Table of Contents

Figures

Tables

1. Executive Summary

This report has been prepared in accordance with the requirements of the GLA Energy Assessment Guidance[1] focused on the overheating risk of the non-cooled, occupied spaces in the RIBA Stage 2 Concept Design of Hillingdon Hospital.

The overheating risk analysis has been carried out against CIBSE TM52 as per the GLA guidance. Using the London Heathrow weather tape, DSY1, all non-cooled occupied rooms are found to pass the criteria set out in CIBSE TM52.

When assessing the building using the DSY2 and DSY3 weather tapes all non-cooled occupied rooms pass.

As the design develops the overheating risk assessment will be updated and the requirement for cooling and ventilation flow rates will be reviewed. Future assessments will look to apply HTM 03-01 thermal comfort criteria as the room loads and functions become more defined.

[1] https://www.london.gov.uk/sites/default/files/gla_energy_assessment_guidance_april_2020.pdf

2. Introduction

This report details the RIBA Stage 2 overheating risk analysis undertaken on the non-cooled patient and clinical areas of the Hillingdon Hospital in line with Section 8 of the GLA Energy Assessment Guidance (April 2020). This requires that all non-cooled occupied spaces show that they comply with CIBSE TM52 guidance to prevent overheating.

Hillingdon Hospital includes a main hospital building, comprised of examination/treatment rooms, multi bed wards, single bedrooms, operating rooms, laboratories, rooms with specialist technology (i.e. CT, X-Ray), a coffee shop, dining area, office spaces and other ancillary spaces, and an adjacent car park which includes a café space. The total floor area of the proposed building is approximately 80,300m².

This assessment has been completed based on the currently available design information; details of which are included in Appendix A. As the design develops the thermal comfort assessment will be updated and the requirement for cooling and ventilation flow rates will be reviewed. Future assessments will look to apply HTM 03-01 thermal comfort criteria as the room loads become more defined.

Thermal Comfort CIBSE TM52 Test Method

This thermal comfort assessment has been completed in accordance with the criteria set out in CIBSE TM52:2013, “The Limits of Thermal Comfort: Avoiding Overheating in European Buildings”. The thermal comfort criteria set out in CIBSE TM52 apply during the occupied hours of a typical non-heating season (May to September inclusive). A room is deemed to overheat if any two of the following three criteria, as defined in CIBSE TM52, are not met:

- **Criterion 1 Hours of Exceedance (H_e)**: The number of hours (H_e) that ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not exceed 3%.
- **Criterion 2 Daily Weighted Exceedance (W_e)**: To allow for the severity of overheating the weighted exceedance (W_e) shall be less than or equal to 6 in any one day where:

  $$W_e = \left(\sum h_e\right) \times WF = (h_{e0} \times 0) + (h_{e1} \times 1) + (h_{e2} \times 2) + (h_{e3} \times 3)$$

  Where the weighting factor WF = 0 if $\Delta T \leq 0$, otherwise WF = ΔT, and h_{ey} is the time (h) when WF = y.

- **Criterion 3 Upper Limit Temperature (T_{upp})**: To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4K.

For this assessment the building has been assessed as a Category I (young/infirm), with a nominal air speed of 0.15m/s. All assessed rooms are assumed to have an activity type of ‘sedentary work, standing’ while bedrooms are assumed to have an activity type set to ‘sleeping’.

The following weather tapes are to be used for this assessment based on GLA guidance:

- London_LHR_DSY1_2020High50
- London_LHR_DSY2_2020High50
- London_LHR_DSY3_2020High50

Based on GLA guidance the building is only required to show compliance with the DSY1 weather tape, DSY2 and DSY3 are included for information only.

3. Modelling Methodology

To carry out the thermal comfort simulations, AECOM uses the industry standard <Virtual Environment> v.2021 software suite, from Integrated Environmental Solutions Ltd. The IES <VE> is an integrated suite of applications based around one 3D geometrical model. The modules used for this assessment are “SunCast” for solar shading analysis and “Apache-Sim” for thermal simulation calculations. The dynamic thermal model of the building was based on the Stage 2 Part L 2A compliance model adapted for the thermal comfort analysis.

SunCast generates shadows and internal solar insolation from any sun position defined by date, time, orientation, site latitude and longitude. This shading information is stored in a database and is used to take account of shading from surroundings in subsequent thermal simulation calculations.

Apache-Sim is a dynamic thermal simulation program based on first-principles mathematical modelling of the heat transfer processes within and around a building. It qualifies as a Dynamic Model in the CIBSE system of model classification and exceeds the requirements of such a model in many areas. The program provides an environment for the detailed evaluation of building and system designs, allowing them to be optimised with regard to comfort criteria and energy use. A three-dimensional thermal model of the building was created based on drawings provided (see Appendix A for full details). The building fabric, activity profiles and HVAC servicing strategy were entered into each zone of the thermal model based on the inputs described in this report.

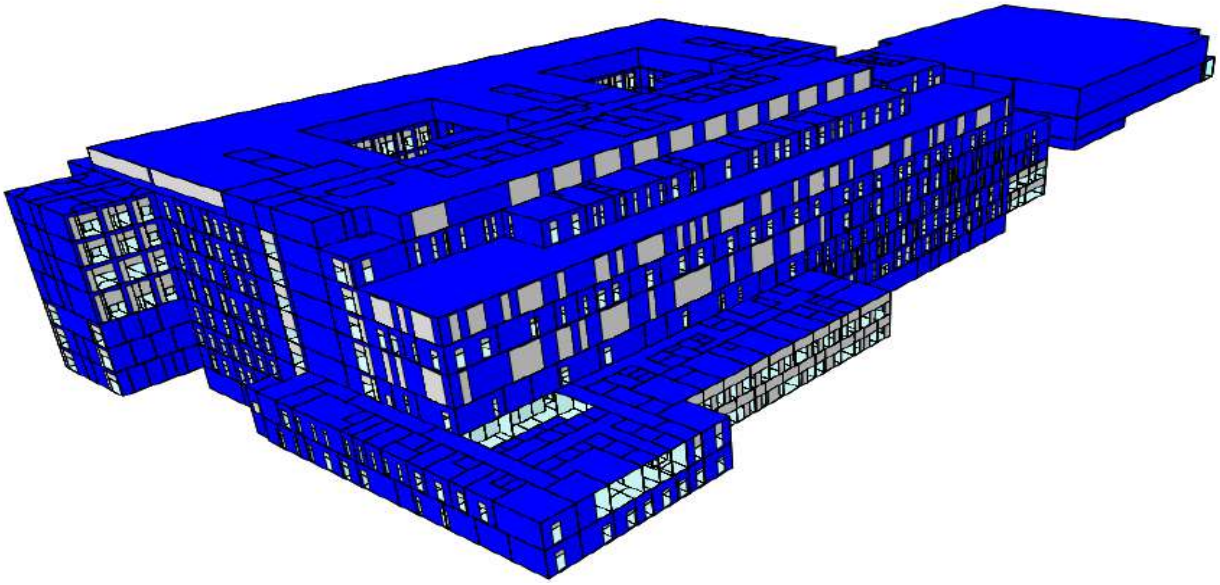


Figure 1: Screenshot of the IES Thermal Comfort Model

4. Design Stage Thermal Comfort Assessment Results

Thermal comfort levels in patient and clinical areas must be in accordance with CIBSE TM52 to comply with the GLA Energy Assessment Guidance on overheating (Section 8). Actively cooled spaces of the building have not been included in this assessment, as per GLA guidance they are included via the energy assessment tool.

