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Development Management
London Borough of Richmond upon Thames
Civic Centre
44 York Street
Twickenham
TW1 3BZ

12th July 2019

Ref. DC//19/1822/VRC/VRC
BY EMAIL

Dear Sir/Madam,

REFERENCE: 19/1822/VRC

LOCATION: RYDE HOUSE 391 RICHMOND ROAD TWICKENHAM TW1 2EF

Introduction

I write regarding the above application (variation of condition U30593 (Approved Drawings Number) attached to planning approval 16/2777/FUL) and the letter from your development management team dated 14th June 2019, stating that the application was incomplete, due to the following outstanding items:

1. Confirmation of agreement to amended description of proposal
2. Confirmation that amendments will not impact on sustainability/energy as approved.
3. Clarification of existing proposed area of green roof.

This letter is hereby submitted as evidence to address points 2 and 3 on the above list, confirming that the proposed changes will not have any impact on the approved sustainability/energy strategy, and that the consented green roof will be retained.

Full details of the impact of the amendments are discussed below.

Sustainability/Energy

The submitted and approved Sustainability & Energy statement, produced by JS Lewis Ltd in July 2016, contains a description of the measures intended to ensure the development is designed, constructed and operated in a sustainable manner, meeting the energy/sustainability requirements of both the Mayor of London and the London Borough of Richmond upon Thames.

The report detailed how the proposed scheme was to achieve the following key sustainability/energy features:

- A BREEAM rating of 'Excellent' for both the retail store and school;
- A Part L emissions reduction in excess of the London Plan 35% target for both the retail store and school; and
- A 5kWp solar photovoltaic array for the school.

The Appendix to this letter contains details of the new roof plans and BRUKL assessments completed for the scheme, which show that the principles outlined in the approved sustainability/energy strategy have been retained following the proposed, minor amendments.

In particular, the following details are highlighted:

- BRUKL documents for both the retail store and the school show that, following the amendments, the scheme achieves Part L pass margins of 36.6% and 37.8% respectively. This exceeds the 35% reduction target set by the London Borough of Richmond upon Thames and the Mayor of London.

- The rooftop PV array has increased in size from 5 kWp (circa. 20 panels) to 51.25 kWp (205 panels) in order to meet the level of CO_2 emissions reduction specified above.

Following on from this, the applicant still intends to pursue BREEAM certification, with a goal of meeting the 'Excellent' standard.

Green Roof

The approved scheme included an area of green roof of 190m^2 over the ground floor cycle/bin storage, the ground floor retail store and the first floor hall store. Due to reasons of improved access for maintenance purposes, the green roof area has been consolidated and relocated to the school roof. The consented area of 190m^2 is reduced by 3m^2 to 187m^2 in the amended proposals. However, as this is less than 2% of the original, consented area, the impact of the reduction will be negligible.

Summary

In response to the comments received regarding the impact of the proposed amendments on the sustainability/energy strategy and the green roof area, this letter and associated Appendices and enclosures illustrates that whilst the scheme has undergone amendments affecting both the proposed energy strategy and the green roof layout, the original intent of the approved July 2016 Sustainability & Energy Statement is retained, meaning that the amended scheme remains in compliance with relevant London Borough of Richmond upon Thames and Mayor of London policies.

Yours sincerely,

Dan Jestico

Director, Sustainable Development

cc. Zayid Randeree, Kier Construction Ltd

encl.

- School BRUKL

- Retail BRUKL
- Consented roof plan (4862-BRA-00-03-DR-A-010005)
- Amended roof plan (4862-BRA-00-03-DR-A-0103-11)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Richmond Road School with increased PV

As designed

Date: Thu Jan 17 19:12:32 2019

Administrative information

Building Details

Address: Richmond Road, Twichenham, TW

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: HDSgreentech LCEA 41943

Telephone number: 07738946988

Address: The Old Dairy, 8, Blackfield Road, Fawley, SO45 1ED

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	12.7
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	12.7
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	7.9
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 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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	00000005:Surf[3]
Floor	0.25	0.22	0.22	00000007:Surf[0]
Roof	0.25	0.18	0.18	00000001:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.47	1.5	00000007:Surf[1]
Personnel doors	2.2	0.38	1.75	FF000004:Surf[2]
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	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	0.9 to 0.95

1- _01 Gas LTHW and NV

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	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- _04 Gas LTHW and MVHR single room

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	0	0.8
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.

