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Chartered Consulting Engineers

PROPOSED REFURBISHMENT
AT
HOLMES ROAD DEPOT, CAMDEN

ENERGY STRATEGY REPORT

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CONTENTS Page

2.0 INTRODUCTION

Brinson Staniland Partnership have been commissioned to carry out an energy strategy assessment for the proposed refurbishment at Holmes Road Depot, 78 Holmes Road, London, NW5 3AP.

The existing depot building is a multifunctional space generally consisting of workshops, stores and office accommodation and has undergone various refurbishment works during the buildings life. Holmes Road Depot is a 1960's mixed-use building consisting of commercial / industrial and residential units. The depot comprises of a concrete framed structure with non-loadbearing cavity wall brickwork infills. The windows mainly consist of metal single glazed windows to the 1st and 2nd storey of the block, with upgraded uPVC windows to the ground floor level. The roofs generally consist of a concrete deck with a built-up felt roofing.

In addition there are 21 flats at 76 Holmes Road, which are served from the Depot's centralised heating system. There are also 4 residential units located on the second floor above the Parking CCTV offices which are provided with independent heating systems.

All 25 units have independent electrical supplies and are not connected to, or served from the depot.

The proposed works at the works depot comprise the complete renewal of the LTHW heating system, DHW system and the above ground soil and waste systems, and the installation of new VRF systems. Electrical works comprise the complete renewal of the incoming supply arrangements, sub-main distribution, small power, lighting, fire alarm, communications systems and security systems.

This energy strategy identifies how the proposed development is to comply with Approved Document L2 of the Building Regulations. The analysis of the building comprises an assessment of the base line building Target Emissions Rate (TER) in terms of space heating, domestic hot water, fans and pumps, and lighting. Values are measured in regulated CO_2 emissions per square metre of floor area, for compliance with Approved Document L2. These are converted to tonnes CO_2 per annum for the requirements of the London Plan.

The calculated Building Emission Rate (BER) needs to be lower than the TER to comply with Building Regulations. The strategy to achieve compliance is to improve the building fabric as far as is practicable, propose efficient electrical and mechanical building systems to reduce fuel demand, and then to supply the remaining requirements via low/zero carbon technologies. Different technologies are reviewed against their suitability for the project, and the preferred options are used to calculate the BER value.

The recommendations and conclusions given herein are based on standards, codes of practice current at the time of writing. The assessment is based on a computer simulation model undertaken using IES-VE software (version 2015.2.2.0). This software is accredited under CIBSE AM11. The thermal model is constructed in accordance with the SBEM conventions (Issue 5) for commercial EPCs by an accredited Low Carbon Energy Assessor. Where no information has been provided or is available, an assumption has been made based on the information provided or the default values from SBEM have been used.

The author of the report is Peter Edwards, a low carbon consultant accredited by CIBSE certification (LCEA50860) for LCEA levels three to five inclusive and he is also a BREEAM Accredited Professional.

3.0 POLICIES AND GUIDANCE

The government is strongly committed to meeting the 2020 EU targets to generate fifteen percent of the UK's energy supplies from a renewable energy mix across all sectors (electricity, heat and transport). This energy mix includes large scale wind generation and energy from tidal, hydro, solar, heat pump and biomass installations. It also requires a significant contribution from small scale on-site low carbon and renewable technologies at community and household level.

Providing heating and power to buildings produces more than a quarter of the UK's CO_2 emissions. The Department of Energy & Climate Change are working to help create a low carbon country with energy supplies which are affordable, secure and sustainable. This is being achieved by a range of grants which are available for both domestic and commercial users.

The key local policy and planning guidance directly concerning the proposed development are:

- London Borough of Camden Planning department guidance;
- The London Plan (2015).

3.1 London Borough of Camden Planning Department Guidance

The London Borough of Camden planning department has published a number of guidance documents and Camden Planning Guidance 3 highlights the requirements for MAJOR refurbishments to existing buildings. This document indicates that Building Research Establishment Energy Assessment Model (BREEAM) Non-Domestic Refurbishment 'Excellent' rating applies to this project. The guidance also requires that the hierarchy of energy efficient as set out in the London Plan is followed with a 35% reduction in regulated CO_2 emissions below the maximum threshold allowed under Approved Document L2B where a deep refurbishment is proposed. Alternatively it is possible to achieve the fullest contribution to CO_2 reduction achieved in a feasible manner.

The council's Carbon Management Plan indicates the following carbon reduction targets are required to be met borough wide;

- 27% by March 2017;
- 40% by March 2020.

These values are based on a 2009 Datum and are an aggregate of the council's current property portfolio.

CS13 requires ALL developments to achieve a 20% reduction in CO_2 emissions through renewable technologies wherever feasible

3.2 The London Plan

Section 5 of the London Plan sets out a range of policies to tackle climate change. These carbon reduction standards apply only to Major Development, which is defined in The Town and Country Planning (Development Management Procedure) (England) Order 2015 as including:

- Provision of 10 or more flats or houses, or
- Provision of over 1,000 square metres of floor space.

The proposed refurbishment works are approximately 5,000m² (800 m² unaltered and 4,200m² total refurbished), which exceeds the 1000m² area threshold defining the requirements for a major development. Hence, the London Plan policies are relevant to this refurbishment / modernisation project and should be either comparable to a new building OR achieve the fullest contribution to CO_2 reduction.

3.3 Building Regulations

The local building control officer has specifically confirmed the following;

- The proposals will constitute works under part L2B of the Building Regulations.
- The area considered to apply in terms of L2B will only relate to the newly created ground floor office accommodation within the entire building envelope. This area equates to 735m² and hence is less than 1000m².
- The areas of storage and workshops would not be considered in terms of part L as the square metre area generally remains the same although in a different location.
- Any consequential improvements would have to have a value of 10% of the contract value of these office areas and with a simple 15 year payback. It is anticipated that the cost of the works required to upgrade the windows and the walls and the new heating installation will cover this cost.

Consequential improvements are defined as additional works from the principal works that are required to make the whole building comply with Part L of the Building Regulations. These improvements should be technically, functionally and economically feasible. In most circumstances this means that the simple payback period is less than 15 years.

3.4 Summary of Guidance

There has been little energy saving measures in place since 2009 (the datum date) and this is an opportunity to take a significant step forward in reducing the buildings energy consumption. Therefore, the requirements therefore are that the energy statement should be submitted demonstrating that the resultant building provides fullest contribution to CO_2 reduction in line with the councils aspirations for a 40% reduction of Carbon by 2020. This project will be assessed against the current building energy demand to determine the energy reduction.

The works should meet the requirements of Approved Document L2B with a 35% improvement as per the London Plan.

Combined heat and power should be considered, along with provision for (or connection to) a district heating network installation.

There are no mandatory type of LZC technologies to be incorporated by the project and technologies used will be determined by the contextual requirements of the building and consideration of the most appropriate technology for the site. However, there is a requirement for a 20% contribution by LZC technologies.

4.0 BASELINE ENERGY CONSUMPTION

The thermal model of Holmes Road Depot was constructed using IES dynamic simulation software to evaluate the existing energy consumption of the building and to offer proposed strategies to reduce the overall energy demand.

The software used is accredited under CIBSE AM11. The thermal model has been constructed in accordance with the SBEM conventions (Issue 5) for commercial EPCs by an accredited Low Carbon Energy Assessor.

Where no information has been provided or available, an assumption has been made based on the information that has been provided or the default values from SBEM have been used.

All other values have been based on the standard NCM v5.2 values as defined for the SBEM calculation. Ventilation rates have been based upon the SBEM standard conventions issued by CIBSE. It is also assumed that the building has been submitted against B1/2 planning classification.

It is understood that the building was originally constructed circa 1970 and currently has no Low or Zero Carbon (LZC) technologies installed. All electrical and mechanical systems within areas subject to the proposed refurbishment are to be installed to meet the requirements of Non-Domestic Building Services Compliance Guide.

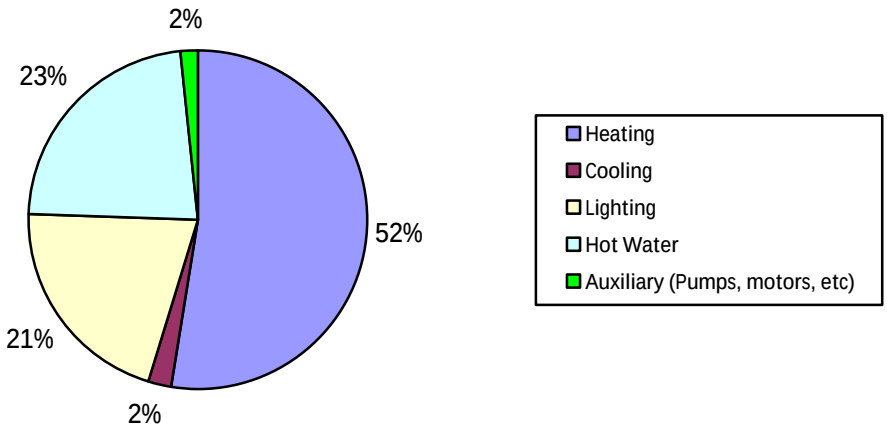
The baseline building energy model has been calculated on the following existing values and the proposed architectural layouts, but excludes the vehicle sheds and the space currently occupied by Veolia:

Roof (U – Value)		1.34 w/m^{2}k
Wall (U – Value)		1.51 w/m^{2}k
Ground Floor (U – Value)		1.03 w/m^{2}k
Window	U – Value	5.34 (11% frame factor) w/m^{2}k
	G – Value	80%
Roof Light	U – Value	5.99 (11% frame factor) w/m^{2}k
	G – Value	80%
Pedestrian Doors (U – Value)		3.61 w/m^{2}k
Internal Wall (U – Value)		1.11 w/m^{2}k
Internal Floor / Ceiling (U – Value)		1.02 w/m^{2}k
Air Permeability		25 m^3/hr m^{-2}
Luminaire Efficacy		40 (lumens per circuit watt)
Occupancy Control		Yes
Heating Efficiency		81%
Heating system Efficiency		91%
Air-Source Heating pump COP		3.0
Air-Source Heating pump EER		3.0
Local Ventilation SFP		1.0 w/l/s
Heat Recovery %		None Installed

The notional building and hence the TER, is based on a building of the same size and shape as the actual building, but constructed to an Approved Document L2A building specification. It is noted that the above values are far worse than the minimum standards as required by Approved Document L2A and L2B (2013 versions). However, the TER value is not considered on this project, as the works are being assessed against Approved Document L2B.

The estimated baseline demands used in this report are based on the results from the SBEM analysis of the existing building. Using this methodology, the base line energy demands for the Holmes Road Depot building are as follows:

Building System	Energy	Unit
Heating	87.35	kWh/m²
Cooling	3.74	kWh/m²
Lighting	34.56	kWh/m²
Hot Water	38.18	kWh/m²
Auxiliary (Pumps, motors, etc.)	2.77	kWh/m²
Total energy load	166.60	kWh/m²



The existing building baseline CO_2 emissions are calculated by combining the above regulated demands with a set of standard energy supply factors to determine the Tonnes of CO_2 per annum used by the building. This equates to 245.5 Tonnes CO_2.

4.1 Existing Works Depot

The purpose of Display Energy Certificates (DECs) is to raise public awareness of energy use and to inform visitors to public buildings about the energy use of a building. DECs provide an energy rating of the building from A to G, where A is very efficient and G is the least efficient, based on the actual amount of metered energy used by the building over a 12 month period. A new DEC is required annually for all public buildings over 1000m² and must be displayed within the building in a prominent place and must be in colour at least A3 size.

The depot building currently has a valid DEC which was issued on the 29th August 2014 with an operational rating of 296. The previously DEC issued in July 2013 had an operational rating of 270. This indicates that the energy performance of the building has worsened since the previous DEC was issued.

All of the different sources of energy (electricity, gas, oil etc.) are converted into carbon dioxide emissions to allow the building's total figure to be compared with others of a similar type, age, size etc. The DEC rating is based on the actual consumption of energy in the building in the previous 12 months and should not be directly compared to the SBEM outputs given.

It is noted that an asset rating provides no information about how the building is operated in practice. In practice it is other factors such as unregulated loads (e.g. small power loads, server rooms, external lighting, etc.) or building user behaviour that create additional emissions, which are reflected in the operational rating (DEC), but not the EPC.

The depots DEC indicates the following annual energy uses and it is these that this report will assess suggested Energy Efficiency Measures (EEM's) against;

- Electricity - 147kWh/m^2/year(or 334.67 Tonnes of CO_2);
- Heating - 366 kWh/m^2/year (or 336.05 Tonnes of CO_2).

This is based on a total useful floor area of 4,572 m^2. The DEC assessor has confirmed that their assessment does not include for the workshops nor plant areas. It was also deemed by the assessor, that the workshops were not heated. This is an incorrect assumption.

The existing facility is a council maintenance depot, in a mainly residential area and hence the building type is defined as a Workshop with Offices. The total useful floor area is actually 4,783m^2. This excludes the vehicle sheds, the space currently occupied by Veolia and the 21 residential units that are fed from the depot heating system.

A comparison of the baseline energy model and its equivalent DEC returns a theoretical Operating Rating of 359. Given the difference in areas (and the omission of the workshops) and, change in use for some spaces, the theoretical Operating Rating is within acceptable tolerances.