The following weather tapes have been used for this assessment:

- London_LHR_DSY1_2020High50
- London_LHR_DSY2_2020High50
- London_LHR_DSY3_2020High50

As per GLA guidance the building is only required to show compliance with the DSY1 weather tape, DSY2 and DSY3 are included for information only

Table 1: CIBSE TM52 Results for Non-cooled Occupied rooms in Hillingdon Hospital

Weather Tape Assessed	Number of Non-cooled Occupied Rooms which Fail	Rooms which Fail
London_LHR_DSY1_2020High50	None	N/A
London_LHR_DSY2_2020High50	None	N/A
London_LHR_DSY3_2020High50	None	N/A

Appendix A Model Inputs

A.1 Location

- Site name/location: Hillingdon Hospital, Uxbridge, London
- Latitude: 51.53ºN
- Longitude: 0.46ºW
- Altitude: 44m
- Model Orientation: As shown below

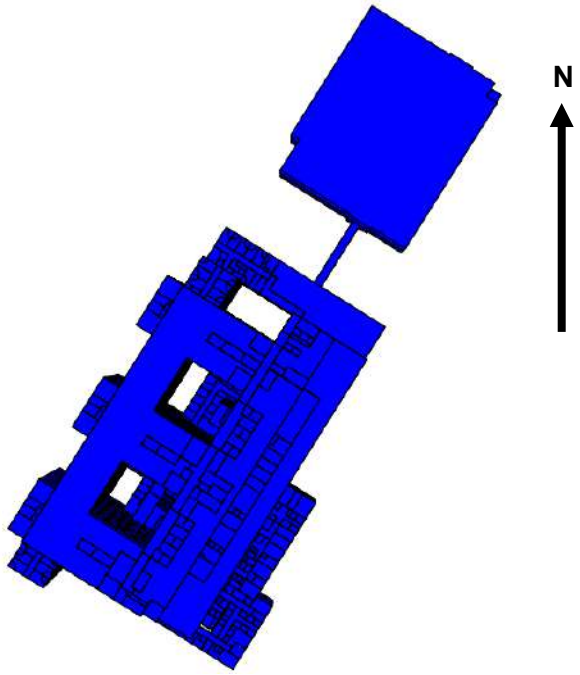


Figure 2: Building Orientation

A.2 Weather Data

The weather tapes used for this assessment as the most appropriate for the site are:

- London_LHR_DSY1_2020High50
- London_LHR_DSY2_2020High50
- London_LHR_DSY3_2020High50

A.3 Building Form

The building geometry was produced from drawing's extracted from IBI's Revit model on 28th January 2022.

	Drawing Title	Date Received
Main Hospital	FloorPlan-BASEMENT1Architect	28/01/22
	FloorPlan-LEVEL00Architect	28/01/22
	FloorPlan-LEVEL01Architect	28/01/22
	FloorPlan-LEVEL02Architect	28/01/22
	FloorPlan-LEVEL03Architect	28/01/22
	FloorPlan-LEVEL04Architect	28/01/22
	FloorPlan-LEVEL05Architect	28/01/22
	FloorPlan-LEVEL06Architect	28/01/22
	FloorPlan-LEVEL07Architect	28/01/22
	Elevation-NorthBIM360	14/02/22
	Elevation-SouthBIM360	14/02/22
	Section-GL4	14/02/22
	Section-GL5	14/02/22
	Section-GL7	14/02/22
	Section-GLE	14/02/22
	Section-GLGG	14/02/22
	Section-GLH	14/02/22
	Section-GLK	14/02/22
	Section-GLN	14/02/22
	Section-GLQ	14/02/22
	THHR_01-ACM-WB-ZZ-M3-BS-000001 - Elevation - East BIM360	02/03/22
	THHR_01-ACM-WB-ZZ-M3-BS-000001 - Elevation - West BIM360	02/03/22
Car Park	THHR_02-IBI-WB-00-DR-A-200000 - MSCP - LEVEL 0	08/03/22
	THHR_02-IBI-WB-01-DR-A-200001 - MSCP - LEVEL 1	08/03/22
	THHR_02-IBI-WB-01-DR-A-200002 - MSCP - LEVEL 2	08/03/22
	THHR_02-IBI-WB-01-DR-A-200003 - MSCP - LEVEL 3	08/03/22
	THHR_02-IBI-WB-01-DR-A-200004 - MSCP - LEVEL 4	08/03/22
	THHR_02-IBI-WB-01-DR-A-200005 - MSCP - LEVEL 5	08/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - North MSCP	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - South	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - East	09/03/22
	THHR_02-ACM-WB-ZZ-M3-BS-000001 - Elevation - West	09/03/22

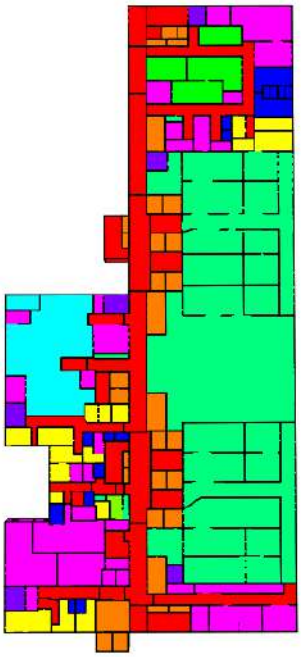
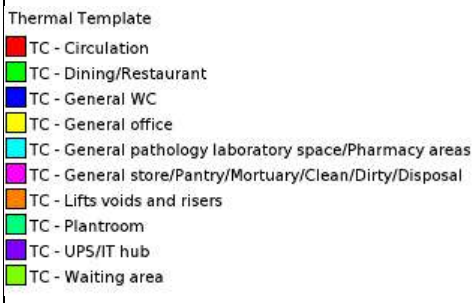
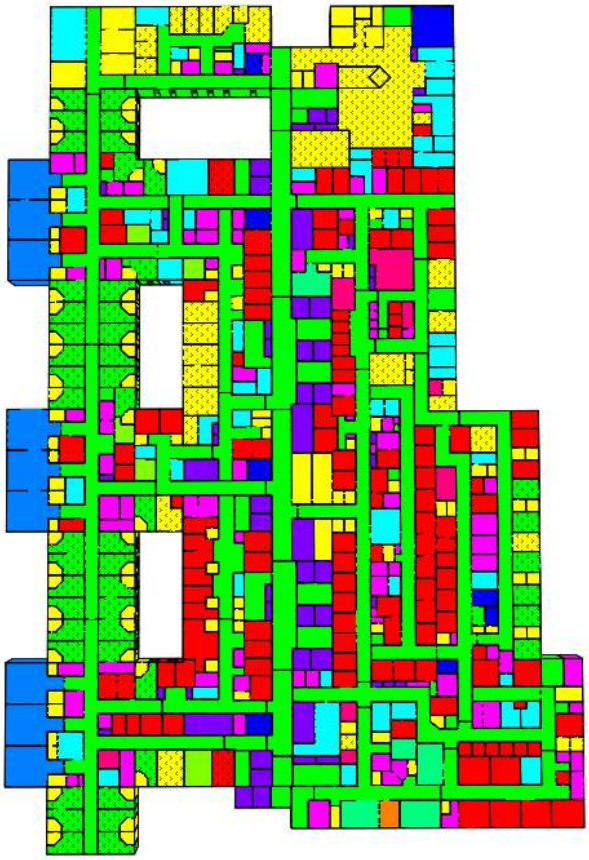
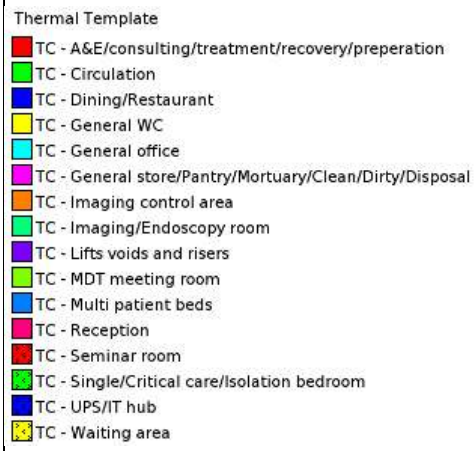
Table 2: Drawings Used to Create IES Model Geometry