3- _03 Gas LTHW and MVe

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	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- _02 Gas LTHW and NVHR

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	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.

5- _05 Gas LTHW and MVHR multi room

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	0	0.8
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.

6- _06 Gas LTHW and MV Kitchen

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.97	-	0	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.

"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	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
001 MAIN OFFICE	-	1.1	-	-	-	-	-	-	-	-	N/A
108 HEADS OFFICE	-	1.1	0.4	-	-	-	-	-	-	-	N/A
109 OFFICE	-	1.1	0.4	-	-	-	-	-	-	-	N/A
111 INTERVIEW ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
113 REPROGRAPHICS	-	1.1	0.4	-	-	-	-	-	-	-	N/A
115 KITCHEN	-	-	-	1	-	-	-	-	-	-	N/A
129 GROUP ROOM	-	1.1	-	-	-	-	-	-	-	-	N/A
208 SEN OFFICE	-	1.1	0.4	-	-	-	-	-	-	-	N/A
209 MI ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
211 STAFF WORK ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
212 HYGIENE ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
220 GROUP ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
222 GROUP ROOM	-	1.1	0.4	-	-	-	-	-	-	-	N/A
228 GROUP ROOM	-	1.1	-	-	-	-	-	-	-	-	N/A
114 MAIN HALL	-	1.1	0.4	-	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
00. RECEPTION	-	110	15	65
001 MAIN OFFICE	110	-	-	123
001 MAIN OFFICE CIRCULATION	-	110	-	12
002 CIRCULATION	-	110	-	203
005 BIN STORE	110	-	-	59
007 STAIRCASE 03 LOWER	-	110	-	70
007 STAIRCASE 03 UPPER	-	110	-	61
008 STAIRCASE 01	-	110	-	77
101 LRC	110	-	-	332
101A STORE 1	110	-	-	15
102 CLASSROOM 1 YR 3 KS2	110	-	-	311

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
102A STORE 2	110	-	-	14
103 CLASSROOM 2 YR 3 KS2	110	-	-	316
103A STORE 3	110	-	-	14
104 CLASSROOM 3 YR 2 KS2	110	-	-	315
104A STORE 4	110	-	-	14
105 STAFF ROOM	110	-	-	324
105A STORE 5	110	-	-	14
106 ATRIUM	-	110	-	128
106A CIRCULATION	-	110	-	79
106A CIRCULATION	-	110	-	115
107 SICK BAY	110	-	-	72
108 HEADS OFFICE	110	-	-	130
109 OFFICE	110	-	-	107
110 ADMIN CORRIDOR	-	110	-	56
111 INTERVIEW ROOM	110	-	-	103
113 REPROGRAPHICS	110	-	-	53
114 MAIN HALL STORE 1	110	-	-	65
114 MAIN HALL STORE 2	110	-	-	62
115 KITCHEN	-	110	-	506
116 CLASSROOM 6 YR 2 KS2	110	-	-	325
116A STORE 10	110	-	-	16
117 CLASSROOM 5 YR 1 KS1	110	-	-	315
117A STORE 9	110	-	-	12
118 CLASSRFOOM 4 YR 1 KS1	110	-	-	315
118A STORE 8	110	-	-	13
119 RECEPTION CLASSROOM	110	-	-	325
119A STORE 7	110	-	-	11
120 RECEPTION CLASSROOM	110	-	-	333
120A STORE 6	110	-	-	8
121 RECEPTION WC A	-	110	-	29
121 RECEPTION WC B	-	110	-	36
122 DIS. WC	-	110	-	30
123 RECEPTION WC A	-	110	-	29
123 RECEPTION WC B	-	110	-	35
125 GIRLS WC	-	110	-	60
126 BOY'S WC	-	110	-	59
128 STAFF WC	-	110	-	30
129 GROUP ROOM	110	-	-	104
130 BREAKOUT SPACE	-	110	-	299
130A CL STORE	110	-	-	21
130B STORE 11	110	-	-	9
130C BUGGY STORE	110	-	-	23
130C BUGGY STORE CIRCULATION	-	110	-	13