5.0 DEMAND REDUCTION (BE LEAN)

The overall energy strategy is to improve refurbished building fabric performance as much as is practicable given that the project is principally refurbishment / modernisation works, propose efficient building systems to reduce fuel demand and then to supply the remaining energy demands with low or zero carbon sources to achieve the requirements.

Upgraded building fabric U-Values should be in compliance with Tables 3 & 5 of both Approved Document L2A and L2B (2010 Edition incorporating 2011, 2013 & 2016 Amendments).

Where costs are indicated these are based on the following unit energy rates;

- Gas – 3.45p per unit;
- Electricity – 10.5p per unit

5.1 Ground Floor

Due to the proposed project being principally a refurbishment project, it is not practical for the ground floor U-value to be improved. As such the existing U-value of 1.17 w/m^{2}k will remain unaltered for all parts of the analysis.

5.2 External walls

During the survey two differing types of wall construction were identified; a solid construction and a traditional cavity construction. The assumed external cavity wall make-up includes for a 75mm cavity space. It may be possible to fill this void with an injection type foam insulation to improve the U-value. Alternatively or in addition to, it may be possible to increase the insulation internal. Hence, it may be possible to reduce the wall U-value to 0.254 w/m^{2}k.

The revised heating energy consumption (with no other building changes) reduces the heating energy consumption to 58.57 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £4,778 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.3 Roof

The roof construction does not appear to have any insulation as part of the ceiling space. Providing additional insulation to the roof space, to provide U-value of 0.20 w/m^{2}k, has been modelled.

The revised heating energy consumption (with no other building changes) reduces the heating energy consumption to 79.86 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £1,304 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.4 Doors and Glazing

The proposed new windows would have a maximum U-value of 1.56 W/m^{2}K (for the whole unit – door and frame). Pedestrian entrance doors have a maximum U-value of 1.78 W/m^{2}K (for the whole unit – door and frame). The existing roof lights are currently proposed to remain unaltered.

All glazing components would have a G value less than 31% to aide with minimising overheating. A frame factor of 11% is allowed for within both doors and windows.

The revised heating energy consumption (with no other building changes) reduces the heating energy consumption to 52.11 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £5,910 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.5 Control of Unwanted Ventilation

As previously stated the baseline energy model has been constructed to EPC conventions version 5 and as the building was construction prior to 1995 a value of 25m^3/hr m^{-2} has been used for air-permeability. As such high levels of heat loss would be expected from this. Air permeability is not just about air leakage from the building; gaps in the fabric allow the passage of warm, moist air to flow from the inside to outer cooler layers.

Therefore, surface and interstitial condensation may result, leading to potential damage to the building fabric as well as increased U-values.

It would be advisable to undertake a thermographic survey of the building during the design stage and implement the recommendations from this survey. Once all considered building works are completed, an air permeability pressure test should be carried out. Should the measured value be 8m^3/hr/m^2, the heating energy consumption would be reduced (with no other building changes) by 8kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £1,798 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.6 Lighting

The proposed strategy is to use LED light sources within all new luminaires to assist in the reduction of electrical power and hence carbon reduction. The efficiency of which will go beyond the requirements of AD L2A (2013 version) and that of table 42 of the Non-Domestic Building Services Compliance Guide.

These luminaires are controlled by occupancy detectors within spaces that are not provided with natural daylight. Where spaces are provided with natural daylight, the luminaires are controlled via combined daylight / occupancy sensors that will regulate the output of the fittings to provide the required amount of artificial light to supplement the daylight within the space.

The revised lighting energy consumption (with no other building changes) reduces the lighting energy consumption by 16.32 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £6,708 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.7 LTHW Heating

The existing depot building is served from three gas boilers within the existing plantroom. These boilers have the following efficiencies; 93%, 91.9%, 91.8% and hence an overall system efficiency of 92.23% has been calculated.

The proposed LTHW system would provide heating to the refurbished building using a mixture of perimeter heating, traditional radiators and unit heaters to the workshop areas, using new gas boilers with an efficiency of 96%.

The revised heating energy consumption (with no other building changes) reduces the heating energy consumption to 84.05 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £552 per annum, at a capital cost of to be confirmed by the Quantity Surveyor.

5.8 Air Source Heat Pumps

The refurbished office areas and comms rooms are intended to be provided with a new VRF fan coil system served by externally mounted air source heat pump units, providing heating and cooling. All units would be ECA eligible.

The new heat pump system would have a Seasonal Heating Efficiency (SCOP) of not less than 2.9 and a Seasonal Cooling Efficiency (SEER) of not less than 3.3. These SCOP / SEER values takes into account the SFP of the fan coil units.

As per Annex VI of Directive 2009/28/EC air source heat pump units are considered as a renewable technology when used in heating mode.

The existing first floor call centre air-source heat pump installation units would be retained and extended into the two meeting rooms which are currently provided with ventilation only.

5.9 Hot water Generation

Existing domestic hot water for the depot building is generated via a dedicated gas fired water heater, together with local point of use heaters. The gas fired water heater has an existing efficiency of 91.9%. The unit has a storage capacity of 1000 litres and a factory fitted insulation of 50mm. The existing electric point of use water heaters are deemed to have an efficiency of 100%.

The proposed hot water strategy would be to provide new gas fired units with an efficiency of 96%. To further reduce energy loss, pipework insulation should exceed the requirements of Table 39 of the Non-Domestic Compliance Guide.

The revised hot water energy consumption (with no other building changes) reduces the hot water energy consumption to 36.55 kWh /m^2.

In financial terms, this could represent an estimated energy cost saving of £272 per annum, at a capital cost to be confirmed by the Quantity Surveyor.

5.10 Ventilation Systems

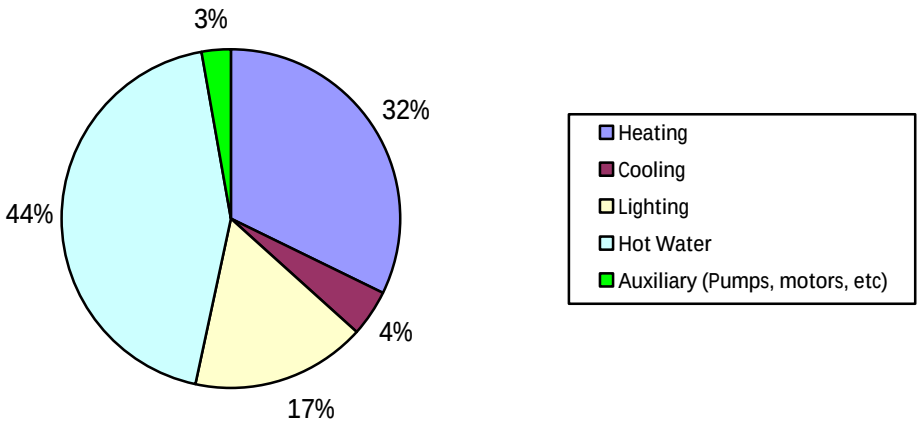
The kitchenettes, toilets and locker rooms would be ventilated in accordance with the requirements of the Building Regulations via a mechanical extract fan controlled via an integral PIR.

The fan shall have a constant trickle with a boost facility upon activation via the PIR. The fan would have a run-on function and heat recovery with at least 65% efficiency. These fans would have a specific fan power less than 0.3 watts / litre / second.

5.11 Be Lean Design

Based upon the above discussions, it can be seen that no single measure will provide the required reductions. Hence by applying improvements to the building fabric U-values and reducing the air permeability of the building, the calculated "Be Lean" Building Emission Rate (BER) has returned the following results;

Building System	Energy	Unit
Heating	26.71	kWh/m²
Cooling	3.63	kWh/m²
Lighting	13.86	kWh/m²
Hot Water	36.55	kWh/m²
Auxiliary (Pumps, motors, etc.)	2.31	kWh/m²
Total energy load	86.06	kWh/m²



The BER CO_2 emissions equates to 120.1 Tonnes CO_2, which falls short of Part L2A TER value by 14%. This is attributed to the existing ground floor and roof lights remaining unaltered by the proposed works.

Therefore, this is an overall reduction to the existing building energy consumption of 49%.

6.0 HEATING INFRASTRUCTURE (BE CLEAN)

The following systems are considered for the purpose of using the primary energy supply efficiently;

6.1 Community / District Heating Network

Community / District Heating Networks are where a number of buildings are heated from a central source. This provides economies of scale and diversification of loads. District heating pipework is not specific to the technology used to generate the heat and so can connect to a range of sources of heat supply including CHP, biomass, energy from waste, ground source heat pumps, geothermal heat or large power stations.

District heating is a long-term commitment that does not provide a short-term return on investment. Benefits to the community include avoided costs of energy, through the use of surplus and wasted heat energy, and reduced investment in individual household or building heating equipment. District heating networks, heat-only boiler stations, and cogeneration plants require high initial capital expenditure and financing. Only if considered as long-term investments will these translate into profitable operations for the owners of district heating systems, or combined heat and power plant Energy Supply Companies (ESCOs).

For connection to existing community / district heating network, this is not an appropriate option as the closest available schemes are as follows;

- Royal Woolwich Arsenal, London, SE18 6EF (7.3km away and has no direct route);
- National Sports Centre, Crystal Palace, SE19 2BB (7.7km away and has no direct route).

It is understood that a separate district heating scheme analysis is being undertaken and as such it may be possible to connect the Holmes Road Depot to a district heating scheme located elsewhere at a future date. The load of the depot itself will be small due to the office accommodation heating being provided by air-source heat pumps. Within the surrounding area there is a high proportion of residential properties that could benefit from being connected to a district heating scheme, including the 25 units that are associated with the works depot.

However, it would be sensible to future proof the site installations whilst the refurbishment works are being undertaken to allow a future connection for the District Heating Network, should the network feasibility study be favourable.

6.2 Combined Heat and Power

Combined heat and power is defined as the simultaneous generation of heat and electricity from a single generator. CHP systems offer a very high efficiency by utilising the emitted heat arising from electricity generation for LTHW heating. The overall thermal efficiency can approach 95%, and the displacement of grid electricity can provide significant CO_2 savings on the site. A typical CHP system consists of a natural gas powered internal combustion engine connected to an alternator. The heat emitted from the engine thermodynamic cycle and engine casing is used to provide space heating and DHW.

Micro CHP is defined as having less than 50kW electrical power output. The CHP plant is usually designed to meet the base-load heating requirements to minimize the need to dump waste heat and therefore maximise efficiency. The remainder of the heat load is made up using a high efficiency gas fired condensing boiler.

Micro CHP systems are currently eligible for the Government's Feed in Tariffs (FITs).

The installation of CHP should be considered for this project due to a good base heating load and the electricity generated could be used on site. However, the life cycle costs, including fuel cost fluctuations, ongoing maintenance costs and inherent resilience of the unit, would not initially satisfy the simple payback period of 15 years as defined within Approved Document L2.

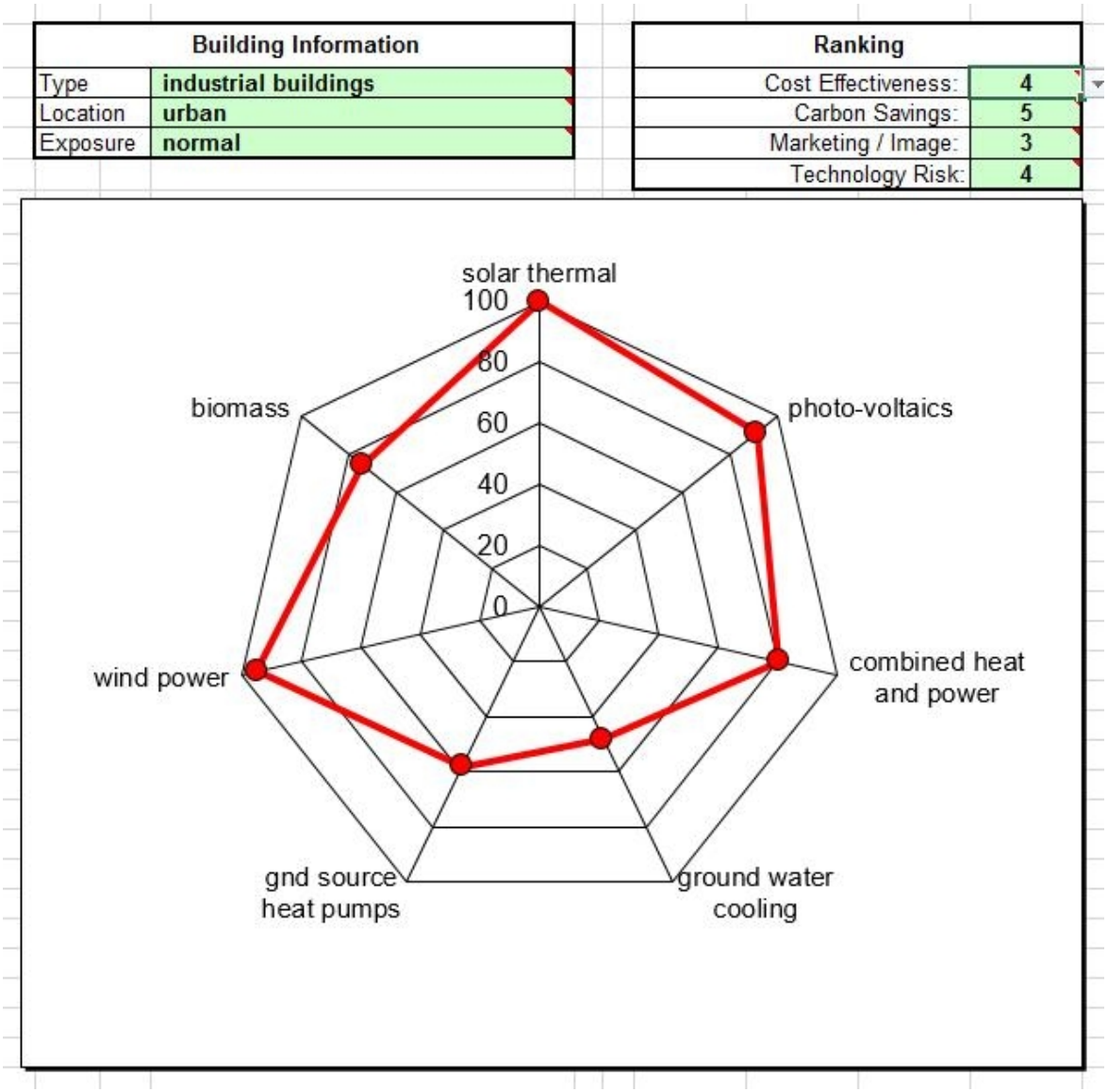
6.3 Be Clean Design

Based upon the existing building layout and proposed refurbishment works, the "Be Clean" Building Emission Rate (BER) value remains unaltered at this stage.