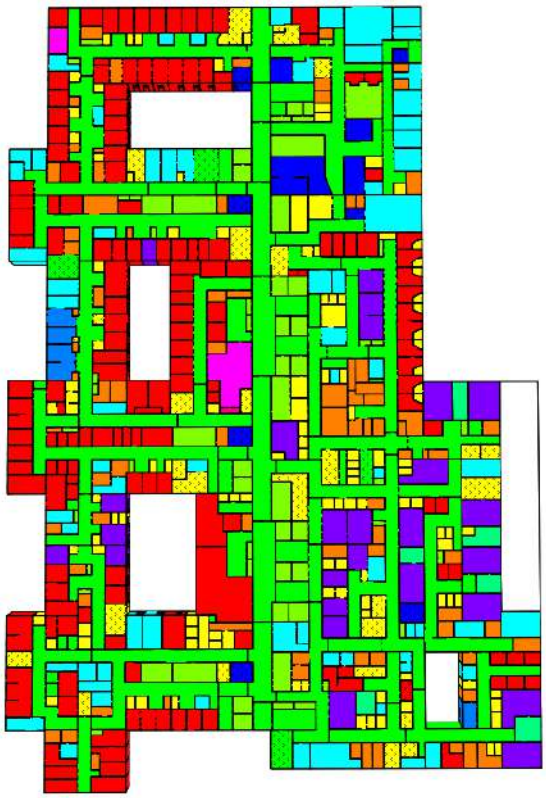
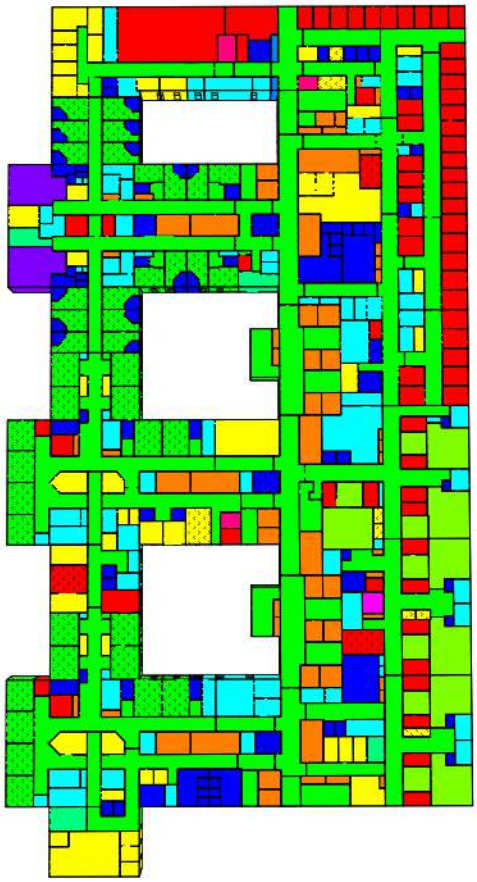
A.4 Building Air Permeability

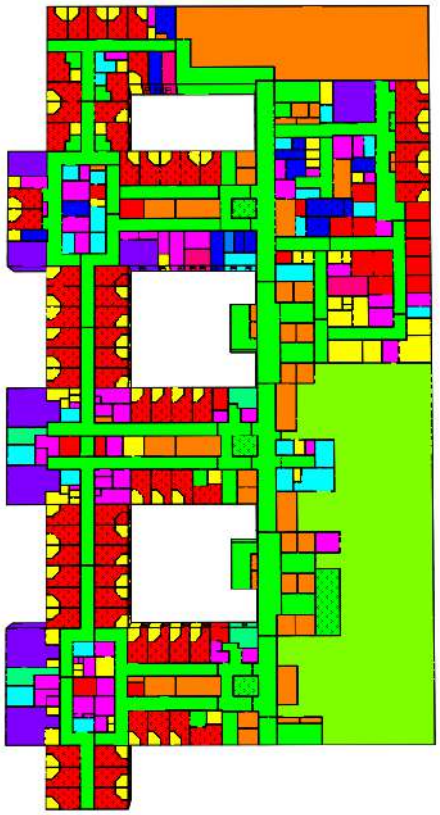
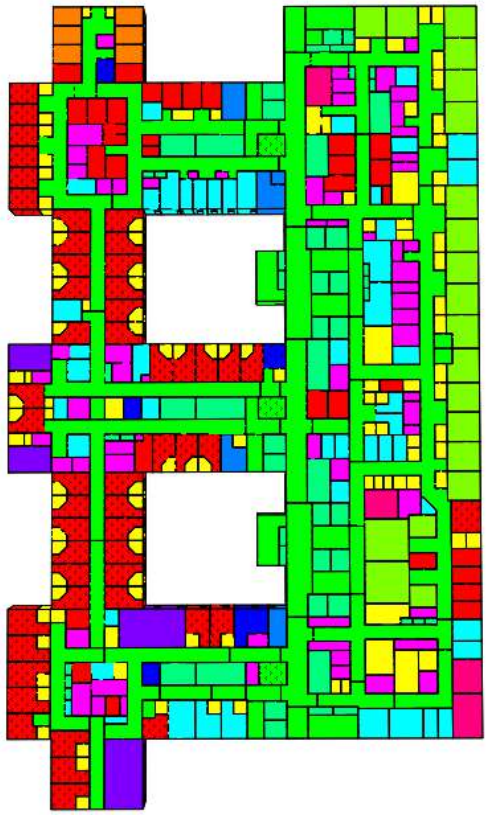
The Hillingdon Hospital is targeting an air pressure test result of **1m³/m².hr at 50Pa**, which is has an equivalent infiltration rate of 0.005ach based on CIBSE TM23 calculation method.

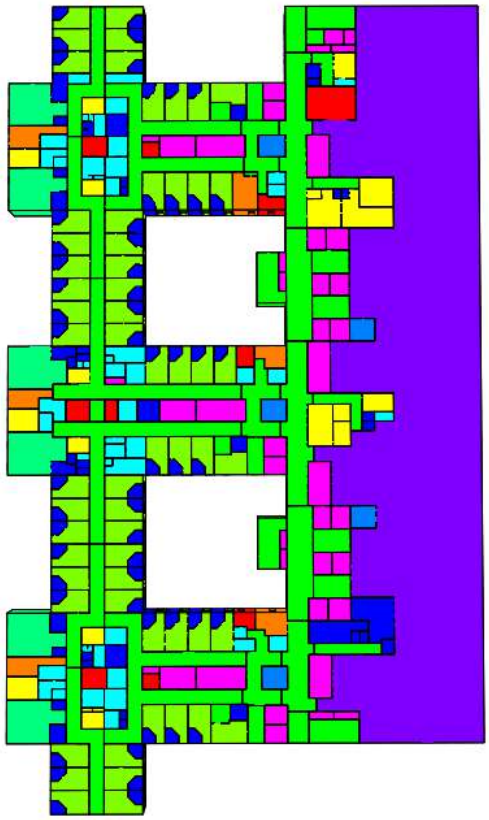
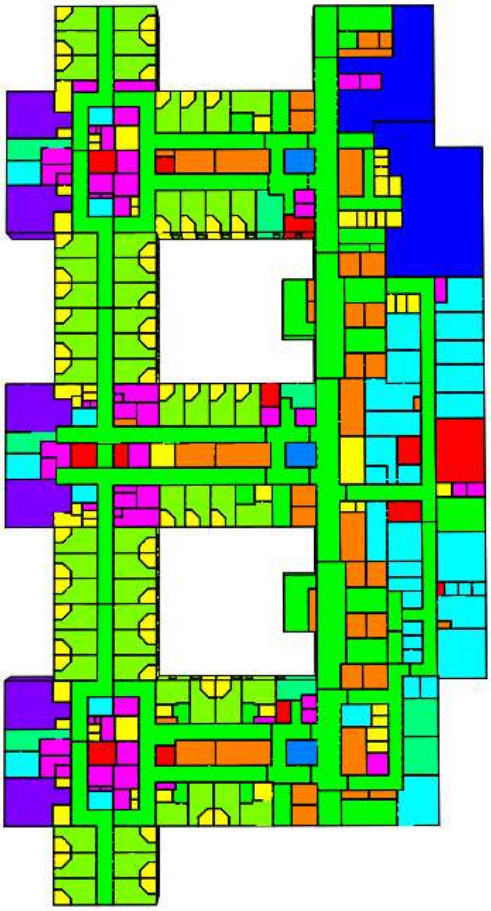
A.5 Thermal Templates

The following images illustrate where thermal templates are applied to the hospital.