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
130D DIS WC	-	110	-	20
130E LOBBY	-	110	-	16
131 STAIRCASE 01	-	110	-	66
132 CENTRAL STOCK	110	-	-	26
133 STAIRCASE 03	-	110	-	77
201 Multipurpose	110	-	-	332
201A STORE 11	110	-	-	15
202 CLASSROOM 7 YR 6 KS2	110	-	-	311
202A STORE 12	110	-	-	14
203 CLASSROOM 8 YR 6 KS2	110	-	-	316
203A STORE 13	110	-	-	14
204 CLASSROOM 9 YR 5 KS2	110	-	-	315
204A STORE 14	110	-	-	14
205 CLASSROOM 10YR 5 KS2	110	-	-	324
205A STORE 15	110	-	-	14
206A CIRCULATION	-	110	-	48
207 SERVER	110	-	-	36
208 SEN OFFICE	110	-	-	130
209 MI ROOM	-	110	-	54
210 ADMIN CORRIDOR	-	110	-	57
211 STAFF WORK ROOM	110	-	-	99
212 HYGIENE ROOM	-	110	-	51
214 PLANT ROOM	110	-	-	197
215 STUDIO	110	-	-	325
215A STORE 18	110	-	-	16
217 CLASSRFOOM 12 YR 4 KS2	110	-	-	315
217A STORE 17	110	-	-	13
218 CLASSROOM 11 YR 4 KS2	110	-	-	317
218A STORE 16	110	-	-	11
220 GROUP ROOM	110	-	-	97
221 DIS. WC	-	110	-	35
221A STAFF WC	-	110	-	35
222 GROUP ROOM	110	-	-	88
224 GIRLS WC	-	110	-	60
225 BOY'S WC	-	110	-	59
226 STORE	110	-	-	21
226A STORE	110	-	-	9
227 CENTRAL STOCK	110	-	-	26
228 GROUP ROOM	110	-	-	104
230 STAIRCASE 01	-	110	-	47
2ND FLOOR STAIRCASE 03	-	110	-	59
B6 STAIRCASE 01	-	110	-	60
CYCLE STORE 004	110	-	-	88

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
CIRCULATION SF	-	110	-	312
206 LOBBY	-	110	-	136
114 MAIN HALL	-	110	-	1166

