

Project name

**The Greenwood Centre Part L2 2013
Correct Lighting + Eff**

As designed

Date: Thu Mar 16 17:13:46 2017

Administrative information

Building Details

Address: Greenwood Place, London, NW5

Owner Details

Name: London Borough of Camden

Telephone number: Phone

Address: 38-50 Bidborough Street, London, WC1H 9DB

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.6

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.6

BRUKL compliance check version: v5.2.g.3

Certifier details

Name: Synergy Consulting Engineers

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

| | |
|--|---------------------|
| CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum | 32.5 |
| Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum | 32.5 |
| Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum | 32.4 |
| 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 the building services should achieve reasonable overall standards of energy efficiency

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

Building fabric

| Element | U _a -Limit | U _a -Calc | U _i -Calc | Surface where the maximum value occurs* |
|---|-----------------------|----------------------|----------------------|--|
| Wall** | 0.35 | 0.2 | 0.22 | RM000004:Surf[1] |
| Floor | 0.25 | 0.2 | 0.2 | 03000000:Surf[0] |
| Roof | 0.25 | 0.13 | 0.13 | 17000000:Surf[6] |
| Windows***, roof windows, and rooflights | 2.2 | 1.48 | 1.5 | 03000004:Surf[1] |
| Personnel doors | 2.2 | 1 | 1 | 0100000C:Surf[1] |
| 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 -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] | | | | |
| * 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 | 5 |

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

| | |
|---|-------|
| Whole building lighting automatic monitoring & targeting with alarms for out-of-range values | YES |
| Whole building electric power factor achieved by power factor correction | >0.95 |

1- Gas central heating radiators with Natural Ventilation

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|--------------------|--------------------|--------------------|---------------|---------------|
| This system | 0.97 | - | 0.47 | 0 | - |
| Standard value | 0.91* | N/A | N/A | N/A | N/A |
| Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system | | | | | YES |
| * Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82. | | | | | |

2- Gas central heating radiators with AC units

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|--------------------|--------------------|--------------------|---------------|---------------|
| This system | 0.97 | 4.08 | 0 | 0 | 0.67 |
| Standard value | 0.91* | 3.2 | N/A | N/A | 0.65 |
| Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system | | | | | YES |
| * Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82. | | | | | |

3- Gas central heating radiators with Mechanical Ventilation (Extract Only)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|--------------------|--------------------|--------------------|---------------|---------------|
| This system | 0.97 | - | 0.48 | 0 | - |
| Standard value | 0.91* | N/A | N/A | N/A | N/A |
| Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system | | | | | YES |
| * Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82. | | | | | |

4- Gas central heating radiators with Mechanical Ventilation (Supply & Extract)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|--------------------|--------------------|--------------------|---------------|---------------|
| This system | 0.97 | - | 0.5 | 0 | 0.89 |
| Standard value | 0.91* | N/A | N/A | N/A | 0.65 |
| Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system | | | | | YES |
| * Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82. | | | | | |

"No HWS in project, or hot water is provided by HVAC system"

Local mechanical ventilation, exhaust, and terminal units

| ID | System type in Non-domestic Building Services Compliance Guide |
|----|---|
| A | Local supply or extract ventilation units serving a single area |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|--|-------------------|-----|-----|-----|-----|-----|-----|-----|---|---------------|----------|
| | ID of system type | A | B | C | D | E | F | G | H | | |
| Standard value | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | Zone | Standard |
| 0.36 Dementia Office | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 0.27 Dementia Dining Room | - | - | 0.5 | - | - | - | - | - | - | - | N/A |
| 0.37 Dementia Meeting Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 0.17 PMLD Activity Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.19 PMLD Sensory Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.24 PMLD Accessible WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 0.23 PMLD Meeting Room/Quiet Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.20 PMLD Changing Places WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 0.22 Laundry | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.52 Bicycle Store | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 0.3 First Aid Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.53 Access Corridor | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.7 Cleaners Cupboard | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 0.10 Accessible WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 0.13 Female WC Provision | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 1.29 Accessible WC/Shower Provision | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 1.37 Mental Health Large Consulting Room | 0.9 | 0.5 | - | - | - | - | - | - | - | - | N/A |
| 1.23 Mental Health Accessible WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 1.22 Mental Health Activity Room 1 | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.7 Large Meeting Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.10 Accessible WC Provision | - | - | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.9 Accessible WC Provision | - | - | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.4 Meeting Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.3 Meeting Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.6 Server Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.5 Meeting Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.19 ASC Base Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 1.20 ASC Base Room | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 1.24 Mental Health Activity Room 2 | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 1.25 Mental Health Activity Room 3 | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 1.32 Mental Health Dining Room | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 2.8 Staff Shower/WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 2.6 Accessible WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 2.19 Sensory Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 2.13 New Shoots Space | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 2.14 New Shoots Changing Places WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 2.16 New Shoots Accessible WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| 2.11 Music Studio | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 2.12 Music Room | - | 0.9 | 0.5 | - | - | - | - | - | - | - | N/A |
| 2.1 IT Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 0.26 PMLD Dining | - | - | 0.5 | - | - | - | - | - | - | - | N/A |
| 0.16 PMLD Day Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |
| 1.13/1.21 ASC Entrance/ASC Day Room | - | - | - | 0.9 | - | - | - | - | - | - | N/A |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | | |
|---------------------------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|---------------|------|----------|
| | ID of system type | A | B | C | D | E | F | G | H | I | Zone | Standard |
| | Standard value | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | | |
| 1.14 ASC Unisex Changing Area | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 1.27 Standard WC Provision - Unisex | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 0.5 Office | - | - | - | 0.8 | - | - | - | - | - | - | - | N/A |
| 0.xx Dementia Acc WC Peninsular | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 0.29 Dementia Acc WC | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 0.28 Dementia Changing Places | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 0.30 Dementia Acc WC | - | - | 0.3 | - | - | - | - | - | - | - | - | N/A |
| 2.21 Demonstration Flat Accessible WC | - | - | 0.1 | - | - | - | - | - | - | - | - | N/A |
| 2.2 Waiting Area | - | - | - | 0.9 | - | - | - | - | - | - | - | N/A |