Floor Plan	Legend
Basement 	
Ground Floor 	

Floor Plan	Legend
First Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - Dining/Restaurant TC - General WC TC - General office TC - General pathology laboratory space/Pharmacy areas TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Imaging control area TC - Imaging/Endoscopy room TC - Lifts voids and risers TC - Operating/Anaesthetic/Birthing room TC - Plantroom TC - Reception TC - Seminar room TC - UPS/IT hub TC - Waiting area
Second Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - General WC TC - General office TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Imaging control area TC - Lifts voids and risers TC - MDT meeting room TC - Multi patient beds TC - Operating/Anaesthetic/Birthing room TC - Plantroom TC - Reception TC - Seminar room TC - Single/Critical care/Isolation bedroom TC - UPS/IT hub TC - Waiting area

Floor Plan	Legend
Third Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - Dining/Restaurant TC - General WC TC - General office TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Lifts voids and risers TC - MDT meeting room TC - Multi patient beds TC - Plantroom TC - Reception TC - Seminar room TC - Single/Critical care/Isolation bedroom TC - UPS/IT hub TC - Waiting area
Fourth Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - Dining/Restaurant TC - General WC TC - General office TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Imaging/Endoscopy room TC - Lifts voids and risers TC - Multi patient beds TC - Operating/Anaesthetic/Birthing room TC - Reception TC - Seminar room TC - Single/Critical care/Isolation bedroom TC - UPS/IT hub TC - Waiting area

Floor Plan	Legend
Fifth Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - General WC TC - General office TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Lifts voids and risers TC - MDT meeting room TC - Multi patient beds TC - Plantroom TC - Single/Critical care/Isolation bedroom TC - UPS/IT hub
Sixth Floor 	Thermal Template TC - A&E/consulting/treatment/recovery/preperation TC - Circulation TC - Dining/Restaurant TC - General WC TC - General office TC - General store/Pantry/Mortuary/Clean/Dirty/Disposal TC - Lifts voids and risers TC - MDT meeting room TC - Multi patient beds TC - Single/Critical care/Isolation bedroom TC - UPS/IT hub

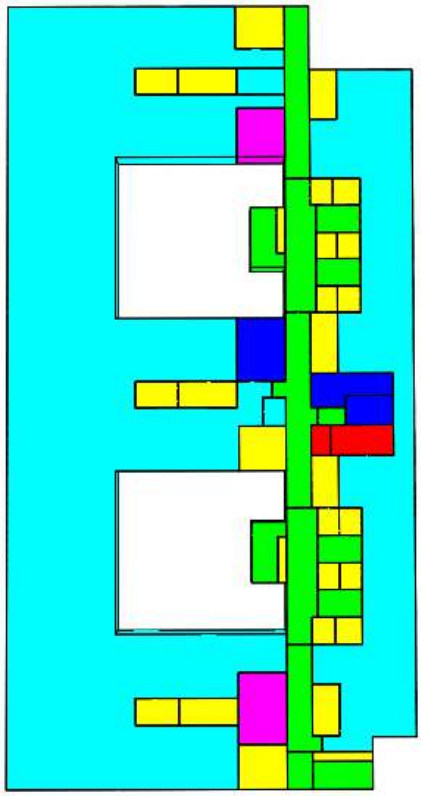
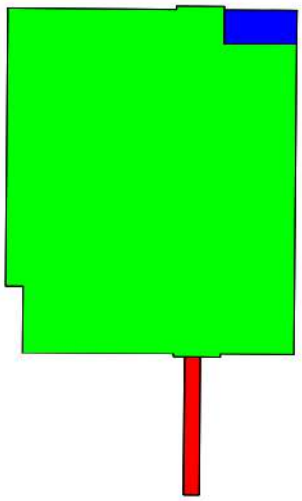
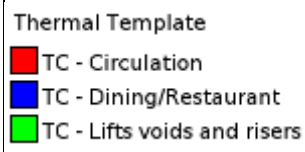
Floor Plan	Legend
Seventh Floor 	
Car Park 	

Table 3: Thermal Templates Assigned to Rooms in the Hillingdon Hospital Thermal Comfort Model

A.6 Construction Details

Construction Element	U-Value (W/m²K)
Ground Floor	0.15
Roof	0.13
Thermal Line Roof	0.13
External Wall	0.15
Opaque Curtain Wall	0.50
Thermal Line Wall	0.15
Opaque Pedestrian Doors	1.20
Louvre	0.15

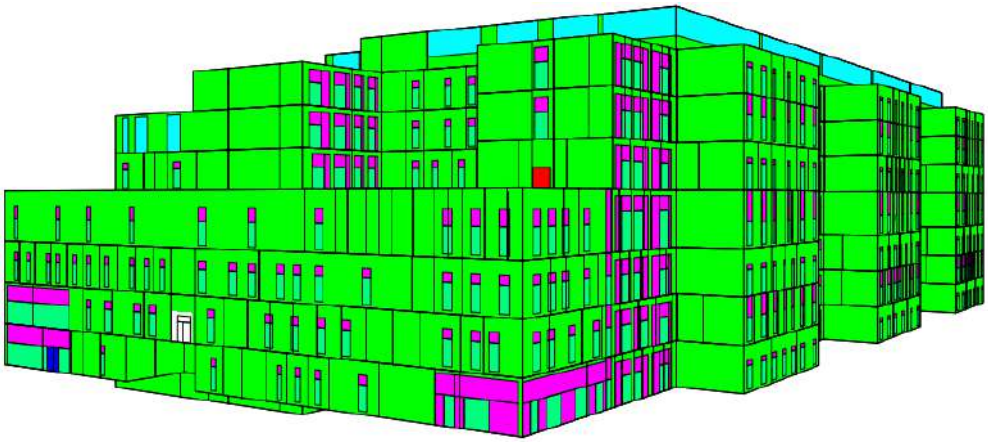
Table 4: Description of the Performance of the Opaque Building Fabric for Hillingdon Hospital

Glazing Type	U-Value (W/m²K)	G-Value (%)	Light Transmittance (%)	Frame Percentage (%)
External Window	0.9	0.26	0.56	10
Glazed Door	0.9	0.26	0.56	10

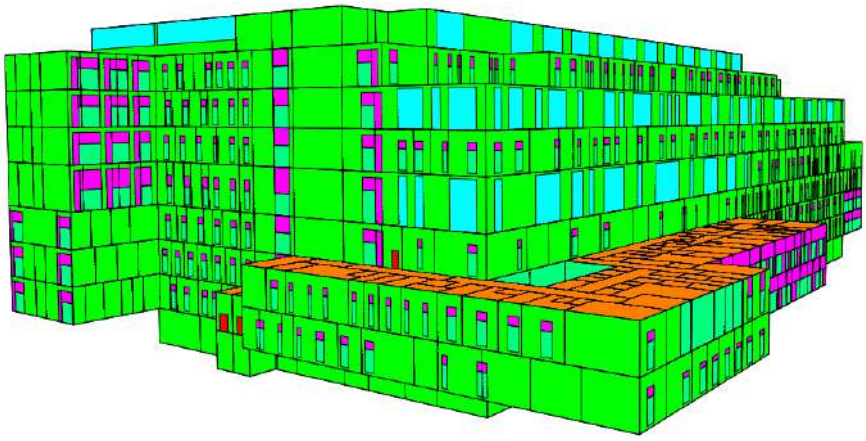
Table 5: Description of the Performance of the Glazed Building Fabric for Hillingdon Hospital

The following sets of images illustrate where the constructions are applied on the main hospital building (Figure 3) and the adjacent car park (Figure 4).