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?
00. RECEPTION	NO (-9%)	NO
001 MAIN OFFICE	NO (-82.9%)	NO
101 LRC	NO (-72.4%)	NO
102 CLASSROOM 1 YR 3 KS2	NO (-51.8%)	NO
103 CLASSROOM 2 YR 3 KS2	NO (-54.7%)	NO
104 CLASSROOM 3 YR 2 KS2	NO (-52.3%)	NO
105 STAFF ROOM	NO (-58.6%)	NO
107 SICK BAY	N/A	N/A
108 HEADS OFFICE	NO (-73.4%)	NO
109 OFFICE	NO (-63.6%)	NO
111 INTERVIEW ROOM	NO (-63.9%)	NO
116 CLASSROOM 6 YR 2 KS2	NO (-74.1%)	NO
117 CLASSROOM 5 YR 1 KS1	NO (-53.5%)	NO
118 CLASSRFOOM 4 YR 1 KS1	NO (-52.8%)	NO
119 RECEPTION CLASSROOM	NO (-54.1%)	NO
120 RECEPTION CLASSROOM	NO (-80.1%)	NO
129 GROUP ROOM	N/A	N/A
201 Multipurpose	NO (-78.4%)	NO
202 CLASSROOM 7 YR 6 KS2	NO (-51.7%)	NO
203 CLASSROOM 8 YR 6 KS2	NO (-54.7%)	NO
204 CLASSROOM 9 YR 5 KS2	NO (-52.3%)	NO
205 CLASSROOM 10YR 5 KS2	NO (-58.6%)	NO
208 SEN OFFICE	NO (-73.1%)	NO
211 STAFF WORK ROOM	N/A	N/A
215 STUDIO	NO (-73.9%)	NO
217 CLASSRFOOM 12 YR 4 KS2	NO (-78.9%)	NO
218 CLASSROOM 11 YR 4 KS2	NO (-61.7%)	NO
220 GROUP ROOM	NO (-92.4%)	NO
222 GROUP ROOM	NO (-91.7%)	NO
228 GROUP ROOM	N/A	N/A
114 MAIN HALL	NO (-67.2%)	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]	2678.5	2678.5
External area [m^2]	4585.3	4585.3
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	1772.5	2099.19
Average U-value [W/m^2K]	0.39	0.46
Alpha value* [%]	10.02	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
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
100	**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/m^2]

	Actual	Notional
Heating	22.67	24.89
Cooling	0	0
Auxiliary	1.99	1.6
Lighting	7.77	10.11
Hot water	9.87	6.33
Equipment*	22.1	22.1
TOTAL**	**42.3**	**42.93**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	7.95	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]	74.34	77.25
Primary energy* [kWh/m^2]	69.36	73.15
Total emissions [kg/m^2]	7.9	12.7

* 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] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	78.6	0	24	0	1	0.91	0	0.97	0
	Notional	81.1	0	26.1	0	1	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	86.4	0	26.3	0	0.7	0.91	0	0.97	0
	Notional	86	0	27.7	0	1.4	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	56.4	0	17.2	0	1.9	0.91	0	0.97	0
	Notional	64.9	0	20.9	0	2.2	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	71.2	0	21.7	0	3.8	0.91	0	0.97	0
	Notional	110.2	0	35.5	0	2.5	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	41.3	0	12.6	0	4.3	0.91	0	0.97	0
	Notional	51.3	0	16.5	0	3	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	10.1	0	3.1	0	6.9	0.91	0	0.97	0
	Notional	5.1	0	1.6	0	4.1	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/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 BCO can give particular attention to items with specifications that 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	0.25	00000005:Surf[3]
Floor	0.2	0.22	00000007:Surf[0]
Roof	0.15	0.18	1000000E:Surf[10]
Windows, roof windows, and rooflights	1.5	1.2	CR000001:Surf[9]
Personnel doors	1.5	0.25	00000006:Surf[11]
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
$m^3/(h.m^2)$ at 50 Pa	5	5

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Richmond Road - Lidl Store with PV

As designed

Date: Thu Jan 17 21:02:21 2019

Administrative information

Building Details

Address: Lidl Store, Twickenham, TW

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: HDSgreentech - LCEA 41943

Telephone number: 07738 946988

Address: The Old Dairy, 8, Blackfield Road, Fawley, SO45 1ED

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	36.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	36.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	23.5
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	B2000000:Surf[2]
Floor	0.25	0.22	0.22	B2000000:Surf[0]
Roof	0.25	0.18	0.18	B2000000:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.5	1.5	GL000000:Surf[2]
Personnel doors	2.2	2.19	2.19	GL000000:Surf[0]
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	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	0.9 to 0.95

1- _09 NV AC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.5	4	0	0	-
Standard value	2.5*	3.2	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 all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

2- _11 MVHR AC

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.5	4	0	0	0.8
Standard value	2.5*	3.2	N/A	N/A	0.45
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

3- _07 NV Elec

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- _08 NV Elec overdoor

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- _21 Point of use DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	0.008
Standard value	1	N/A