"LENI calculation for lighting energy provided in a separate submission."

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|--|--------------------------------|-----------------------|
| 0.35 Dementia Office | NO (-80.4%) | NO |
| 0.36 Dementia Office | NO (-68.3%) | NO |
| 0.27 Dementia Dining Room | NO (-30.4%) | NO |
| 0.37 Dementia Meeting Room | NO (-75.2%) | NO |
| 0.17 PMLD Activity Room | NO (-7.6%) | NO |
| 0.19 PMLD Sensory Room | N/A | N/A |
| 0.23 PMLD Meeting Room/Quiet Room | N/A | N/A |
| 0.3 First Aid Room | N/A | N/A |
| 1.31 Mental Health Day Room | NO (-44.4%) | NO |
| 1.37 Mental Health Large Consulting Room | NO (-58.5%) | NO |
| 1.22 Mental Health Activity Room 1 | NO (-45%) | NO |
| 1.7 Large Meeting Room | NO (-79.1%) | NO |
| 1.4 Meeting Room | NO (-80.3%) | NO |
| 1.3 Meeting Room | NO (-79%) | NO |
| 1.6 Server Room | NO (-79%) | NO |
| 1.5 Meeting Room | NO (-77.2%) | NO |
| 1.19 ASC Base Room | N/A | N/A |
| 1.20 ASC Base Room | NO (-51.9%) | NO |
| 1.24 Mental Health Activity Room 2 | NO (-15%) | NO |
| 1.25 Mental Health Activity Room 3 | N/A | N/A |
| 1.32 Mental Health Dining Room | NO (-8.1%) | NO |
| 2.9 Office | NO (-7.6%) | NO |
| 2.18 New Shoots Office | NO (-61.6%) | NO |
| 2.19 Sensory Room | N/A | N/A |
| 2.13 New Shoots Space | NO (-68.9%) | NO |
| 2.11 Music Studio | NO (-60.6%) | NO |
| 2.12 Music Room | NO (-40.1%) | NO |
| 1.2 Office | NO (-36.6%) | NO |
| 1.8 Waiting Area | YES (+1.4%) | NO |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|-------------------------------------|--------------------------------|-----------------------|
| 1.1 Office | NO (-15.9%) | NO |
| 2.1 IT Room | NO (-56.3%) | NO |
| 0.26 PMLD Dining | NO (-2.6%) | NO |
| 0.16 PMLD Day Room/dining with UFH | NO (-26.7%) | NO |
| 0.33 Dementia Day Room | NO (-47%) | NO |
| 0.16 PMLD Day Room | NO (-67.2%) | NO |
| 1.16 ASC Activity Room | NO (-22.8%) | NO |
| 1.13/1.21 ASC Entrance/ASC Day Room | YES (+21.4%) | NO |
| 1.28 Office | N/A | N/A |
| 1.30 Office | NO (-7.3%) | NO |
| 2.10 Art Room (Kiln) | NO (-44.2%) | NO |
| 2.10 Art Room | NO (-24.9%) | NO |
| 0.5 Office | N/A | N/A |
| 0.2 Mutil Purpose Hall | NO (-33.1%) | NO |
| 0.39 Dementia Lobby | N/A | N/A |
| 2.5 Demonstration Flat | NO (-74.6%) | NO |
| 2.2 Waiting Area | YES (+0.1%) | NO |
| 2.17 New Shoots Space | NO (-53.7%) | 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? | YES |
| Is evidence of such assessment available as a separate submission? | YES |
| Are any such measures included in the proposed design? | YES |