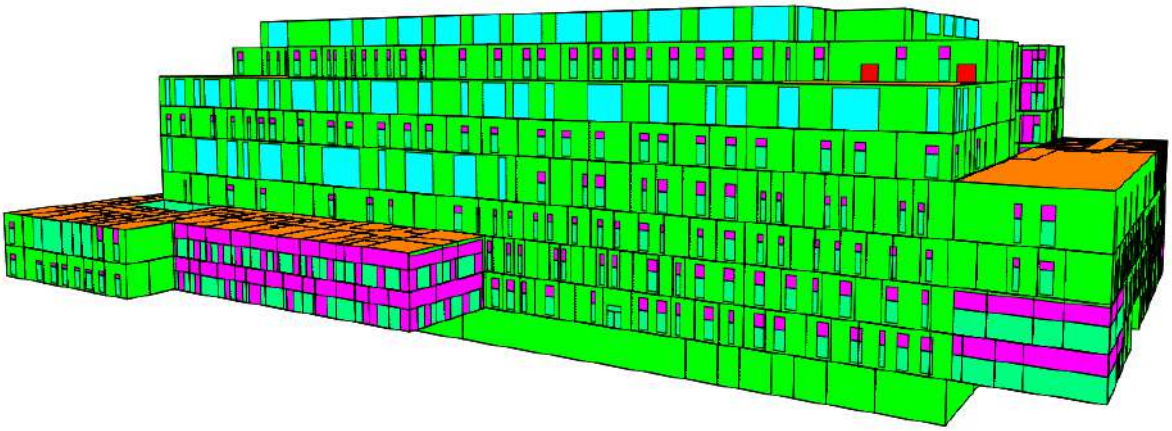
North



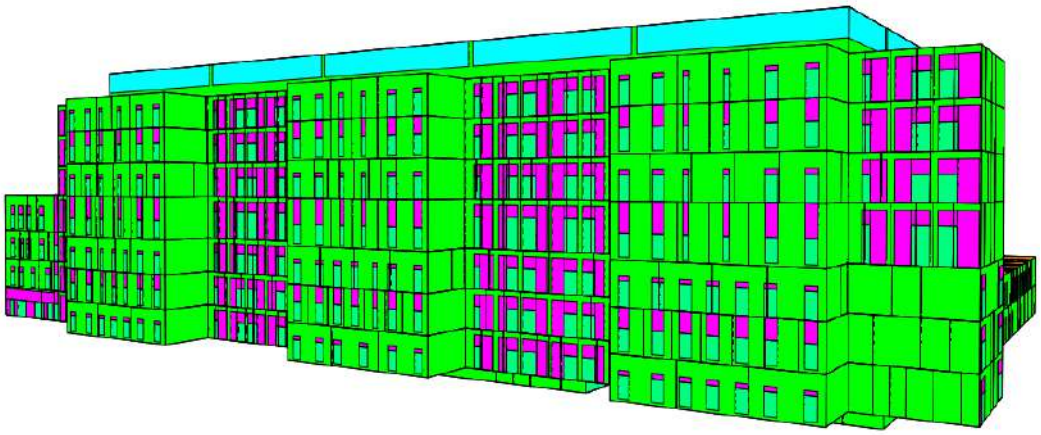
South



East



West



Legend

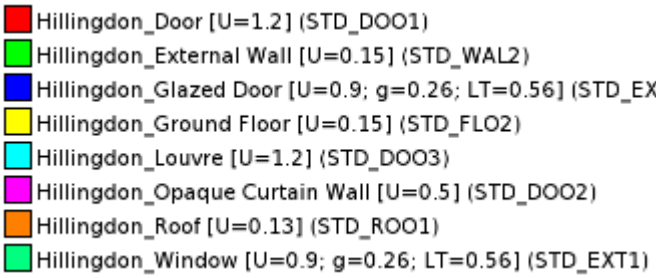


Figure 3: Screenshots to Illustrate Where Each Construction is Applied to the Main Hospital Building

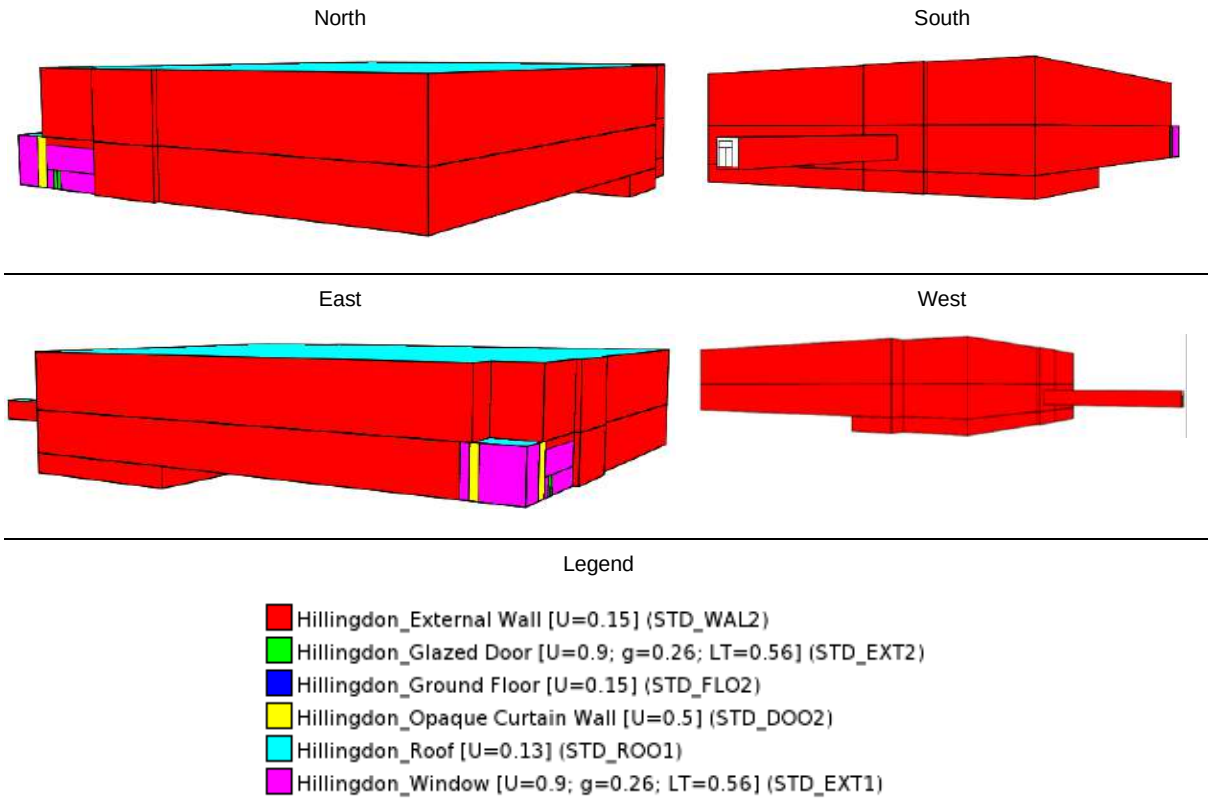


Figure 4: Screenshots to Illustrate Where Each Construction is Applied to the Car Park

A.7 Set Points and Ventilation Rates

The following section describes the heating and cooling set points as well as the ventilation rates applied to the Hillingdon Hospital thermal comfort model based on the Stage 2 Environmental Matrix as well as discussions with AECOM MEP team.

Room types	Heating setpoint (°C) [2]	Cooling setpoint (°C)	Ventilation rate (ACH unless stated) [1]
A&E Bays	20	N/A	6.15 supply air
Anaesthetic Room	18	21	9.23 supply air
Birthing Room	20	25	6.15 supply air
Circulation	N/A	N/A	30 l/s [4]
Clean Utility	N/A	N/A	3.69 supply air
Consulting / Examination Room	20	25 [3]	3.69 supply air
Critical Care Bedroom	20	25 [3]	6.15 supply air
Dining / Restaurant	20	25 [3]	17 l/s/person supply air
Dirty Utility	N/A	N/A	3.69 extract air
Disposal	N/A	N/A	N/A
Endoscopy Room	20	23	6.15 supply air
General WC	20	N/A	6.15 extract air
General Office	20	25 [3]	3.69 supply air
General Store	N/A	N/A	N/A
Imaging Control Area	20	23	17 l/s/person supply air
Imaging Room	20	23	6.15 supply air
Isolation Room	20	N/A	6.15 supply air
MDT Meeting Room	20	25	15 l/s/person supply air
Mortuary	20	25	6.15 supply air
Multi-Patient beds	20	25 [3]	3.69 supply air
Operating Theatre	18	25	13.54 supply air
Pantry	20	25	2.46 supply air
Pharmacy Areas	20	25	3.69 supply air
Plantroom	5	N/A	N/A
Preparation Room	20	25	13.54 supply air
Reception	20	N/A	20 l/s/person
Recovery Area	20	25 [3]	9.23 supply air
Resus Room	20	22	6.15 supply air
Seminar Room	20	25 [3]	17 l/s/person
Single Bedroom	20	25 [3]	3.69 supply air
Staff Base	20	N/A	150 l/s supply air [5]
Storage (fluids)	N/A	N/A	3.69 supply air
Treatment Room	20	25 [3]	6.15 supply air
UPS / IT Hub	20	23	3.69 extract air
Waiting Area	20	25 [3]	20 l/s/person supply air [6]

Room types	Heating setpoint (°C) [2]	Cooling setpoint (°C)	Ventilation rate (ACH unless stated) [1]

[Note 1] – Supply rooms are assumed to all be supplied with air which is always conditioned to 20°C. Extract rooms are assumed to draw the air from the adjacent room (e.g., from corridors or bedrooms). Ventilation flow rates are subject to further development during design.

Air changes per hour are based on the Stage 2 Environmental Matrix but have been adjusted based on the assumed floor to ceiling height of 3m. The adjusted values are as follows:

- 4ach is modelled as 2.46ach
- 6ach is modelled as 3.69ach
- 10ach is modelled as 6.15ach
- 12ach is modelled as 7.38ach
- 15ach is modelled as 9.23ach
- 22ach is modelled as 13.54ach

[Note 2] – The heating set point has been reduced from 21°C to 20°C to match the temperature of incoming supply air, where the heating set point is given as a temperature lower than this it is unchanged from the Environmental Matrix.

[Note 3] – Cooling only applied to rooms which currently feature active cooling in the Stage 2 Cooling Strategy Layouts – these are subject to further development during design. In addition, the following 5 rooms have had cooling applied to prevent overheating:

- 00_Cashier Office
- 00_Office Pals
- 01_Office 002
- 01_Office 012
- 02_Office 001

[Note 4] – Larger corridors and circulation spaces which are not lobbies, stairwells or the main street corridor are assumed to have a supply air flow rate of 30 l/s on average, this is to provide make up air for the rooms with extract ventilation.