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	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
B3 WELFARE common	-	1.1	0.5	-	-	-	-	-	-	-	N/A
B3 WELFARE changing	-	1.1	0.5	-	-	-	-	-	-	-	N/A
B3 WELFARE CLEANERS	-	1.1	0.5	-	-	-	-	-	-	-	N/A
B3 WELFARE DISALBLED WC	-	1.1	0.5	-	-	-	-	-	-	-	N/A
B3 WELFARE changing	-	1.1	0.5	-	-	-	-	-	-	-	N/A
B3 WELFARE WC	-	1.1	0.5	-	-	-	-	-	-	-	N/A
G3 MANAGERS OFFICE	-	1.1	0.5	-	-	-	-	-	-	-	N/A
G4 BAKERY	-	1.1	0.5	-	-	-	-	-	-	-	N/A
G7 DISABLED WC	-	1.1	0.5	-	-	-	-	-	-	-	N/A
G1 SALES AREA	-	1.1	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
B2 WAREHOUSE	100	-	22	1188
B3 WELFARE common	100	-	-	202
B3 WELFARE changing	-	100	-	43
B3 WELFARE CIRCULATION	-	100	-	46
B3 WELFARE CLEANERS	100	-	-	17
B3 WELFARE DISALBLED WC	-	100	-	40
B3 WELFARE changing	-	100	-	45
B3 WELFARE WC	-	100	-	24
B4 LOBBY	-	100	-	384
B5 CIRCULATION	-	100	-	103
B7 STAIRCASE 02	-	100	-	68
G LOBBY	-	100	-	300
G10 UTILITIES	-	100	22	218
G2 WAREHOUSE 01	100	-	22	1368
G3 CIRCULATION TO MANAGERS OFFICE	-	100	-	18
G3 MANAGERS OFFICE	100	-	-	165
G4 BAKERY	-	100	22	549
G7 DISABLED WC	-	100	-	59
G8 STAIRCASE 02	-	100	-	80
G1 SALES AREA	-	100	22	9273

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?
B2 WAREHOUSE	N/A	N/A
B3 WELFARE common	N/A	N/A
B3 WELFARE changing	N/A	N/A
B3 WELFARE CLEANERS	N/A	N/A
B3 WELFARE DISALBLED WC	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B3 WELFARE changing	N/A	N/A
B3 WELFARE WC	N/A	N/A
G10 UTILITIES	NO (-80.3%)	NO
G2 WAREHOUSE 01	N/A	N/A
G3 MANAGERS OFFICE	N/A	N/A
G4 BAKERY	NO (-99.9%)	NO
G7 DISABLED WC	N/A	N/A
G1 SALES AREA	NO (-99%)	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?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	1783.3	1783.3
External area [m^2]	4447.6	4447.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	1125.87	1394.23
Average U-value [W/m^2K]	0.25	0.31
Alpha value* [%]	10.12	10

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

Building Use

% Area	Building Type
86	**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
14	**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
	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/m^2]

	Actual	Notional
Heating	14.6	17.4
Cooling	3.2	6.16
Auxiliary	4.24	2.85
Lighting	39.29	50.67
Hot water	1.45	1.54
Equipment*	18.47	18.47
TOTAL**	**62.77**	**78.63**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	16.92	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]	123.51	159.33
Primary energy* [kWh/m^2]	197.32	216.54
Total emissions [kg/m^2]	23.5	36.9

* 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] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	220.5	0	72.7	0	0	0.84	0	1	0
	Notional	124.8	61	13.6	4.5	0	2.56	3.79	----	----
[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	191.1	0	63	0	0	0.84	0	1	0
	Notional	295.1	0	95.1	0	0	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	29.5	66.3	1.9	4.1	6.4	4.41	4.48	4.5	6
	Notional	205.4	0	66.2	0	0	0.86	0	----	----
[ST] Single room cooling system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	102.6	55.5	6.5	3.4	0	4.41	4.48	4.5	6
	Notional	21.6	114.4	2.3	8.4	4.3	2.56	3.79	----	----
[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 BCO can give particular attention to items with specifications that are better than typically expected.