7.0 DEMAND REDUCTION (BE GREEN)

The CIBSE TM38 Tool provides stage 1 guidance on renewable energy sources that should be considered at the feasibility stage of the project, when ideas are being considered and the outline direction of the design is developed. This tool provides outline guidance relating to the overall appearance, orientation, building mass, heating and ventilation strategies which can also have a direct influence on the renewable energy source.

The guidance helps to identify the most appropriate low or zero carbon (LZC) energy solutions for buildings and/or developments based on users' requirements. From the TM38 tool, it can be seen from the chart below which renewable energy sources are initially preferable.



Therefore, the following low or Zero carbon (LZC) technologies have been reviewed in specific context to the proposed refurbishment of the Holmes Road Depot as these have scored over 80 in the above chart. Ground Source Heat pumps have been additionally considered due to the large site area of Holmes Road.

7.1 Ground Source Heat Pump

Ground source heat pumps extract low grade heat from the ground, and through a vapour compression cycle, increase the temperature to provide low grade space and water heating. When operated in reverse, they can provide cooling by extracting thermal energy from the building and dumping it in the ground.

The ground heat exchangers can either be horizontal (surface) or vertical. Surface systems require large open areas and so are typically not suitable for urban areas. Vertical systems consist of a number of closed-circuit coolant pipes in boreholes and can be relatively expensive due to the requirement of a number of deep holes.

A GSHP normally provides heat at a maximum of circa 45°C and can primarily be used to raise the temperature of water from 15°C to 45°C. GSHPs are not well suited to conventional space heating with radiators, due to the requirement of a space heating flow temperature of 80°C. GSHPs are better matched to a low temperature system such as underfloor heating. Newer generation GSHPs may also be used for the provision of DHW by utilising a higher temperature circuit of 65°C, however, this has a detrimental effect on the efficiency. Conventionally, the remaining temperature rise required to increase water temperatures to 60°C would be supplied by a gas boiler.

The rate at which heat is exchanged between the collector loop of the ground source heat pump and the ground is determined mainly by the thermal properties of the Earth. Thermal conductivity is the capacity of a material to conduct or transmit heat, whilst thermal diffusivity describes the rate at which heat is conducted through a medium. For a horizontal loop system in a shallow (1 to 2 m) trench then the properties of the superficial deposits are important, whilst for a vertical loop system it is the properties of the bedrock geology that are important.

At a depth of 10m the temperature is about 10°C increasing to about 12°C at 100m. The thermal conductivity of different soils and rocks, however, ranges from about 1 to 3 W/mK and a ground source heating system cannot be operated for long periods at high extraction rates without allowing the zones surrounding the ground loops or boreholes to have a temperature re-charge. This is normally allowed for in a design by assuming a reduced loading in summer months when only domestic hot water is being heated, allowing thermal recharge from the surrounding ground, or by designing a cooling system to operate during summer months which will provide direct recharge to the ground surrounding the loops. On this project there are a several comms rooms and as such a cooling load would be available.

A detailed site feasibility investigating ground conditions (identifying soils, geology, thermogeology, engineering geology and hydrogeology) would be required to optimise the system and define the costs. Typically a 100m deep borehole could provide 3-5kW of extractable heat, based on 1800 running hours a year and a 6m spacing.

GSHPs are incentivised as part of the Governments Renewable Heat Initiative (RHI) however given the nature of this building and its thermally efficient construction, the principle uses of energy is in the generation of space heating and hot water. Because of the higher temperature required for stored water to avoid the risk of legionella additional boiler plant to generate the higher temperatures would be required. Although the GSHP is capable of achieving the required overall CO_2 saving when combined with PV, the GSHPs high capital cost relative to other available technologies means that this option is not particularly attractive in this application.

Ground source heat pumps are more easily integrated into new build and site with soft landscaping. It is therefore considered that they not viable for this application due to the high

capital cost of the group loop / bore-hole installation and the major disruption to the car park areas during the construction phase.

7.2 Photovoltaic panels

Photovoltaic panels are made from one or two layers of semi-conducting material, including silicon. When solar energy reaches each cell, electrical direct current will flow across the layers. The stronger the sunlight and daylight the more electrical energy is produced. PV systems can also generate energy in overcast conditions, although the system output efficiency is affected. The strength of a PV cell is measured in kilowatt peak (kWp), which is the amount of energy the cell generates in direct sunlight.

The amount of electrical energy generated is dependant on factors such as orientation and inclination. Optimal factors are south facing with a pitch of 30^0-40^0.

The development and manufacture of photovoltaic (PV) panels has rapidly improved over the past few years. Systems are now a viable source of renewable energy, with the Feed in Tariff incentives and the reduction in manufacturing and installation costs

Systems can be classified as “on grid” or “off grid”. On-grid also known as grid-connected PV systems are the most common type of systems installed. Energy produced can be either used within the connected building or, in periods of low demand, export the produced energy onto the local electricity network which is then purchased by the energy supplier through the Feed in Tariff scheme.

In periods of high peak demand that exceed the energy produced by the photovoltaic system, the short fall in energy is met by the import of electricity from the energy supplier without interruption to the building occupants.

Off grid systems are stand-alone systems and are not connected to the incoming supply. These systems are not common within the UK and are not discussed within this report.

The Feed in Tariff incentive schemes provides building owners that have renewable energy systems a fixed unit price for all electrical energy produced from a PV installation and an additional unit price for electricity that is exported onto the local electrical network. For systems below 30kWp an export meter is not required and the “exported” portion of generated electricity is estimated at 50% until such time that smart meters are fully introduced in the UK where export energy can be more accurately measured.

Owing to the suitable roof top location, the installation of photovoltaics is a preferred option for this project. The units can be roof mounted to the proposed pitch on the flat roof above the vehicle sheds and can be grid connected for the export of surplus energy. It is also possible to apply for part of the feed in tariff scheme.

The proposed panel layout would be mounted 10 degrees from due south and cover $400m^2$. Based on this, the PV panels within the energy model could contribute $4.99kWh/m^2$ towards reducing the overall electrical energy consumption.

Utilising 250watt PV panels to generate the required 24.5kWp, this area could be reduced to $200m^2$ and hence any concerns with over shading are greatly reduced.

7.3 Solar Thermal Panels

Solar thermal panels are roof-mounted heat exchangers that use the sun's radiation, either to heat water directly, or indirectly through an alternative heat transfer fluid. Solar thermal collectors are available in the form of flat panels and evacuated tubes. Evacuated tube collectors have a number of advantages over flat panels, they have a greater efficiency through lower heat losses. They are also stated to operate with greater efficiencies in overcast or low-light conditions.

Evacuated tube collectors have performance efficiencies in excess of 80%. They can be connected to wet or dry manifold systems depending on water quality and can be accommodated into most domestic hot water generation systems.

The solar thermal system preheats water, which is then passed through a secondary coil within the domestic hot water storage cylinder. Vacuum solar tube systems can be connected to pressurised or vented domestic hot water systems.

The capital costs for equipment and installation are less than for Photovoltaic (PV) cells and the technology is well established. Initial estimated insolation average for this site is estimated at 2.54kWh/m^2/day which peaks at 4.56kWh/m^2/day in July.

The installation of solar hot water is a preferred option for this project due to the high hot water demand from the showering facilities being proposed on this project and this sits well with the available roof space.

Solar thermal panels have been included within the model and could contribute 2.72 kWh/m^2 towards reducing the hot water energy consumption based on being mounted 10 degrees from due south and cover 20m^2. Subject to a detailed over shading assessment, this area has the potential to be increased and hence further benefit the building.

7.4 Wind turbines

The wind resource in UK is stated to be a major renewable source for power. However, this is not universally true across the country. Exposed and coastal sites in the west and north do have appropriate wind regimes as do offshore sites currently being developed as part of the national renewable power initiative. The wind regime in London is generally inadequate for maximising power. Average wind speeds are generally of the order of 5.3m/s while the British Wind Energy Association (BWEA) notes that an average speed of 7m/s is needed for viable systems.

Data from the UK wind speed database, indicates the following wind speeds are likely at this site;

At 10 meters above ground	4.9	m/s
At 25 meters above ground	5.7	m/s
At 45 meters above ground	6.2	m/s

The Business, Enterprise & Regulatory Reform (BERR) wind speed database estimates the effect of topography on wind speed and it is noted that there is no allowance for the effect of local thermally driven winds such as sea breezes or mountain/valley breezes. The data is used as an initial guide and if viable would be followed by on-site measurements for a proper assessment.

Wind energy installations can range from small domestic turbines (>1kWp) to large commercial developments (>2MW). Some typical small wind turbines have the following power output and dimensions:

Small turbine:	Power 5.5kW.	Tower height 9/15m.	Rotor diameter 6m
	Power 1.5kW	Tower height 2m	Rotor diameter 2m

In the urban environment the main concern after site suitability relates to potential noise levels and shadow flicker that may affect residents on, or adjacent to, the turbine location.

For the small turbines there is presently insufficient data on either of these issues to confirm this impact, and the location of the development being enclosed by low and medium rise residential properties on all boundaries for the incorporation of small domestic wind turbines is not advisable or feasible.

The installation of wind turbines is not a preferred option for this project due to the low wind velocity within the depot boundary and both the proximity of adjacent private dwellings housing.

7.5 Be Lean Design

Based upon the existing building layout and proposed refurbishment works, the "Be Lean" Building Emission Rate (BER) value has been re-calculated with the addition of at least 400m^2 of Photovoltaic monocrystalline cells mounted to the flat roof of the vehicle sheds at an angle of 15-30^O. Calculations suggests this PV array would contribute 4.99 kWh/m^2.

The "Be Lean" Building Emission Rate (BER) value has also been re-calculated with the addition of at least 20m^2 of thermal solar cells mounted to the flat roof of the vehicle sheds at an angle of 15-30^O using PV powered pumping system to further reduce energy consumption. Calculations suggests the solar thermal system would to contribute 2.72 kWh/m^2.

Both these solutions provides a cost effective solution for return of investment, in simple terms of 10 years for the LZC contribution.

The revised CO2 emissions equates to 98.5 Tonnes CO2, or a 6% improvement over Approved Document L2A, and hence a short fall of 29% from the London Plan.

However, from the existing building baseline the total savings are;

	Existing Depot Building	**Proposed Refurbished Depot Building**
CO_2 Emissions ($kgCO^2$)	0.0103	0.0046
Building Area (m^2)	4783.7	4783.7
Building Emissions ($kgCO^2/m^2$)	49.1	21.9
Saving ($kgCO^2/m^2$)		27.2
Saving (%)		**45%**

This achieves compliance with the council's requirement for a 40% improvement by 2020.

The PV and Solar Thermal arrays contribution to this energy reduction is 12.7% and the contribution from the air-source heat pumps (in heating mode) is 15.88%. Thus exceeding the councils requirement for a 20% contribution from LZC Sources

8.0 Additional Sustainable Strategies

8.1 Metering

It is noted that that there are no energy meters installed on the existing distribution boards nor heating and hot water systems. Whilst there are half-hour utility meters installed, it is not possible to record the energy consumption of the heating nor hot water energy consumption either site wide or the separate departments. It is also not possible to determine how much electricity is consumed for the lighting systems, air-conditioning systems or unregulated electrical loads.

Measured data is essential to energy consumption and an energy reduction strategy.

CIBSE TM39 is designed to help facilities managers and building operators introduce metering and sub-metering in buildings, where an understanding of energy consumption is essential in the management and improvement of carbon emissions.

In order to be in a position to realise these benefits companies must first undertake to understand their current and on-going situation. This commences with measuring their utilisation of energy and other relevant resources, from which a strategy to manage these can be defined and implemented. A key element of any energy management strategy is increasing efficiency whilst reducing overall consumption, where possible, and it is this which determines the scale of the benefits that can be delivered.