[Note 5] – Two larger staff bases (one on Level 00 and one on Level 04) are enclosed and therefore do no benefit from the additional ventilation supplied into the open corridors around the staff bases, therefore these two rooms have 250 l/s air flow.

[Note 6] – The entrance concourse waiting areas have an air flow rate of 4ach, which is not adjusted for ceiling height as the spaces are double height and the ventilation is only applied to the ground floor spaces.

Table 6: Heating, Cooling and Ventilation Inputs Applied to Model

Where heating set points have been applied based on the above room types, they are assumed to operate continuously throughout the year, the same for mechanical ventilation flow rates. Cooling operational profiles are based on the NCM template associated with the thermal templates applied to each room.

The following table details which NCM templates are mapped to the thermal comfort templates.

Thermal Comfort Room Types	NCM Room Types
A&E Bays Consulting / Examination Room Preparation Room Recovery Area Resus Room Treatment Room	NCM Hops: A&E consulting/treatment/work areas
Anaesthetic Room Birthing Room Operating Theatre	NCM Hosp: Operating theatre
Circulation	NCM Hosp: Circulation area
Clean Utility Dirty Utility Disposal General Store Mortuary Pantry Storage (fluids)	NCM Hosp: Cupboard
Critical Care Bedroom Isolation Room Single Bedroom	NCM Hosp: Bedroom
Dining / Restaurant	NCM Hosp: Eating/drinking area
Endoscopy Room	NCM Hosp: Diagnostic Imaging

Thermal Comfort Room Types	NCM Room Types
Imaging Room Imaging Control Area	
General WC	NCM Hosp: Toilet
General Office Staff Base	NCM Hosp: Office
MDT Meeting Room	NCM Hosp: Office (Hospital: Meeting)
Multi-Patient beds	NCM Hosp: Wards (Patient)
Pharmacy Areas	NCM Hosp: Laboratory
Plantroom	NCM Hosp: Light plant room
Reception	NCM Hosp: Reception
Seminar Room	NCM Hosp: Hall/lecture theatre/assembly area
UPS / IT Hub	NCM Misc24Hr: Server room
Waiting Area	NCM Hosp: Reception (Hospital: Waiting)

Table 7: Thermal Comfort and NCM Template Mapping

A.8 Internal Gains

The following section describes the internal gains applied to the Hillingdon Hospital thermal comfort model. All lighting gains are based on the Part L2A modelling report, version 1, issued as part of the GLA Energy Statement (April 2022), please see separate report for further details.

Room occupancies and diversities are have been provided by AECOM MEP based on proposed room use and function.

Room type	Lighting Gains (W/m²)	Lighting Diversity	People Gains (Number of People) [1]	People Diversity	Equipment Gains (W/m²)	Equipment Diversity
A&E Bays	7.70	1.00	1 – transfer 2 – streaming 3 – triage	0.75	10.00	0.50
Anaesthetic Room	14.70	1.00	8.00 m²/person	1.00	75.00	1.00
Birthing Room	14.70	1.00	8.00 m²/person	1.00	75.00	1.00
Circulation	Various	1.00	None	N/A	None	N/A
Clean Utility	None	N/A	None	N/A	None	N/A
Consulting / Examination Room	Various	1.00	1 – streaming 2 – interview 3 – C/E 14.3 m²/person for remaining	0.75 (1.00 streaming rooms)	10.00	0.50 (1.00 streaming rooms)
Critical Care Bedroom	4.92	1.00	2 (9.55 m²/person with cot)	1.00	2.90	1.00
Dining / Restaurant	Various	1.00	2.86 m²/person	0.50	20.00	0.50
Dirty Utility	None	N/A	None	N/A	None	N/A
Disposal	None	N/A	None	N/A	None	N/A
Endoscopy Room	16.80	1.00	10 m²/person	1.00	150.00	1.00
General WC	None	N/A	None	N/A	None	N/A
General Office	Various	1.00	Various [3]	0.75	27.11	0.75
General Store	None	N/A	None	N/A	None	N/A
Imaging Control Area	16.80	1.00	10 m²/person	1.00	150.00	1.00
Imaging Room	16.80	1.00	10 m²/person	1.00	150.00	1.00
Isolation Room	4.92	1.00	2	1.00	2.90	1.00
MDT Meeting Room	6.93	1.00	5.13 m²/person	1.00	27.11	1.00
Mortuary	13.55	1.00	None	N/A	None	N/A
Multi-Patient beds	7.02	1.00	8 – 4 bed 5 – 2 bed with cot 6 – 2 bed 5.71 m²/person – 4 bed cots	1.00	12.85	1.00
Operating Theatre	52.00 – operating	1.00	8 m²/person	1.00	75.00	1.00

Room type	Lighting Gains (W/m²)	Lighting Diversity	People Gains (Number of People) [1]	People Diversity	Equipment Gains (W/m²)	Equipment Diversity
	14.70 – dental and C-section					
Pantry	5.42	1.00	None	N/A	None	N/A
Pharmacy Areas	10.10 (15 – outpatient pharmacy)	1.00	12.5 m²/person	1.00	22.48	1.00
Plantroom	None	N/A	None	N/A	None	N/A
Preparation Room	7.70	1.00	14.29 m²/person	1.00	10.00	1.00
Reception	8.35 [2]	1.00	6.59 m²/person	0.75	15.39	0.75
Recovery Area	7.70	1.00	1 – recovery wait 2- recovery bay	1.00	10.00	1.00
Resus Room	7.70	1.00	14.29 m²/person	1.00	10.00	1.00
Seminar Room	4.41 (7.35 skills lab, education area 11.25)	1.00	1.00 m²/person	1.00 (0.50 skills lab)	5.00	1.00
Single Bedroom	4.92	1.00	2 (9.55 m³/person with cots)	1.00	2.90	1.00
Staff Base	6.60	1.00	2 or 3 depending on size	1.00	27.11	1.00
Storage (fluids)	None	N/A	None	N/A	None	N/A
Treatment Room	7.70	1.00	14.29 m²/person	1.00	10.00	1.00
UPS / IT Hub	None	N/A	None	N/A	50.00	1.00
Waiting Area	10.30 [2] (26.00 reception/wait)	1.00	Various [4]	0.75	15.39	0.25

[Note 1] – People are assumed to have gains of 80W/person sensible, 60W/person latent in all rooms apart from the following:

- Anaesthetic, Birthing rooms 100W/person sensible, 50W/person latent (NCM template)
- Endoscopy, Critical care bedrooms with cots, 99.96W/person sensible, 44.04 W/person latent (NCM template)
- Preparation, Resus rooms 85.4W/person sensible, 54.6 W/person latent (NCM template)
- Single bedrooms (without cots) 75 W/person sensible, 55 W/person latent (CIBSE Guide A)

[Note 2] – Display lighting is an additional 4.5 W/m², with a diversity of 0.25

[Note 3] – Most offices assumed to be 3 people if number of desks not explicit in room name (e.g., Office: 4 person), where office number uncertain it is based on NCM template density of 5.13 m²/person.

[Note 4] – Number of people is either based on the room name (e.g., Lounge with seating/10) otherwise is based on NCM template density of 6.59 m²/person.

Table 8: Internal Gains Applied to Model

All internal gains are assumed to have profiles based on the NCM template type for the room, except for the Outpatient department on Level 01, see following section for more details.

A.9 Outpatients

Level 01 contains the outpatient department which is assumed to operate 12 hours per day all year round. These spaces are assumed to operate 7am to 7pm daily. In these areas internal gain profiles have been modified to be on only between these hours unless the NCM template profile already assumes those hours of use. The following figure highlights the outpatient departments in green, with the 24-hour operational departments in red.