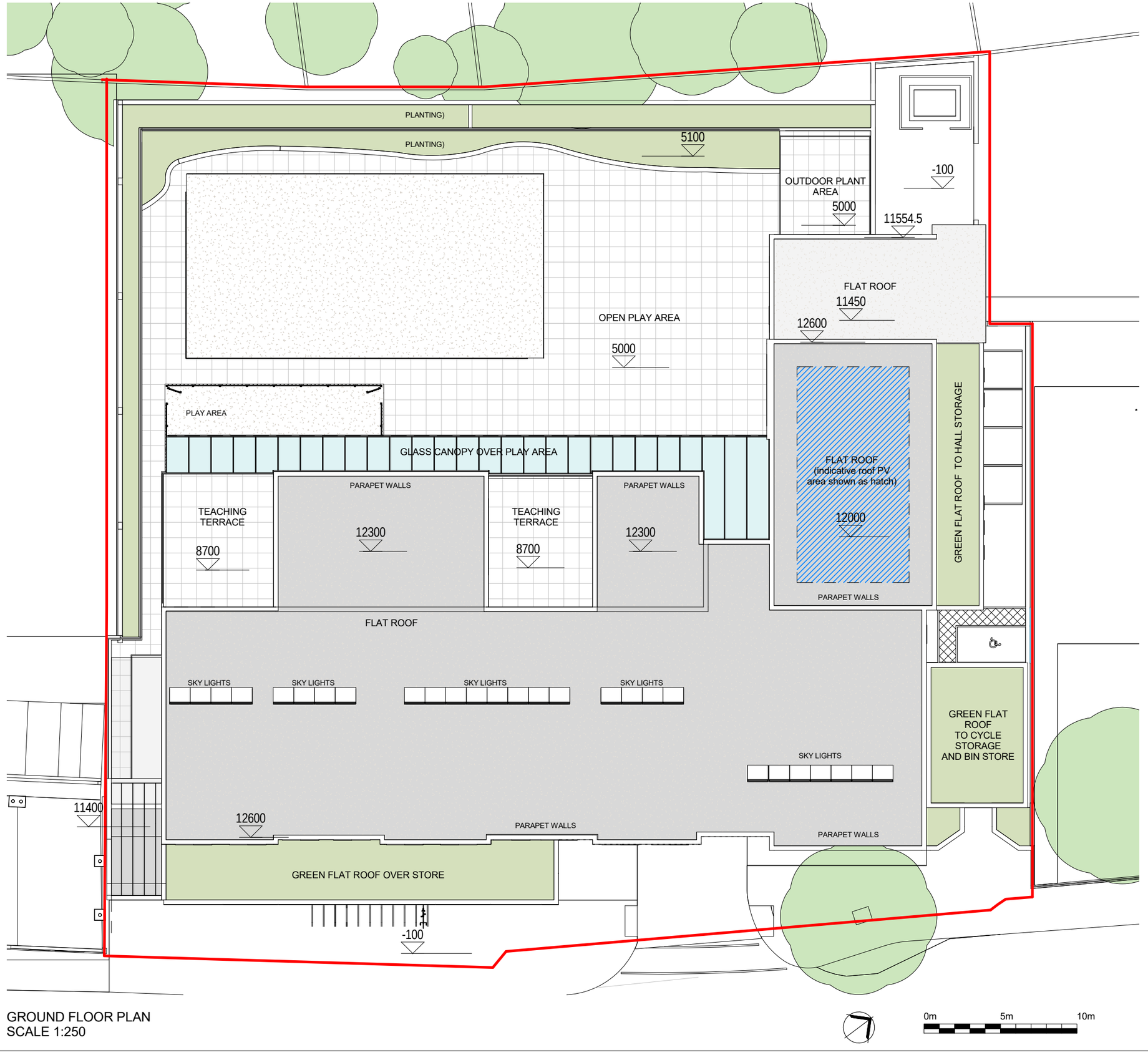
Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	B2000000:Surf[2]
Floor	0.2	0.22	B2000000:Surf[0]
Roof	0.15	0.18	B2000000:Surf[1]
Windows, roof windows, and rooflights	1.5	1.5	GL000000:Surf[2]
Personnel doors	1.5	2.19	GL000000:Surf[0]
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
$m^3/(h.m^2)$ at 50 Pa	5	5