Hence the Holmes Road Depot should be provided with energy meters to each distribution board, along with energy meters to the heating, air-source heat pump units and hot-water systems. These meters should all be connected to a data logging system for live monitoring / reporting of the energy consumption, to enable the actual energy consumption to be monitored and reviewed for areas of high usage, whereby further investigation can be undertaken to determine the cause.

Additionally, it is recommended that a remote energy display screen is installed within the building reception that will provide live information on the amount of energy being generated by the photovoltaic cells and the amount of CO2 that is being offset.

8.2 BREEAM

The Building Research Establishment Environmental Assessment Method (BREEAM) is used to set the current standard for the environmental credibility of a building. The requirement is for the assessed building to satisfy certain environmental and sustainability criteria.

The current versions of BREEAM are New Construction 2014 (technical manual version SD5076-4.1:2014) and BREEAM Refurbishment and fit-out 2014 (technical manual version SD216-1.1:2014).

Much of the criteria within BREEAM tends to focus more on the asset and the way in which this is managed rather than the way users behave. For example, the management category requests a non-technical building user guide to be provided to the users; however this assumes that the users will read such a document. This emphasises the importance of the individual.

Even though individuals/employees are fully aware of the issues they do not believe that it is their responsibility to reverse current trends.

The ultimate aim is to protect and improve the environment by increasing the contribution from individual and community action. This will come in particular from moving towards more sustainable patterns of consumption, covering the purchase, use and disposal of goods and

services. In essence, the aim should be to encourage and support more sustainable behaviours through a mix of labelling, incentive and reward, infrastructure provision and capacity building (e.g. through information, education and skills). And hence show people they are part of something bigger and part of a collective movement, spanning the public sector, business and the third sector and establishing new social norms.

A full pre-assessment should be undertaken during the early parts of RIBA stage 2, to fully define the extent of the project and associated BREEAM requirements. This will identify any shortfalls that may be deficient in the scheme and that need to be addressed prior to during RIBA stage 3 and onwards.

As defined by Compliance Note 3, recognized 'Local' LZC Technologies consider air source heat pumps as a renewable technology when they are used in heating mode.

Initial discussions with the planning department indicate that this project would not be required to achieve a BREEAM rating. However, it is understood that 60% of the credits under the BREEAM UK Non-domestic Refurbishment and Fit-out 2014 scheme Energy category will need to be achieved. Therefore, the requirement under ENE1 is to achieve at least nine credits or an improvement greater than 0.54 versus the baseline assessment measured as part of the feasibility.

Initial analysis under the ENE01 calculator provisionally indicates one credit could be achieved. It is noted that this calculator tool makes an assessment of BER against TER, i.e. the 'as designed building' against the 'Part L Notional building' and not against the existing building.

Therefore an assessment of the existing DEC (296) against the projected DEC (161) indicates a 54% improvement and hence compliance with this planning requirement.

8.3 Water Efficiency

The principle of water efficiency is to reduce the amount of water consumed by a development and to meet the demand as efficiently as possible. Reducing the demand will also reduce the capacity of the systems for supplying, pumping, storing and disposing of water.

A number of water reducing strategies are available for this project and include;

- Dual / low flush WCs;
- Spray / aerating taps;
- Water efficient appliances;
- Low flow showers;
- Water check meters;
- Leak detection systems;
- Reclaimed / recycled water.

Detecting leakage and waste on the building side of the water main should be considered to reduce demand. Check water meters will help break down water use and identify areas of high

water use. Leak detection would monitor the mains demand profile and raise alarm when there is a change in demand profile.

Sanitary shut off systems should also be considered as these systems turn off water supplies to an area that has been vacant for a period of time, thereby avoiding waste from dripping taps or faulty connections.

Reclaiming and recycling water on site will reduce the demand for potable water and hence reduce the associated water pumping energy costs.

Rainwater could be collected from the roods and hard surfaces and stored and re-used. This collected water is then used flushing toilets or vehicle washing. Generally rainwater is stored for around 20 days, but this will depend on the amount of contaminants in the water and it is suggest that for this project rainwater collection from hard landscaping is not used. Efficiencies of around 90% can be seen for rainwater collection systems.

9.0 SUMMARY OF EEMs

The following table summarises all Energy Efficiency Measures suggested for Holmes Road.

The following measures have been assessed based on the existing building being retained and subjected to a refurbishment programme. It is noted that due to this being an existing building, changes to the ground floor fabric are not possible and hence have been excluded from the subsequent analysis.

	Feed-in Tariff / Renewable Heat Incentive revenue	Electricity / Gas Money Saved	Carbon Savings	Capital cost (excl. VAT)	Lifetime of Measure	Simple Payback	Cost per Tonne of Carbon saving across lifetime of installation
Unit	£ / year	£ / year	(Tonnes per Annum)	£	Years	Years	£/Tonnes per Annum
PV	£ 1,644.50	£ 8,368.13	12.44	£ 100,891.00	25	10	£ 324.47
Solar Thermal	£ 1,672.06	£ 21,082.72	2.87	£ 67,037.00	25	3	£ 934.24
CHP	£ 1,744.67	£ 19,348.15	6.22	£ 110,000.00	15	5	£ 1,179.22
Window & Door Replacement	na	£ 5,910.26	38.27	£ 250,000.00	35	42	£ 186.65
Improve External Wall U-Value	na	£ 4,778.44	31.09	£ 250,000.00	40	52	£ 201.00
Improve Roof U-Value	na	£ 1,304.28	12.92	£ 250,000.00	28	192	£ 691.28
Improve airtightness	na	£ 1,798.19	13.39	£ 250,000.00	40	139	£ 466.61
LED lighting & Controls	na	£ 6,708.90	25.35	£ 436,105.00	35	65	£ 491.45
Air Source Heat Pumps	na	£ 5,299.14	45.45	£ 178,335.00	45	34	£ 87.20
New Water Heaters	na	£ 272.91	1.91	£ 70,000.00	45	256	£ 812.95
New Gas Boilers	na	£ 552.52	3.35	£ 90,000.00	45	163	£ 597.27

Installation costs, where available are based on information provided by the Quantity Surveyor.

Fuel costs, FIT tariff & RHI rates are based on OFGEM rates correct at September 2016.

In addition to the above energy efficiency measures that should also be implemented are;

- Provision of electrical metering in accordance with CIBSE TM39;
- Provision of heat system metering in accordance with CIBSE TM39;
- Provision of hot water system metering in accordance with CIBSE TM39;
- Provision of water usage metering in accordance with CIBSE TM39;
- Low water use sanitary ware should be installed;
- Leak detection fitted to incoming water supplies;
- Sensor taps should be fitted to all sinks / wash hand basins.

10.0 CONCLUSION

This document has reviewed the most appropriate carbon reducing technologies for the refurbishment and modernisation of the Holmes Road Depot, Camden.

As this is a refurbishment / modernisation project, the requirement for compliance is for Approved document L2B compliance plus a 40% reduction of CO_2 from the current building baseline.

Based upon the above discussions, the most cost effective and practical solution to achieve the obligation for reduction in carbon emissions is through good building fabric refurbishment strategy and efficient building services and the inclusion of at least 400m² photovoltaic cells and 20 m² of Thermal Solar cells. Photovoltaic and Solar Thermal panels are incorporated as they are more suited to the particular conditions at this site and offer good CO_2 savings through the displacement of grid supplied electricity and hot water generation.

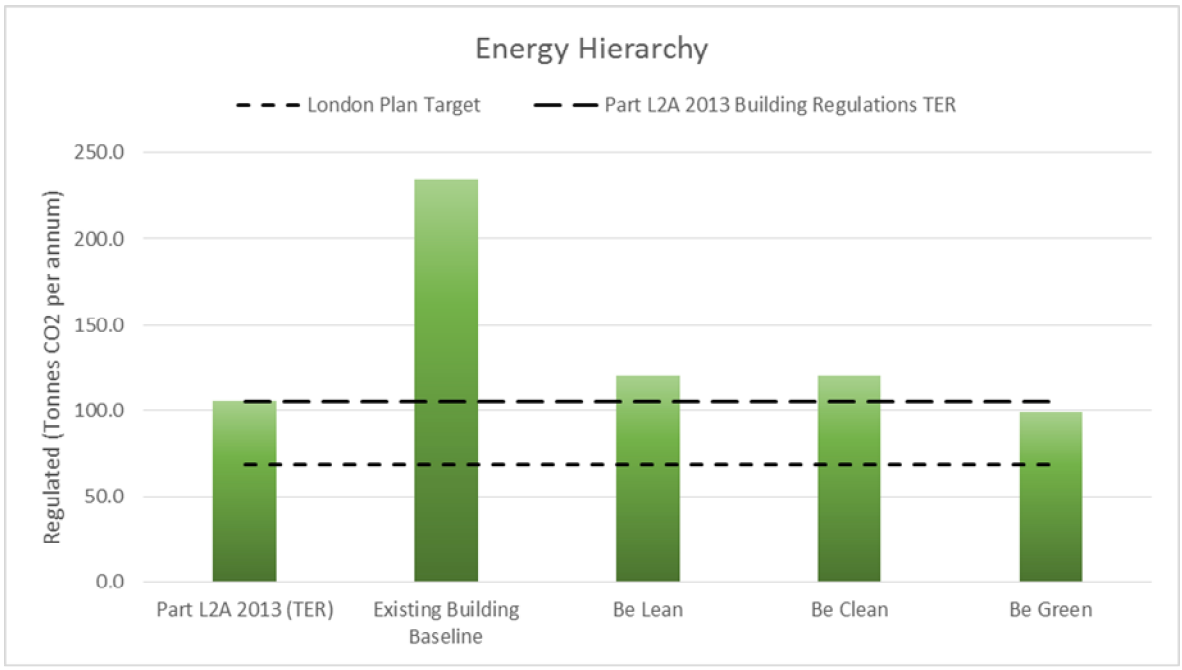
It is therefore very clear that the main methods of reducing energy usage is through the design of the building services and fabric performance. It is proposed to install services which minimise energy usage as part of the design, thus minimising the electrical and thermal demands on the building.

Whilst outside the scope of this report the refurbishment should provide facility for connection to any future district heating network and hence the benefits that such a scheme will provide to the building and the associated residential properties.

The recommended design should incorporate energy saving measures as follows;

- Improved fabric Insulation levels in line with the Building Regulations Approved Document L2;
- Highly efficient Air-source Heat pump;
- Energy efficient lighting systems;
- Air permeability less than 8 m^3/m^2/hour.

The following chart summarises the savings at each stage of analysis and providing an overall saving of 45% from where the existing building currently stands;



11.0 APPENDIX 1 – ARCHITECTURAL DRAWINGS

NOTES

Report all discrepancies, errors and omissions
Do not scale from this drawing.
Verify all dimensions on site before commencing any work or preparing shop drawings.
All materials, components and workmanship are to comply with all the relevant British Standards, Codes of Practice, and appropriate manufacturers recommendations that from time to time shall apply.
For all specialist work, see relevant drawings.

Rev	Date	Description	Name
N	09.9	Generator & tool lockers added	MJG
M	30.8	Public lighting amended to offices	GB
L	15.8	Storage racking indicated	GB
K	10.8	Mezzanine extension omitted	GB
J	29.7	General amendments	MJG
H	26.7	General amendments	MJG
G	14.7	WCs amended	MJG
F	14.7	Office furniture & lockers reconfigured	MJG
E	6.7.	Office furniture reconfigured	GB
D	16.6	Zones amended	GB
C	6.6.	Zones amended	GB
B	26.5	Zones amended	GB
A	24.5	Zones added	GB