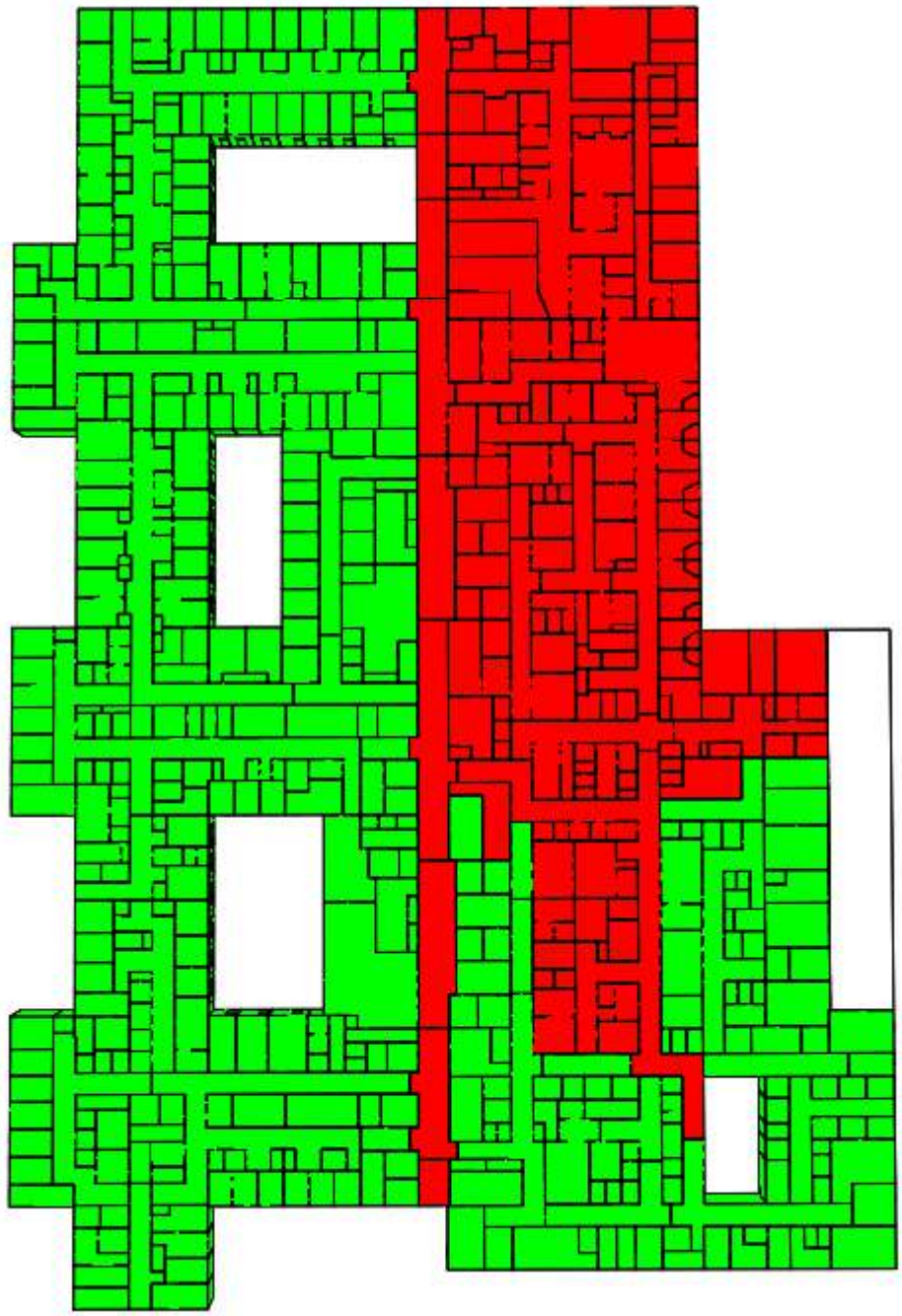


Figure 5: Outpatient Departments on Level 01 of Model (in green)

aecom.com

Appendix F Correspondence with Heat Network Operators

F.1 Correspondence with London Borough of Hillingdon

McLoughlin-Jenkins, Celine

From: Ian Thynne <IThynne@Hillingdon.Gov.UK>
Sent: 28 March 2022 11:10
To: Shelley, Nathan
Cc: Belfitt, Richard; McLoughlin-Jenkins, Celine
Subject: [EXTERNAL] RE: Hillingdon Hospital - Local District Heating Networks

Nathan,

That is correct. There are no systems in this location. The incinerator is due for de-commissioning and will be unavailable to service the new hospital.

Kind regards

Ian Thynne
Planning Specialists Team Manager

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

From: Shelley, Nathan <nathan.shelley@aecom.com>
Sent: 28 March 2022 10:40
To: Ian Thynne <IThynne@Hillingdon.Gov.UK>
Cc: Belfitt, Richard <Richard.Belfitt@aecom.com>; McLoughlin-Jenkins, Celine <Celine.McLoughlin-Je@aecom.com>
Subject: RE: Hillingdon Hospital - Local District Heating Networks

> You don't often get email from nathan.shelley@aecom.com. Learn why this is important

Morning Ian,

Please could you provide a response to my email from 18th March?

Kind regards,

Nathan Shelley, BSc (Hons), BREEAM Assessor, BREEAM AP, WELL AP, WELL PT Agent
(he/him/his)
Senior Sustainability Consultant, Sustainable Development Group, Buildings + Places
M +44 (0) 7818 723 000
nathan.shelley@aecom.com

Click here to connect with me on LinkedIn

AECOM
Aldgate Tower
2 Leman Street
London, E1 8QN, United Kingdom
T +44 (0) 2086 393 500
aecom.com

Delivering a better world

LinkedIn | Twitter | Facebook | Instagram

From: Shelley, Nathan
Sent: 18 March 2022 12:29
To: IThynne@Hillingdon.Gov.UK
Cc: Belfitt, Richard <Richard.Belfitt@aecom.com>; McLoughlin-Jenkins, Celine <Celine.McLoughlin-Je@aecom.com>
Subject: Hillingdon Hospital - Local District Heating Networks [Filed 18 Mar 2022 12:29]

Hi Ian,

I hope that you are well.

I understand that a summary of our investigations into local heat sources was discussed on a pre-application call last year for The Hillingdon Hospital Redevelopment project (on 26/05/2021). The London Heat Map (screenshot shown below) indicates there is (or was) a proposed district heating network connection running north between the Hillingdon Hospital site and the Bishopshalt School. We have investigated this and found no evidence that the network was ever developed. The red point on the map is the Clinical Waste Incinerator for the Hillingdon Hospital site – this is addressed in the note issued on 01/12/2021.

Please can you confirm that this network was not developed and there are no other existing district heating networks in the local area not shown on the map?

Kind regards,

Nathan Shelley, BSc (Hons), BREEAM Assessor, BREEAM AP, WELL AP, WELL PT Agent
(he/him/his)
Senior Sustainability Consultant, Sustainable Development Group, Buildings + Places
M +44 (0) 7818 723 000
nathan.shelley@aecom.com

Click here to connect with me on LinkedIn

AECOM
Aldgate Tower
2 Leman Street
London, E1 8QN, United Kingdom
T +44 (0) 2086 393 500
aecom.com

Delivering a better world

LinkedIn | Twitter | Facebook | Instagram

F.2 Correspondence with SSE Energy Solutions

Shelley, Nathan

Subject: FW: Proposed Heat Network - Uxbridge

From: Mann, Richard <richard.mann@aecom.com>
Sent: 18 March 2022 08:18
To: AHMED, Tahir (THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST) <tahir.ahmed2@nhs.net>; Cale, Nicholas <Nicholas.Cale@sse.com>
Cc: Boyer, Rob <rob.boyer@aecom.com>; Shelley, Nathan <nathan.shelley@aecom.com>
Subject: RE: Proposed Heat Network - Uxbridge

Morning Nicholas,
Just following up after Tahir introduced us.
Have you managed to compile details of your planned network and are they ready to share?
Thank you
Richard

EUR ING **Richard Mann** CEng BEng Hons MCIBSE FIHEEM

Director, Healthcare and Science Sector Leader UKI

M +44(0) 7979 248322
richard.mann@aecom.com
aecom.com

Delivering a better world
LinkedIn | Twitter | Facebook | Instagram

From: AHMED, Tahir (THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST) <tahir.ahmed2@nhs.net>
Sent: 01 March 2022 15:38
To: Cale, Nicholas <Nicholas.Cale@sse.com>
Subject: [EXTERNAL] RE: Proposed Heat Network - Uxbridge

WARNING: this email has originated from outside of the SSE Group. Please treat any links or attachments with caution.

Hi Nicolas

Thank you or your email, I have copied Richard Man, our specialist advisors to the new hospital at Hillingdon .

Perhaps you could please share your initial thoughts with Richard, as I am aware that quite a of lot of work has already been undertaken in relation to this agenda.

Regards
Tahir

Tahir Ahmed,
Executive Director of Estates and Facilities

The Hillingdon Hospitals NHS Foundation Trust
Estates and Facilities Department,
Kirby Way, Uxbridge,
Middlesex,
London,
UB8 3XX.