GROUND FLOOR PLAN
SCALE 1:250

Client's Logo :

REV	DATE	DESCRIPTION	BY
4	16.10.17	Minor note amendments	JC
3	16.09.26	Minor amendments to package	JC
2	16.09.23	Amdendments following comments	JC
1	16.09.13	Amendments following Planning advice	JC

SUITABILITY NUMBER KEY:

WIP
- 50 - Work in Progress*

SHARED
- S1 - Fit for co-ordination**
- S2 - Fit for information
- S3 - Fit for internal review and comment
- S4 - Fit for construction approval

DOCUMENTATION
- D1 - Fit for costing
- D2 - Fit for tender
- D3 - Fit for contractor design
- D4 - Fit for manufacture/ procurement

DOCUMENTATION - SIGN-OFF
- A - Fit for construction
- B - Fit for construction, with comments
- C - Comprehensive revisions needed

ARCHIVE
- AB - As Built
- FC - Final Construction

* For internal pre-issue usage only.
** For model file usage only.

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Registered office. As above Reg No. 295 1683 (England & Wales)

PROJECT TITLE :
Proposed LIDL store on Richmond Road Twickenham

DRAWING TITLE :
Roof Plan

DRAWN BY :	ADT	SCALE :	1 : 250 @ A3
JOB NO :	4862	DATE :	11/17/15

SUITABILITY :	S2	REVISION:	4

PROJECT	ORIGIN.	VOLUME	LEVEL	TYPE	DISCIP.	NUMBER
4862	BRA	00	03	DR	A	010005

Client's Logo :

Contractor's Logo:

0m 5m 10m

PLANTING)

OPEN PLAY AREA

PLAY AREA

GLASS CANOPY OVER PLAY AREA

PARAPET WALLS

TEACHING TERRACE

TEACHING TERRACE

PARAPET WALLS

PARAPET WALLS

Guardrail

1P

1P

1P

PARAPET WALLS

FLAT ROOF TO CYCLE STORAGE AND BIN STORE

GREEN FLAT ROOF OVER ROOF HEIGHT

PARAPET WALLS

PARAPET WALLS

FLAT ROOF OVER STORE

C

REV	DATE	DESCRIPTION	BY
11	11.07.19	Updated PV array	LM
10	05.06.19	Plantroom roof reinstated, layout amended	ARD
9	05.03.19	Roof redesigned; Green roof and PVs alocation updated	LM
8	21.12.18	Updated for construction with latest package information	JC
7	03.10.18	GA plan general update	TN

SUITABILITY NUMBER KEY:

WIP
- S0 - Work in Progress*

SHARED
- S1 - Fit for co-ordination**
- S2 - Fit for information
- S3 - Fit for internal review and comment
- S4 - Fit for construction approval

DOCUMENTATION
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- D2 - Fit for tender
- D3 - Fit for contractor design
- D4 - Fit for manufacture/ procurement

DOCUMENTATION - SIGN-OFF
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- B - Fit for construction, with comments
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PROJECT TITLE :
Proposed LIDL store on Richmond Road Twickenham

DRAWING TITLE :
GA Roof Plan

DRAWN BY : ADT | SCALE : As indicated @ A1

JOB NO : 4862 | DATE : 11/17/15

SUITABILITY : S3 | REVISION: 11

PROJECT	ORIGIN.	VOLUME	LEVEL	TYPE	DISCIP.	NUMBER
4862	BRA	00	03	DR	A	0103