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CLIENT
L.B.CAMDEN

PROJECT
HOLMES ROAD DEPOT

TITLE
GROUND PLAN
PROPOSED
-

DATE	SCALE	DRAWN
12.5.16	1-200 @A1	GB

DRAWING No.
274 009 10 N

NOTES

Report all discrepancies, errors and omissions
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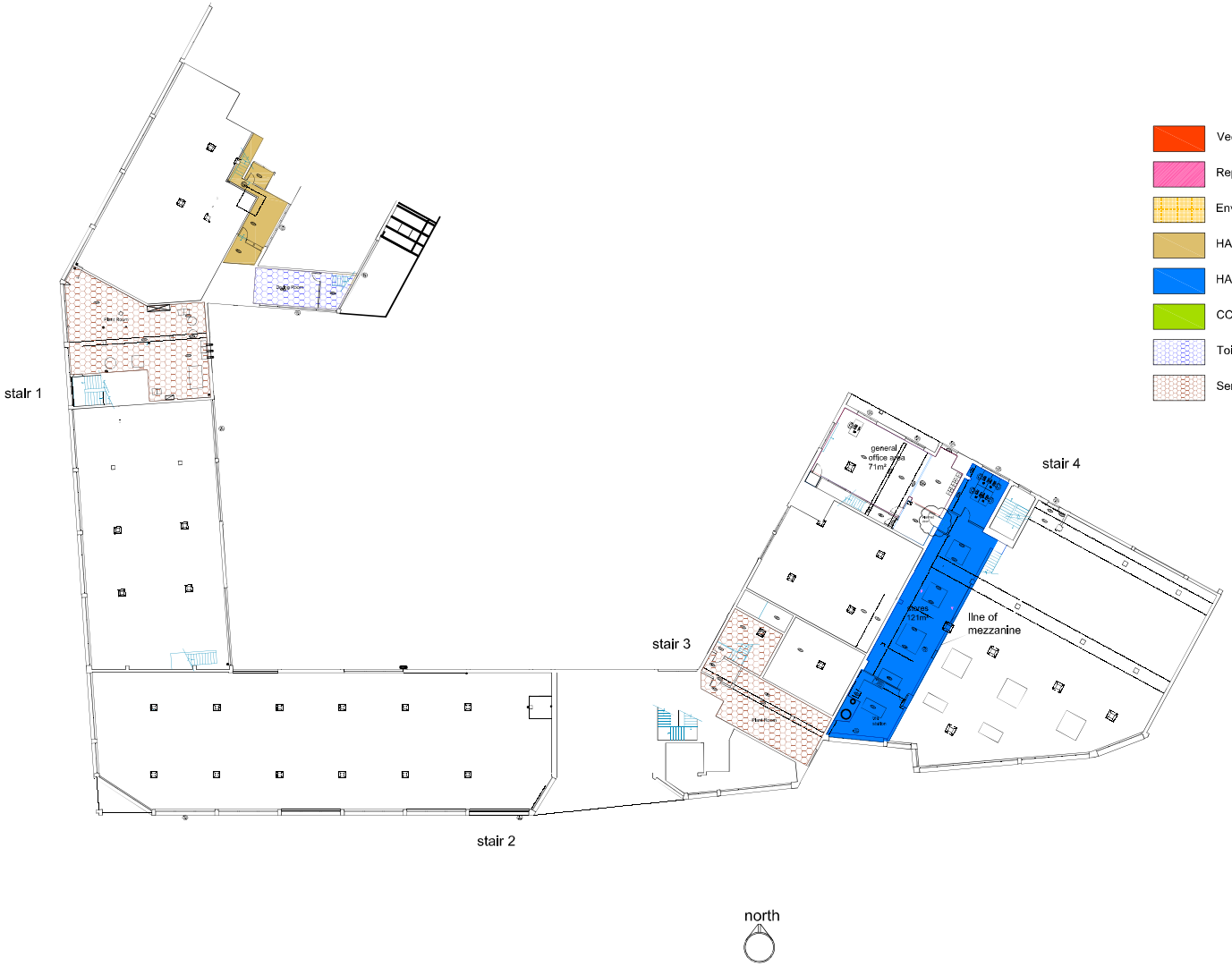

- Veolia
- Repairs office area
- Environmental Services office area
- HASC workshops area
- HASC stores area
- CCTV area
- Toilet & locker areas
- Services intake & plant rooms

Rev	Date	Description	Name
I	9.9	Alarmed door added	MJG
H	30.8	Public lighting to become office space	GB
G	10.8	Mezzanine extension omitted	GB
F	29.7	Plant room indicated	GB
E	14.7	Drying room added	MJG
D	16.6	Joinery workshop amended	GB
C	1.6.	Public lighting zone added	GB
B	26.5	Zones amended	GB
A	24.5	Zones added	GB

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CLIENT
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PROJECT
HOLMES ROAD DEPOT

TITLE
MEZZANINE FLOOR PLAN
PROPOSED
-

DATE	SCALE	DRAWN
12.5.16	1-200 @A1	GB

DRAWING No.
274 009 11 I

Veolla
Repairs office area
Environmental Services office area
HASC workshops area
HASC stores area
CCTV area
Toilet & locker areas
Services intake & plant rooms

preliminary

Rev	Date	Description	Name
H	9.9	Men's toilet amended	MJG
G	10.8	Men's toilet amended	GB
E	26.7	General amendments	MJG
E	14.7	Office spaces reconfigured	MJG
D	6.7	Office furniture reconfigured	GB
C	16.6	Zones amended	GB
B	6.6	Zones amended	GB
A	24.5	Zones added	GB

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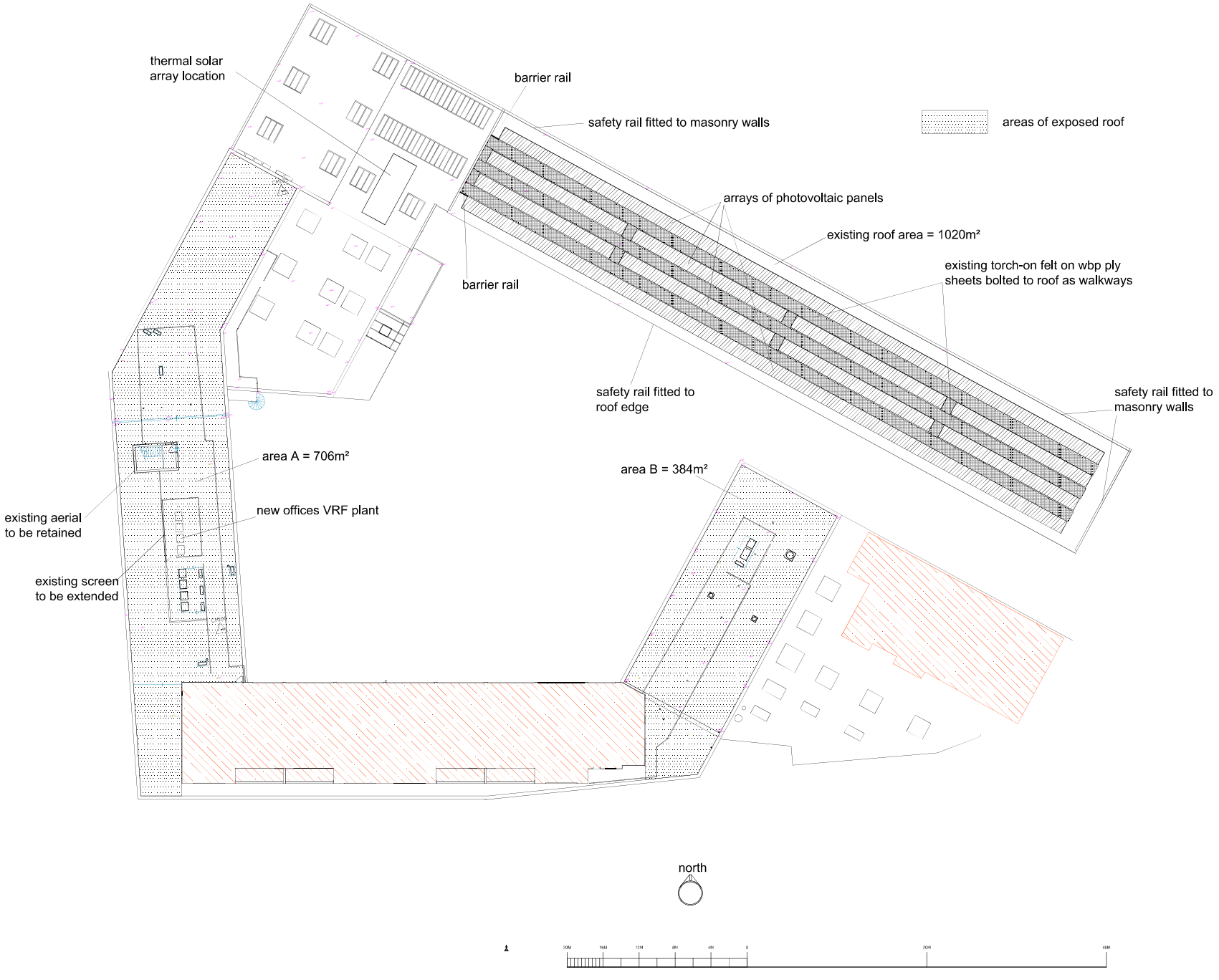
PROJECT
HOLMES ROAD DEPOT

TITLE
FIRST FLOOR PLAN
PROPOSED
-

DATE	SCALE	DRAWN
12.5.16	1-200 @A1	GB

DRAWING No.
274 009 12 H



NOTES

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For all specialist work, see relevant drawings.

Rev	Date	Description	Name
E	30.8	Notes added	GB
D	15.8	Notes added	GB
C	10.8	VRF & notes added	GB
B	20.7	Access & safety notes added	GB
A	7.7	Arrays amended to provide access	GB

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CLIENT
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PROJECT
HOLMES ROAD DEPOT