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

| | Actual | Notional |
|---|---------|----------|
| Area [m ²] | 3201.4 | 3201.4 |
| External area [m ²] | 5698.6 | 5698.6 |
| Weather | LON | LON |
| Infiltration [m ³ /hm ² @ 50Pa] | 5 | 3 |
| Average conductance [W/K] | 2212.53 | 2413.55 |
| Average U-value [W/m ² K] | 0.39 | 0.42 |
| Alpha value* [%] | 9.26 | 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
C2 Residential Inst.: Hospitals and Care Homes
C2 Residential Inst.: Residential schools
C2 Residential Inst.: Universities and colleges
C2A Secure Residential Inst.
Residential spaces

100 D1 Non-residential Inst.: Community/Day Centre
D1 Non-residential Inst.: Libraries, Museums, and Galleries
D1 Non-residential Inst.: Education
D1 Non-residential Inst.: Primary Health Care Building
D1 Non-residential Inst.: 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 | 30.45 | 26.65 |
| Cooling | 0.44 | 0.79 |
| Auxiliary | 3.23 | 2.86 |
| Lighting | 8.8 | 14.64 |
| Hot water | 90.41 | 81.05 |
| Equipment* | 30.3 | 30.3 |
| TOTAL** | 133.32 | 125.99 |

* Energy used by equipment does not count towards the total for calculating emissions.

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

Energy Production by Technology [kWh/m²]

| | Actual | Notional |
|-----------------------|--------|----------|
| Photovoltaic systems | 0 | 0 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |

Energy & CO₂ Emissions Summary

| | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m ²] | 108.13 | 93.47 |
| Primary energy* [kWh/m ²] | 184.75 | 186.13 |
| Total emissions [kg/m ²] | 32.4 | 32.5 |

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

HVAC Systems Performance

| System Type | Heat dem MJ/m ² | Cool dem MJ/m ² | Heat con kWh/m ² | Cool con kWh/m ² | Aux con kWh/m ² | Heat SSEFF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | |
| Actual | 89.3 | 56.5 | 27.6 | 2.6 | 4.5 | 0.9 | 5.99 | 0.97 | 8.02 |
| Notional | 72.7 | 63.5 | 23.4 | 4.7 | 4.2 | 0.86 | 3.79 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | |
| Actual | 125.8 | 0 | 38.9 | 0 | 1.4 | 0.9 | 0 | 0.97 | 0 |
| Notional | 102.7 | 0 | 33.1 | 0 | 1 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | |
| Actual | 24.3 | 0 | 7.5 | 0 | 5.7 | 0.9 | 0 | 0.97 | 0 |
| Notional | 24.1 | 0 | 7.8 | 0 | 4.9 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | |
| Actual | 122.6 | 0 | 37.9 | 0 | 3.1 | 0.9 | 0 | 0.97 | 0 |
| Notional | 109.9 | 0 | 35.4 | 0 | 4.5 | 0.86 | 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/m ²] | = Heating energy demand |
| Cool dem [MJ/m ²] | = Cooling energy demand |
| Heat con [kWh/m ²] | = Heating energy consumption |
| Cool con [kWh/m ²] | = Cooling energy consumption |
| Aux con [kWh/m ²] | = 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 BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

| Element | U _{i-Typ} | U _{i-Min} | Surface where the minimum value occurs* |
|---|--------------------|---|--|
| Wall | 0.23 | 0.19 | 01000004:Surf[0] |
| Floor | 0.2 | 0.2 | 03000000:Surf[0] |
| Roof | 0.15 | 0.13 | 02000001:Surf[1] |
| Windows, roof windows, and rooflights | 1.5 | 1.18 | 04000005:Surf[11] |
| Personnel doors | 1.5 | 1 | 0100000C:Surf[1] |
| 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-Typ} = Typical individual element U-values [W/(m ² K)] | | U _{i-Min} = Minimum individual element U-values [W/(m ² K)] | |
| * There might be more than one surface where the minimum U-value occurs. | | | |

| Air Permeability | Typical value | This building |
|--|---------------|---------------|
| m ³ /(h.m ²) at 50 Pa | 5 | 5 |