Hillingdon Hospital: 01895 238282. ext 3727
Mount Vernon: 01923826111. ext 3727
Mobile: 07852200003
mailto: tahir.ahmed2@nhs.net

Assistant & Senior Estates Administrator: Clare Rolfe Clare.rolfe@nhs.net

The Hillingdon Hospitals NHS Foundation Trust

Hillingdon Hospital	**Mount Vernon Hospital**
Pield Heath Road	Rickmansworth Road,
Uxbridge	Northwood
Middlesex	London
UB8 3NN	HA6 2RN

www.thh.nhs.uk

From: Cale, Nicholas <Nicholas.Cale@sse.com>
Sent: 24 February 2022 10:29
To: AHMED, Tahir (THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST) <tahir.ahmed2@nhs.net>
Subject: Proposed Heat Network - Uxbridge

Hi Tahir,

I hope you're well.

Your colleague Alex Debebe passed me your details. SSE Energy Solutions are currently working with a partner to explore the feasibility of developing a zero carbon Heat Network in the Uxbridge area.

A connection from the proposed heat network into the hospital would be a fantastic way to decarbonise the hospital estate, and would make a significant contribution to its net zero ambitions. Alongside providing the hospital with a continuous and secure, low cost source of heat.

Is this something that would be of interest? If so, it'd be great to have a quick call this week or next to discuss in a little more detail.

Best Regards

Nick Cale || Business Development Manager

Distributed Energy - Regeneration and Development
One Forbury Place
43 Forbury Road, Reading
RG1 3JH

M: +44 (0)7436 507 405

sseenergysolutions.co.uk

The information in this E-Mail is confidential and may be legally privileged. It may not represent the views of the SSE Group. It is intended solely for the addressees. Access to this E-Mail by anyone else is unauthorised. If you are not the intended recipient, any disclosure, copying, distribution or any action taken or omitted to be taken in reliance on it, is prohibited and may be unlawful. Any unauthorised recipient should advise the sender immediately of the error in transmission. Unless specifically stated otherwise, this email (or any attachments to it) is not an offer capable of acceptance or acceptance of an offer and it does not form part of a binding contractual agreement.
SSE Contracting Group Limited is part of the SSE Group. The Registered Office of SSE Contracting Group Limited is No.1 Forbury Place, 43 Forbury Road, Reading, Berkshire, RG1 3JH, Registered in England & Wales No. 02471438

Appendix G GSHP Preliminary Options Appraisal

LZT Feasibility Results - Non Domestic

Project Name	Hillingdon Hospital
Project Number	UK

Energy for generations

		Technology Matrix				
		GSHP / WSHP	Gas Boilers	GSHP / WSHP	VRF	Grid Electricity
		Heating		Cooling		Power
	Option					

	Option	Heating		Cooling		Power	Investment Costs		Annual Cost (Year 1)						Whole Life 50 yrs			
							Capital Cost	System Life Span	Run Costs	O&M Cost	Total Costs	Cost Savings	CO_2 Produced	CO_2 Savings	Cost	Saving	Carbon	Saving
							£'000	Years	£'000	£'000	£'000	%	tonnes	%	£'000	%	tonnes	%
0	**Base Case** Heating & Cooling via Gas boilers / VRF System	-	4,100kW	-	3,800kW	-	£3,280	15	£602.1	£32.8	£634.9	0%	3,311.1 t	0%	£94,221.0	0%	154,950.8 t	0%
		-	9,430,000MWh	-	4,750MWh	1,583MWh												
1	**Option 1 GSHP System** providing 4.1MW of Heating (50/45°C) & 3.8MW of Cooling (6/12°C) via 400 x 150m deep Boreholes at 6m centres, located under the main building and car parking areas, requiring an area of approx. 18,000m2	4,100kW	-	3,800kW	-	-	£6,970	25	£341.3	£65.6	£406.9	36%	724.7 t	78%	£59,547.8	37%	13,378.7 t	91%
		9,430MWh	-	4,750MWh	-	3,413.1MWh												
2	**Option 2 WSHP System** providing 4.1MW of Heating (50/45°C) & 3.8MW of Cooling (6/12°C via 9 pairs of water well abstraction and discharge wells @12l/s each (abstraction and recharge wells to have a min. separation of 80m.	4,100kW	-	3,800kW	-	-	£5,740	25	£323.5	£82.0	£405.5	36%	686.8 t	79%	£56,656.0	40%	12,680.0 t	92%
		9,430MWh	-	4,750MWh	-	3,234.8MWh												
1	**Option 3 GSHP System** providing 4.1MW of Heating (50/45°C) & 3.8MW of Cooling (6/12°C) via 285 x 150m deep Boreholes at 6m centres, located under the main building and car parking areas, requiring an area of approx. 12,000m2 and 880 single loop Energy Piles to a depth of 20m & min. pile diameter of 450mm providing a contribution of 1.2MW of heating and 800kW of Cooling.	4,100kW	-	3,800kW	-	-	£6,765	25	£341.3	£65.6	£406.9	36%	724.7 t	78%	£59,253.6	37%	13,378.7 t	91%
		9,430MWh	-	4,750MWh	-	3,413.1MWh												

General Exclusions

Typical main contractor attendances

CDM Responsibilities

Internal / External builders (spoil removal, trench excavation and reinstatement)

Works terminate at buffer vessels in the energy centre

Liaison with EA

Installation of Structural Piles

Technical Data		
GSHP Heating SPF	4.00	Design Point
GSHP Cooling SPF	4.50	Design Point
WSHP Heating SPF	4.20	Design Point
WSHP Cooling SPF	4.80	Design Point
VRF Efficiency	3.00	Design Point
Gas Boiler Efficiency	85%	CIBSE
Gas CO2 Intensity	0.183 kg CO2/kWh	DEFRA
Electricity Carbon Intensity	0.212 kg CO2/kWh	DEFRA
Electricity decarbonisation factor	5.0 % year on year	

Economic Data		
Energy Price Inflation	2.0% per annum	BEIS

Whole life costs (50 years)		
Gas System Replacement	100.0% of system replaced every 15 years	Assumed
GSHP System Replacement	30.0% of system replaced every 25 years	Assumed
System Replacement inflation	1.5%	Assumed

Customer Specific Data		
Gas Price	£ 0.0400 kWh	Assumed
Electricity Price	£ 0.10 kWh	Assumed

Appendix H Good Homes Alliance Early Stage Overheating Risk Tool

Notes and assumptions on the completion of the Good Homes Alliance Early Stage Overheating Risk Tool:

1. The Proposed Development scheme is located in the South East of England ***(Score 4)***.
2. The site is located in the London Borough of Hillingdon defined by the guidance as a Greater London location ***(Score 2)***.
3. It is expected that dwellings will have openable windows to provide natural purge ventilation, subject to acoustic and constraints which will be addressed at the RMA stage. The suitability scenarios for daytime and night-time indicate a range of acoustic conditions across the Masterplan Development facades, an average 'medium' risk is assumed ***(Score 8 (4 for daytime and 4 for night-time)).***
4. The Illustrative Masterplan includes provision of flats ***(Score 3)***.
5. Communal heating networks within the buildings are proposed for the Masterplan Development ***(Score 3)***.
6. The glazing ratio is assumed to be a maximum of 30% (across the external facades) and 25% as a ratio of internal window area to internal floor area of each dwelling. These will be optimised during detailed design to minimise overheating while allowing optimal levels of daylight ***(Score 0)***.
7. The Illustrative Masterplan will avoid the provision of some single aspect dwellings ***(Score 0)***.
8. There is extensive landscaping proposed as part of the scheme including street trees, play spaces and other soft landscaping ***(Score -1)***.
9. Details of the façade materials to be used across the Masterplan Development are to be confirmed and it is currently assumed that the majority of immediate surrounding surfaces will not be pale in colour ***(Score 0)***.
10. There is no significant shading from either mature trees or adjacent tall buildings assumed to be included within the Illustrative Masterplan ***(Score 0)***.
11. The use of a high exposed thermal mass strategy is not proposed for the Masterplan Development ***(Score 0)***.
12. The floor-to-ceiling heights for the Illustrative Masterplan are assumed to be less than 2.8 m ***(Score 0)***.
13. Since the design of balconies and other external shading will be confirmed with the detailed design of the building it is assumed that external shading may only be in part ***(Score 0)***.
14. The Masterplan Development will, at a minimum, meet the purge requirements of Part F of Building Regulations. ***(Score 0)***.

aecom.com