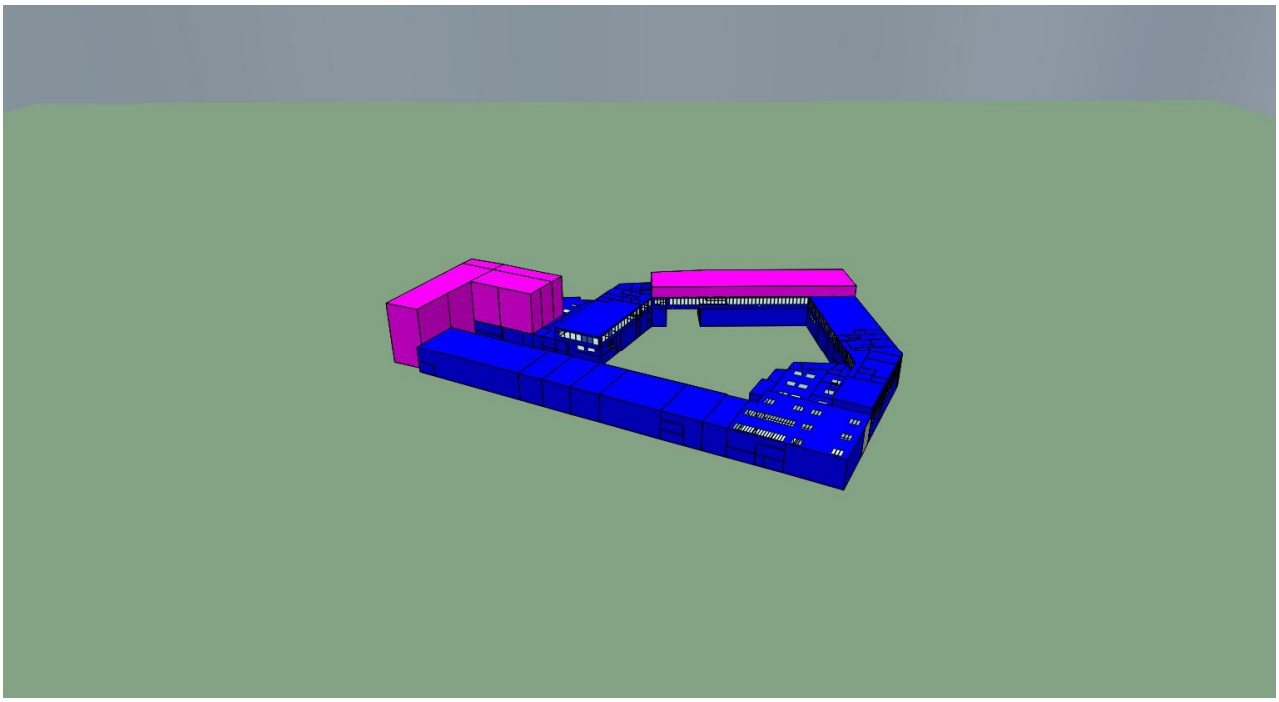
TITLE
ROOF PLAN
PROPOSED
-

DATE	SCALE	DRAWN
12.5.16	1-200 @A1	GB

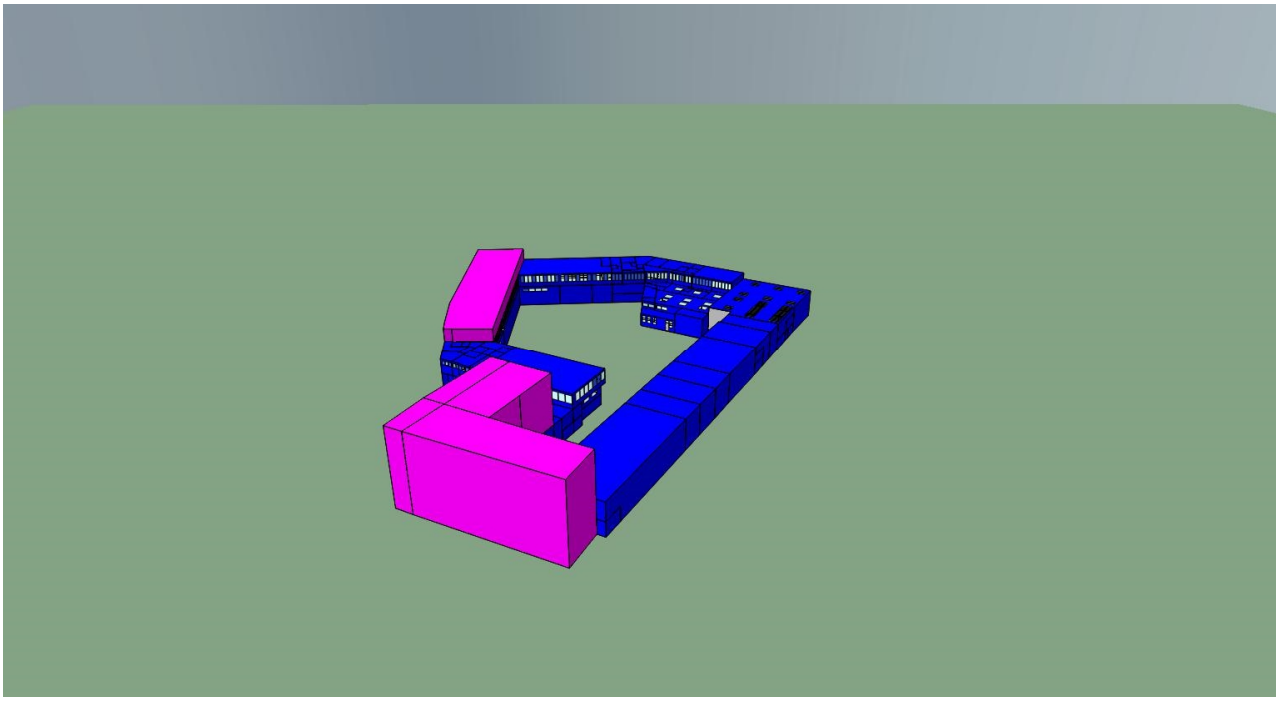
DRAWING No.
274 009 31 E

12.0 APPENDIX 2 – ENERGY MODEL

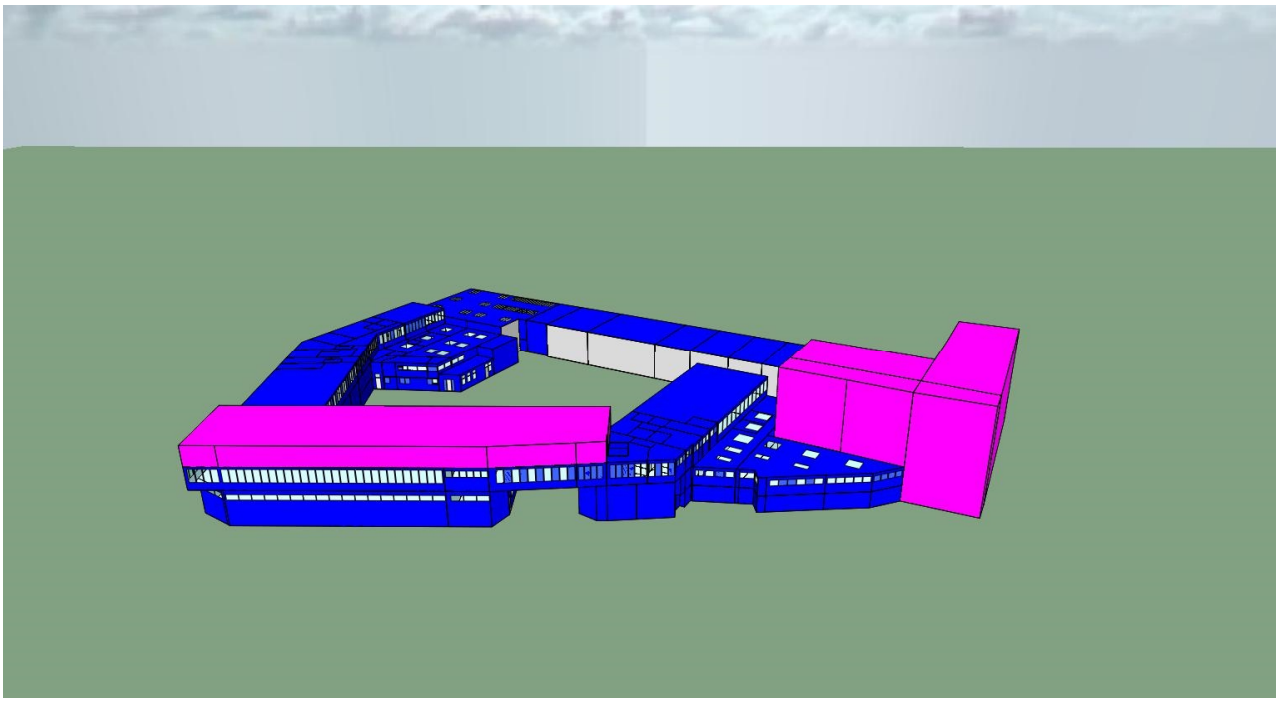
North View



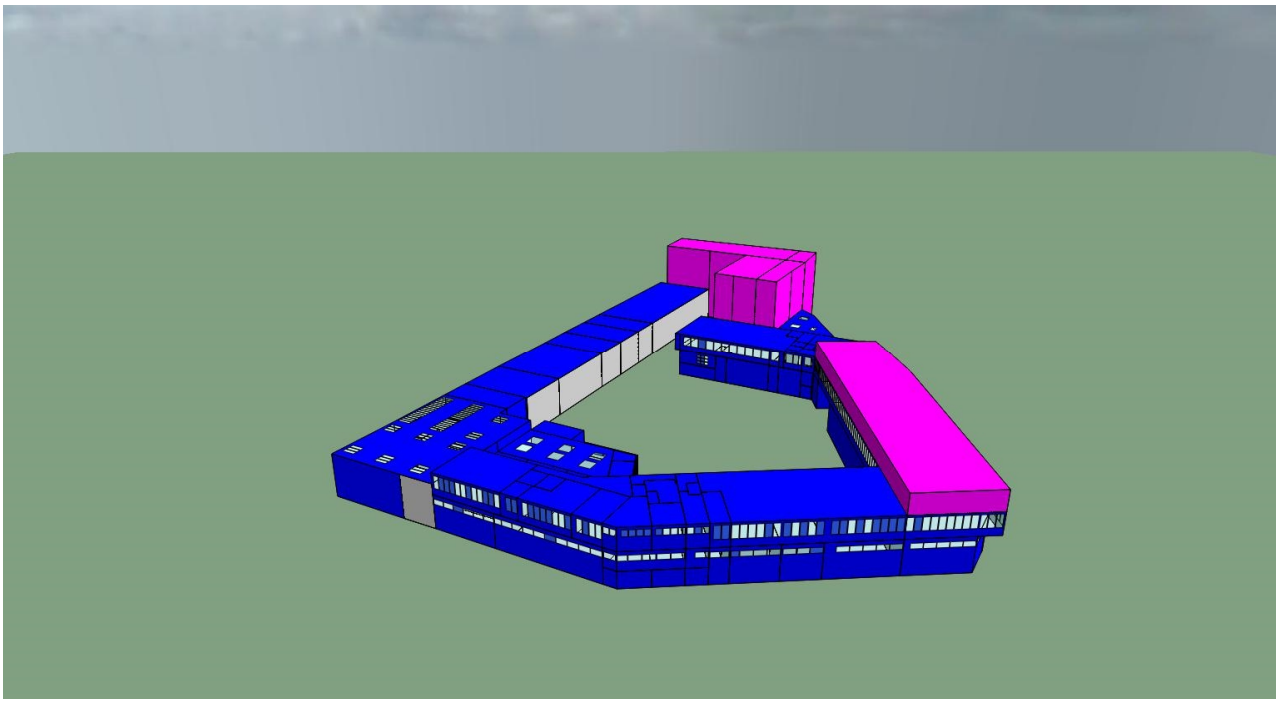
East View



South View



West View



13.0 APPENDIX 3 – BRUKL Outputs

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

1654 Holmes Road Depot

As designed

Date: Tue Jul 19 17:04:28 2016

Administrative information

Building Details

Address: Holmes Road Depot, 78 Holmes Road, London, NW5 3AP

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.5

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

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	22
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	22
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	49.1
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	1.42	1.52	1F000001_W-1_2
Floor	0.25	0.23	0.98	GF000034_F_-1
Roof	0.25	1.34	1.37	1F000001_C_-1
Windows***, roof windows, and rooflights	2.2	5.62	6.69	GF00001C_C-W0
Personnel doors	2.2	3.7	3.7	GF000030_W4-W0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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	25

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	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- CCTV Suite VRF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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- Comms Room 1 Cooling

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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- Comms Room 2 Cooling

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

4- Comms Room 3 Cooling

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

5- Existing Office VRF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

6- Gas Radiators

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.92	-	-	-	-
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					NO
* 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.					

7- Workshop Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.92	-	-	-	-
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					NO

* 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.

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.92	0
Standard value	0.8	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
1F - W - Housing and community safety CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Parking Enforcement CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Comms Room 1	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Comms room 2	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Comms room 3	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open Plan Office	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Disabled WC	1	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC	1	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC store?	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift and WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Meeting Room 1	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Meeting Room 2	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WCs	1	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan office Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan Office Tea Station	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Praying Room	-	-	-	-	-	-	-	-	-	-	N/A

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
1F - E - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - S - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Corridor	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Meeting Room	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Tea Room	1	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC	1	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Mens WC	1	-	-	-	-	-	-	-	-	-	N/A
1F - W - Open plan office Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Tea Station	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - HASC toilets corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room PU & EV	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Entrance and stairs	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores void	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Ladies WC	1	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	1	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC showers	1	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices stariwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Public lighting stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Reception/Security	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants access corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants lift	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants Lift lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Wall void	-	-	-	-	-	-	-	-	-	-	N/A
GF - Paint & Spirit store	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices Reception Area	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Canteen	1	-	-	-	-	-	-	-	-	-	N/A
GF - W - Circulation	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Cleaners'	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Filter room	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop	-	-	-	-	-	-	-	-	-	-	N/A

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
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Ladies parks & enforcements Lockers	1	-	-	-	-	-	-	-	-	-	N/A
GF - W - Male WC	1	-	-	-	-	-	-	-	-	-	N/A
GF - W - Mens parks & enforcement lockers	1	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop Ancillary	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers	1	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops WCs and showers	1	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room (AHU)	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Public lighting Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Old plant room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Open plan Office	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - HASC Store	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Discapacitated WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Glazing workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop back entrance	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	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	
1F - W - Housing and community safety CCTV	24	-	-	1529
1F - W - Parking Enforcement CCTV	22	-	-	808
1F - SW - Comms Room 1	18	-	-	100
1F - E - Comms room 2	16	-	-	60
1F - W - CCTV Comms room 3	21	-	-	139
1F - E - Open Plan Office	25	-	-	4164

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1F - E - Disabled WC	-	31	-	111
1F - E - Ladies WC	-	38	-	231
1F - E - Ladies WC Lobby	-	24	-	44
1F - E - Ladies WC store?	15	-	-	26
1F - E - Lift	-	26	-	45
1F - E - Lift and WCs Lobby	-	29	-	56
1F - E - Lift Lobby	-	21	-	40
1F - E - Meeting Room 1	14	-	-	189
1F - E - Meeting Room 2	14	-	-	188
1F - E - Mens WC Lobby	-	23	-	46
1F - E - Mens WCs	-	38	-	174
1F - E - Open plan office Lobby	-	35	-	102
1F - E - Open plan Office Tea Station	18	-	-	342
1F - E - Praying Room	17	-	-	403
1F - E - Stairwell	-	44	-	192
1F - S - Stairwell	-	45	-	166
1F - W - CCTV Corridor	-	37	-	180
1F - W - CCTV Meeting Room	16	-	-	247
1F - W - CCTV Store	16	-	-	29
1F - W - CCTV Tea Room	-	31	-	87
1F - W - Ladies WC	-	40	-	201
1F - W - Ladies WC lobby	-	19	-	41
1F - W - Mens WC	-	42	-	263
1F - W - Open plan office Store	11	-	-	22
1F - W - Stairwell	-	37	-	108
1F - W - Tea Station	19	-	-	414
1F - W - WCs Lobby	-	23	-	46
1F - W - HASC toilets corridor	-	30	-	134
GF - E - Boiler Room	18	-	-	607
GF - E - Boiler Room PU & EV	16	-	-	280
GF - E - Entrance and stairs	-	22	-	125
GF - E - HASC Stores	25	-	-	187
GF - E - HASC Stores Stairwell	-	23	-	103
GF - E - HASC Stores void	-	50	-	564
GF - E - Incoming mains	8	-	-	145
GF - E - Incoming mains	11	-	-	216
GF - E - Incoming mains	14	-	-	386
GF - E - Ladies WC	-	17	-	163
GF - E - Mens WC	-	45	-	274
GF - E - Mens WC lobby	-	35	-	39
GF - E - Mens WC showers	-	31	-	38
GF - E - Offices stariwell	-	17	-	69
GF - E - Public lighting stores	24	-	-	85

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
GF - E - Reception/Security	-	21	15	216
GF - E - Tenants access corridor	-	34	-	83
GF - E - Tenants lift	-	17	-	47
GF - E - Tenants Lift lobby	-	17	-	84
GF - E - Wall void	8	-	-	22
GF - Paint & Spirit store	23	-	-	100
GF - S - HASC Offices	24	-	-	6862
GF - S - HASC Offices Reception Area	-	43	15	615
GF - W - Canteen	-	39	-	364
GF - W - Circulation	-	44	-	160
GF - W - Cleaners'	19	-	-	24
GF - W - HASC Offices	23	-	-	2236
GF - W - Joinery Filter room	19	-	-	418
GF - W - Joinery Workshop	28	-	-	1702
GF - W - Joinery Workshop Offices	23	-	-	590
GF - W - Joinery Workshop Offices	22	-	-	685
GF - W - Ladies parks & enforcements Lockers	-	27	-	179
GF - W - Male WC	-	45	-	226
GF - W - Mens parks & enforcement lockers	-	45	-	146
GF - W - Metal Workshop Ancillary	10	-	-	55
GF - W - Metal Workshop store	15	-	-	15
GF - W - Stairwell	-	43	-	89
GF - W - Workshops Lockers	-	36	-	182
GF - W - Workshops Lockers corridor	-	26	-	280
GF - W - Workshops WCs and showers	-	34	-	161
Mezz - E - Old Plant Room	16	-	-	84
Mezz - E - Old Plant Room (AHU)	23	-	-	452
Mezz - E - Public lighting Office	24	-	-	1498
Mezz - W - Joinery Workshop Office	17	-	-	201
Mezz - W - Joinery Workshop Office	22	-	-	461
Mezz - W - Metal Workshop store	19	-	-	17
Mezz - W - Metal Workshop store	13	-	-	16
Mezz - W - Old plant room	25	-	-	834
Mezz - W - Stairwell	-	41	-	92
1F - SW - Open plan Office	25	-	-	13253
GF - E - HASC Stores	25	-	-	538
Mezz - E - HASC Store	25	-	-	372
GF - E - Offices	24	-	-	1049
GF - E - Mens WC	10	-	-	357
GF - E - Discapacitated WC	8	-	-	194
GF - E - Offices	23	-	-	2472
GF - W - Glazing workshop	24	-	-	694
GF - W - Joinery Workshop back entrance	10	-	-	223

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
GF - W - Metal Workshop	19	-	-	432
GF - W - Metal Workshop	21	-	-	450
GF - W - Metal Workshop	28	-	-	2224
Mezz - W - Metal Workshop	26	-	-	316

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?
1F - W - Housing and community safety CCTV	YES (+22.1%)	NO
1F - W - Parking Enforcement CCTV	YES (+35.7%)	NO
1F - SW - Comms Room 1	YES (+52.6%)	NO
1F - E - Comms room 2	NO (-2%)	NO
1F - W - CCTV Comms room 3	YES (+28%)	NO
1F - E - Open Plan Office	YES (+61.3%)	NO
1F - E - Meeting Room 1	N/A	N/A
1F - E - Meeting Room 2	N/A	N/A
1F - E - Open plan Office Tea Station	NO (-16.3%)	NO
1F - E - Praying Room	YES (+71.3%)	NO
1F - W - CCTV Meeting Room	N/A	N/A
1F - W - CCTV Tea Room	YES (+1.9%)	NO
1F - W - Tea Station	N/A	N/A
GF - E - Reception/Security	NO (-12.9%)	NO
GF - S - HASC Offices	NO (-49%)	NO
GF - S - HASC Offices Reception Area	NO (-58.2%)	NO
GF - W - Canteen	N/A	N/A
GF - W - HASC Offices	NO (-35.2%)	NO
GF - W - Joinery Filter room	N/A	N/A
GF - W - Joinery Workshop	YES (+108.9%)	NO
GF - W - Joinery Workshop Offices	NO (-45.1%)	NO
GF - W - Joinery Workshop Offices	NO (-19.9%)	NO
GF - W - Metal Workshop Ancillary	N/A	N/A
Mezz - E - Public lighting Office	NO (-57%)	NO
Mezz - W - Joinery Workshop Office	NO (-55.9%)	NO
Mezz - W - Joinery Workshop Office	NO (-40.8%)	NO
1F - SW - Open plan Office	YES (+66.1%)	NO
GF - E - Offices	N/A	N/A
GF - E - Mens WC	N/A	N/A
GF - E - Discapacitated WC	N/A	N/A
GF - E - Offices	N/A	N/A
GF - W - Glazing workshop	NO (-54.7%)	NO
GF - W - Joinery Workshop back entrance	NO (-25.4%)	NO
GF - W - Metal Workshop	YES (+108%)	NO
GF - W - Metal Workshop	YES (+79.7%)	NO
GF - W - Metal Workshop	NO (-79%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Mezz - W - Metal Workshop	YES (+107.3%)	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]	4783.7	4783.7
External area [m^2]	7580.7	7580.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	25	3
Average conductance [W/K]	10481.6	2757.65
Average U-value [W/m^2K]	1.38	0.36
Alpha value* [%]	5.37	16.46

* 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
99	**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
	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
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	87.35	21.54
Cooling	3.74	2.25
Auxiliary	2.77	0.98
Lighting	34.56	15.3
Hot water	38.18	35.93
Equipment*	42.49	42.49
TOTAL**	**166.59**	**75.99**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	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]	390.22	157.97
Primary energy* [kWh/m^2]	283.27	126.86
Total emissions [kg/m^2]	49.1	22

* 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] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	496.5	190.8	49.3	24.9	0	2.8	2.13	3	3
	Notional	83.1	134.5	9.5	10.4	0	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	211.6	1087.5	21	141.8	0	2.8	2.13	3	3
	Notional	0	1516	0	117	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	282.7	1076.7	28.1	140.4	0	2.8	2.13	3	3
	Notional	0	1489.5	0	114.9	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	234.7	1061.1	23.3	138.4	0	2.8	2.13	3	3
	Notional	0	1511.4	0	116.6	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	433.9	188.4	43.1	24.6	0	2.8	2.13	3	3
	Notional	73.6	130.4	8.4	10.1	0	2.43	3.6	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	277.1	84.6	93.5	0	2.7	0.82	0	0.92	0
	Notional	71.2	70.4	24.1	0	1.2	0.82	0	----	----
[ST] Central heating using water: convectors, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	225.6	49.1	76.1	0	2.1	0.82	0	0.92	0
	Notional	33.2	32.5	10.7	0	0	0.82	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	-	1F000001_W-1_0_0
Floor	0.2	0.07	GF00002F_F_-1
Roof	0.15	-	ST000001_C_0_0
Windows, roof windows, and rooflights	1.5	5.55	1F000001_W0-W0
Personnel doors	1.5	3.7	GF000030_W4-W0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

1654 Holmes Road Depot

As designed

Date: Wed Jul 20 09:45:29 2016

Administrative information

Building Details

Address: Holmes Road Depot, 78 Holmes Road, London, NW5 3AP

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.5

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

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, kgCO_2/m^2.annum	22
Target CO_2 emission rate (TER), kgCO_2/m^2.annum	22
Building CO_2 emission rate (BER), kgCO_2/m^2.annum	25.1
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	0.29	1.52	1F00001C_W1_-1
Floor	0.25	0.23	0.98	GF00000B_F_-1
Roof	0.25	0.38	1.37	1F00001C_C_-1
Windows***, roof windows, and rooflights	2.2	2.59	6.69	GF00001C_C-W0
Personnel doors	2.2	1.8	1.8	GF000001_W2-W0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

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

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

$U_{i\text{-}Calc}$ = 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	8

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	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Workshop Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	-	-	-
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					NO
* 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- Comms Room 1 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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- Comms Room 2 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

4- CCTV Suite VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

5- Comms Room 3 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

6- Existing Office VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

7- Gas Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	-	-	-
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					NO
* 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.					

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.96	0
Standard value	0.8	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
GF - W - Glazing workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop back entrance	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Comms Room 1	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Comms room 2	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Housing and community safety CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Parking Enforcement CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Comms room 3	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open Plan Office	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Disabled WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC store?	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift and WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Meeting Room 1	-	-	-	-	-	-	-	-	-	-	N/A

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
1F - E - Meeting Room 2	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WCs	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan office Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan Office Tea Station	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Praying Room	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - S - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Corridor	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Meeting Room	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Tea Room	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Mens WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Open plan office Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Tea Station	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - HASC toilets corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room PU & EV	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Entrance and stairs	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores void	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC showers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices stariwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Public lighting stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Reception/Security	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants access corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants lift	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants Lift lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Wall void	-	-	-	-	-	-	-	-	-	-	N/A
GF - Paint & Spirit store	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices Reception Area	-	-	-	-	-	-	-	-	-	-	N/A

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
GF - W - Canteen	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Circulation	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Cleaners'	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Filter room	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Ladies parks & enforcements Lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Male WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Mens parks & enforcement lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop Ancillary	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops WCs and showers	0.3	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room (AHU)	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Public lighting Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Old plant room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Open plan Office	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - HASC Store	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Discapacitated WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	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	
GF - W - Glazing workshop	68	-	-	460
GF - W - Joinery Workshop back entrance	68	-	-	148
GF - W - Metal Workshop	68	-	-	286
GF - W - Metal Workshop	68	-	-	298
GF - W - Metal Workshop	68	-	-	1472
Mezz - W - Metal Workshop	68	-	-	209

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1F - SW - Comms Room 1	68	-	-	55
1F - E - Comms room 2	68	-	-	33
1F - W - Housing and community safety CCTV	68	-	-	759
1F - W - Parking Enforcement CCTV	68	-	-	401
1F - W - CCTV Comms room 3	68	-	-	77
1F - E - Open Plan Office	68	-	-	2066
1F - E - Disabled WC	-	85	-	61
1F - E - Ladies WC	-	85	-	127
1F - E - Ladies WC Lobby	-	85	-	24
1F - E - Ladies WC store?	68	-	-	14
1F - E - Lift	-	85	-	25
1F - E - Lift and WCs Lobby	-	85	-	31
1F - E - Lift Lobby	-	85	-	22
1F - E - Meeting Room 1	68	-	-	94
1F - E - Meeting Room 2	68	-	-	93
1F - E - Mens WC Lobby	-	85	-	25
1F - E - Mens WCs	-	85	-	96
1F - E - Open plan office Lobby	-	85	-	56
1F - E - Open plan Office Tea Station	68	-	-	170
1F - E - Praying Room	68	-	-	200
1F - E - Stairwell	-	85	-	106
1F - S - Stairwell	-	85	-	92
1F - W - CCTV Corridor	-	85	-	100
1F - W - CCTV Meeting Room	68	-	-	123
1F - W - CCTV Store	68	-	-	16
1F - W - CCTV Tea Room	-	85	-	48
1F - W - Ladies WC	-	85	-	111
1F - W - Ladies WC lobby	-	85	-	23
1F - W - Mens WC	-	85	-	145
1F - W - Open plan office Store	68	-	-	12
1F - W - Stairwell	-	85	-	60
1F - W - Tea Station	68	-	-	205
1F - W - WCs Lobby	-	85	-	25
1F - W - HASC toilets corridor	-	85	-	74
GF - E - Boiler Room	68	-	-	335
GF - E - Boiler Room PU & EV	68	-	-	155
GF - E - Entrance and stairs	-	85	-	69
GF - E - HASC Stores	68	-	-	103
GF - E - HASC Stores Stairwell	-	85	-	57
GF - E - HASC Stores void	-	85	-	311
GF - E - Incoming mains	68	-	-	80
GF - E - Incoming mains	68	-	-	119
GF - E - Incoming mains	68	-	-	213

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
GF - E - Ladies WC	-	85	-	90
GF - E - Mens WC	-	85	-	151
GF - E - Mens WC lobby	-	85	-	21
GF - E - Mens WC showers	-	85	-	21
GF - E - Offices stariwell	-	85	-	38
GF - E - Public lighting stores	68	-	-	47
GF - E - Reception/Security	-	85	15	107
GF - E - Tenants access corridor	-	85	-	46
GF - E - Tenants lift	-	85	-	26
GF - E - Tenants Lift lobby	-	85	-	46
GF - E - Wall void	68	-	-	12
GF - Paint & Spirit store	68	-	-	55
GF - S - HASC Offices	68	-	-	3406
GF - S - HASC Offices Reception Area	-	85	15	305
GF - W - Canteen	-	85	-	201
GF - W - Circulation	-	85	-	88
GF - W - Cleaners'	68	-	-	13
GF - W - HASC Offices	68	-	-	1110
GF - W - Joinery Filter room	68	-	-	277
GF - W - Joinery Workshop	68	-	-	1127
GF - W - Joinery Workshop Offices	68	-	-	293
GF - W - Joinery Workshop Offices	68	-	-	340
GF - W - Ladies parks & enforcements Lockers	-	85	-	99
GF - W - Male WC	-	85	-	124
GF - W - Mens parks & enforcement lockers	-	85	-	80
GF - W - Metal Workshop Ancillary	68	-	-	36
GF - W - Metal Workshop store	68	-	-	8
GF - W - Stairwell	-	85	-	49
GF - W - Workshops Lockers	-	85	-	100
GF - W - Workshops Lockers corridor	-	85	-	154
GF - W - Workshops WCs and showers	-	85	-	89
Mezz - E - Old Plant Room	68	-	-	46
Mezz - E - Old Plant Room (AHU)	68	-	-	249
Mezz - E - Public lighting Office	68	-	-	744
Mezz - W - Joinery Workshop Office	68	-	-	100
Mezz - W - Joinery Workshop Office	68	-	-	229
Mezz - W - Metal Workshop store	68	-	-	10
Mezz - W - Metal Workshop store	68	-	-	9
Mezz - W - Old plant room	68	-	-	460
Mezz - W - Stairwell	-	85	-	51
1F - SW - Open plan Office	68	-	-	6578
GF - E - HASC Stores	68	-	-	297
Mezz - E - HASC Store	68	-	-	205

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
GF - E - Offices	68	-	-	521
GF - E - Mens WC	68	-	-	177
GF - E - Discapacitated WC	68	-	-	96
GF - E - Offices	68	-	-	1227

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?
GF - W - Glazing workshop	NO (-77.7%)	NO
GF - W - Joinery Workshop back entrance	NO (-63.3%)	NO
GF - W - Metal Workshop	YES (+108%)	NO
GF - W - Metal Workshop	YES (+79.7%)	NO
GF - W - Metal Workshop	NO (-89.7%)	NO
Mezz - W - Metal Workshop	YES (+107.3%)	NO
1F - SW - Comms Room 1	NO (-24.9%)	NO
1F - E - Comms room 2	NO (-2%)	NO
1F - W - Housing and community safety CCTV	NO (-39.9%)	NO
1F - W - Parking Enforcement CCTV	NO (-33.2%)	NO
1F - W - CCTV Comms room 3	NO (-37%)	NO
1F - E - Open Plan Office	YES (+61.3%)	NO
1F - E - Meeting Room 1	N/A	N/A
1F - E - Meeting Room 2	N/A	N/A
1F - E - Open plan Office Tea Station	NO (-58.8%)	NO
1F - E - Praying Room	NO (-15.7%)	NO
1F - W - CCTV Meeting Room	N/A	N/A
1F - W - CCTV Tea Room	NO (-49.8%)	NO
1F - W - Tea Station	N/A	N/A
GF - E - Reception/Security	NO (-57.1%)	NO
GF - S - HASC Offices	NO (-74.9%)	NO
GF - S - HASC Offices Reception Area	NO (-79.4%)	NO
GF - W - Canteen	N/A	N/A
GF - W - HASC Offices	NO (-68.1%)	NO
GF - W - Joinery Filter room	N/A	N/A
GF - W - Joinery Workshop	YES (+101.9%)	NO
GF - W - Joinery Workshop Offices	NO (-73%)	NO
GF - W - Joinery Workshop Offices	NO (-60.6%)	NO
GF - W - Metal Workshop Ancillary	N/A	N/A
Mezz - E - Public lighting Office	NO (-78.9%)	NO
Mezz - W - Joinery Workshop Office	NO (-78.3%)	NO
Mezz - W - Joinery Workshop Office	NO (-70.9%)	NO
1F - SW - Open plan Office	NO (-18.3%)	NO
GF - E - Offices	N/A	N/A
GF - E - Mens WC	N/A	N/A
GF - E - Discapacitated WC	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF - E - Offices	N/A	N/A

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]	4783.7	4783.7
External area [m^2]	7580.7	7580.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	8	3
Average conductance [W/K]	3931.45	2757.65
Average U-value [W/m^2K]	0.52	0.36
Alpha value* [%]	14.32	16.46

* 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
99	**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
	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
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	29.71	21.54
Cooling	3.63	2.25
Auxiliary	2.31	0.98
Lighting	13.86	15.3
Hot water	36.55	35.93
Equipment*	42.49	42.49
TOTAL**	**86.06**	**75.99**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	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]	189.46	157.97
Primary energy* [kWh/m^2]	145.04	126.86
Total emissions [kg/m^2]	25.1	22

* 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: convectors, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	82.7	38.7	26.8	0	2.1	0.86	0	0.96	0
	Notional	33.2	32.5	10.7	0	0	0.82	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	1422.1	0	185.5	0	0	2.13	0	3
	Notional	0	1516	0	117	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	210.8	1119.7	20.9	146	0	2.8	2.13	3	3
	Notional	0	1489.5	0	114.9	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	121.8	98.1	12.1	12.8	0	2.8	2.13	3	3
	Notional	83.1	134.5	9.5	10.4	0	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	1395.6	0	182	0	0	2.13	0	3
	Notional	0	1511.4	0	116.6	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	439.3	159	43.6	20.7	0	2.8	2.13	3	3
	Notional	73.6	130.4	8.4	10.1	0	2.43	3.6	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	92.7	57.4	30	0	2.2	0.86	0	0.96	0
	Notional	71.2	70.4	24.1	0	1.2	0.82	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	-	GF000008_W5_0_0
Floor	0.2	0.07	GF00002F_F_-1
Roof	0.15	-	ST000001_C_0_0
Windows, roof windows, and rooflights	1.5	1.6	GF000008_W4-W0
Personnel doors	1.5	1.8	GF000001_W2-W0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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	8

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

1654 Holmes Road Depot

As designed

Date: Wed Jul 20 11:07:46 2016

Administrative information

Building Details

Address: Holmes Road Depot, 78 Holmes Road, London, NW5 3AP

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.5

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

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	22
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	22
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.9
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	0.29	1.52	1F00001D_W1_-1
Floor	0.25	0.23	0.98	GF00000B_F_-1
Roof	0.25	0.38	1.37	1F00001D_C_-1
Windows***, roof windows, and rooflights	2.2	2.59	6.69	GF00001C_C-W0
Personnel doors	2.2	1.8	1.8	GF000001_W2-W0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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	8

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	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Workshop Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	-	-	-
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					NO

* 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- Comms Room 3 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* 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- Gas Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	-	-	-
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					NO

* 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- CCTV Suite VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* 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.

5- Comms Room 1 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* 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.

6- Existing Office VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* 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.

7- Comms Room 2 Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.96	0
Standard value	0.8	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
GF - W - Glazing workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop back entrance	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Comms room 3	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Disabled WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Ladies WC store?	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift and WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Lift Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Meeting Room 1	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Meeting Room 2	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WC Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Mens WCs	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan office Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open plan Office Tea Station	-	-	-	-	-	-	-	-	-	-	N/A

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
1F - E - Praying Room	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - S - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Corridor	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Meeting Room	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - CCTV Tea Room	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Ladies WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Mens WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1F - W - Open plan office Store	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Tea Station	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - WCs Lobby	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - HASC toilets corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Boiler Room PU & EV	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Entrance and stairs	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores void	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Incoming mains	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Ladies WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC showers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices stariwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Public lighting stores	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Reception/Security	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants access corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants lift	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Tenants Lift lobby	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Wall void	-	-	-	-	-	-	-	-	-	-	N/A
GF - Paint & Spirit store	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - S - HASC Offices Reception Area	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Canteen	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Circulation	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Cleaners'	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - HASC Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Filter room	-	-	-	-	-	-	-	-	-	-	N/A

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
GF - W - Joinery Workshop	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Joinery Workshop Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Ladies parks & enforcements Lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Male WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Mens parks & enforcement lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop Ancillary	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers	0.3	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops Lockers corridor	-	-	-	-	-	-	-	-	-	-	N/A
GF - W - Workshops WCs and showers	0.3	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Old Plant Room (AHU)	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - Public lighting Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Joinery Workshop Office	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Metal Workshop store	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Old plant room	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - W - Stairwell	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Open plan Office	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - HASC Stores	-	-	-	-	-	-	-	-	-	-	N/A
Mezz - E - HASC Store	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Mens WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Discapacitated WC	-	-	-	-	-	-	-	-	-	-	N/A
GF - E - Offices	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Housing and community safety CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - W - Parking Enforcement CCTV	-	-	-	-	-	-	-	-	-	-	N/A
1F - SW - Comms Room 1	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Open Plan Office	-	-	-	-	-	-	-	-	-	-	N/A
1F - E - Comms room 2	-	-	-	-	-	-	-	-	-	-	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	
GF - W - Glazing workshop	68	-	-	460
GF - W - Joinery Workshop back entrance	68	-	-	148
GF - W - Metal Workshop	68	-	-	286
GF - W - Metal Workshop	68	-	-	298
GF - W - Metal Workshop	68	-	-	1472
Mezz - W - Metal Workshop	68	-	-	209

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1F - W - CCTV Comms room 3	68	-	-	77
1F - E - Disabled WC	-	85	-	61
1F - E - Ladies WC	-	85	-	127
1F - E - Ladies WC Lobby	-	85	-	24
1F - E - Ladies WC store?	68	-	-	14
1F - E - Lift	-	85	-	25
1F - E - Lift and WCs Lobby	-	85	-	31
1F - E - Lift Lobby	-	85	-	22
1F - E - Meeting Room 1	68	-	-	94
1F - E - Meeting Room 2	68	-	-	93
1F - E - Mens WC Lobby	-	85	-	25
1F - E - Mens WCs	-	85	-	96
1F - E - Open plan office Lobby	-	85	-	56
1F - E - Open plan Office Tea Station	68	-	-	170
1F - E - Praying Room	68	-	-	200
1F - E - Stairwell	-	85	-	106
1F - S - Stairwell	-	85	-	92
1F - W - CCTV Corridor	-	85	-	100
1F - W - CCTV Meeting Room	68	-	-	123
1F - W - CCTV Store	68	-	-	16
1F - W - CCTV Tea Room	-	85	-	48
1F - W - Ladies WC	-	85	-	111
1F - W - Ladies WC lobby	-	85	-	23
1F - W - Mens WC	-	85	-	145
1F - W - Open plan office Store	68	-	-	12
1F - W - Stairwell	-	85	-	60
1F - W - Tea Station	68	-	-	205
1F - W - WCs Lobby	-	85	-	25
1F - W - HASC toilets corridor	-	85	-	74
GF - E - Boiler Room	68	-	-	335
GF - E - Boiler Room PU & EV	68	-	-	155
GF - E - Entrance and stairs	-	85	-	69
GF - E - HASC Stores	68	-	-	103
GF - E - HASC Stores Stairwell	-	85	-	57
GF - E - HASC Stores void	-	85	-	311
GF - E - Incoming mains	68	-	-	80
GF - E - Incoming mains	68	-	-	119
GF - E - Incoming mains	68	-	-	213
GF - E - Ladies WC	-	85	-	90
GF - E - Mens WC	-	85	-	151
GF - E - Mens WC lobby	-	85	-	21
GF - E - Mens WC showers	-	85	-	21
GF - E - Offices stariwell	-	85	-	38

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
GF - E - Public lighting stores	68	-	-	47
GF - E - Reception/Security	-	85	15	107
GF - E - Tenants access corridor	-	85	-	46
GF - E - Tenants lift	-	85	-	26
GF - E - Tenants Lift lobby	-	85	-	46
GF - E - Wall void	68	-	-	12
GF - Paint & Spirit store	68	-	-	55
GF - S - HASC Offices	68	-	-	3406
GF - S - HASC Offices Reception Area	-	85	15	305
GF - W - Canteen	-	85	-	201
GF - W - Circulation	-	85	-	88
GF - W - Cleaners'	68	-	-	13
GF - W - HASC Offices	68	-	-	1110
GF - W - Joinery Filter room	68	-	-	277
GF - W - Joinery Workshop	68	-	-	1127
GF - W - Joinery Workshop Offices	68	-	-	293
GF - W - Joinery Workshop Offices	68	-	-	340
GF - W - Ladies parks & enforcements Lockers	-	85	-	99
GF - W - Male WC	-	85	-	124
GF - W - Mens parks & enforcement lockers	-	85	-	80
GF - W - Metal Workshop Ancillary	68	-	-	36
GF - W - Metal Workshop store	68	-	-	8
GF - W - Stairwell	-	85	-	49
GF - W - Workshops Lockers	-	85	-	100
GF - W - Workshops Lockers corridor	-	85	-	154
GF - W - Workshops WCs and showers	-	85	-	89
Mezz - E - Old Plant Room	68	-	-	46
Mezz - E - Old Plant Room (AHU)	68	-	-	249
Mezz - E - Public lighting Office	68	-	-	744
Mezz - W - Joinery Workshop Office	68	-	-	100
Mezz - W - Joinery Workshop Office	68	-	-	229
Mezz - W - Metal Workshop store	68	-	-	10
Mezz - W - Metal Workshop store	68	-	-	9
Mezz - W - Old plant room	68	-	-	460
Mezz - W - Stairwell	-	85	-	51
1F - SW - Open plan Office	68	-	-	6578
GF - E - HASC Stores	68	-	-	297
Mezz - E - HASC Store	68	-	-	205
GF - E - Offices	68	-	-	521
GF - E - Mens WC	68	-	-	177
GF - E - Discapacitated WC	68	-	-	96
GF - E - Offices	68	-	-	1227
1F - W - Housing and community safety CCTV	68	-	-	759

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1F - W - Parking Enforcement CCTV	68	-	-	401
1F - SW - Comms Room 1	68	-	-	55
1F - E - Open Plan Office	68	-	-	2066
1F - E - Comms room 2	68	-	-	33

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?
GF - W - Glazing workshop	NO (-77.7%)	NO
GF - W - Joinery Workshop back entrance	NO (-63.3%)	NO
GF - W - Metal Workshop	YES (+108%)	NO
GF - W - Metal Workshop	YES (+79.7%)	NO
GF - W - Metal Workshop	NO (-89.7%)	NO
Mezz - W - Metal Workshop	YES (+107.3%)	NO
1F - W - CCTV Comms room 3	NO (-37%)	NO
1F - E - Meeting Room 1	N/A	N/A
1F - E - Meeting Room 2	N/A	N/A
1F - E - Open plan Office Tea Station	NO (-58.8%)	NO
1F - E - Praying Room	NO (-15.7%)	NO
1F - W - CCTV Meeting Room	N/A	N/A
1F - W - CCTV Tea Room	NO (-49.8%)	NO
1F - W - Tea Station	N/A	N/A
GF - E - Reception/Security	NO (-57.1%)	NO
GF - S - HASC Offices	NO (-74.9%)	NO
GF - S - HASC Offices Reception Area	NO (-79.4%)	NO
GF - W - Canteen	N/A	N/A
GF - W - HASC Offices	NO (-68.1%)	NO
GF - W - Joinery Filter room	N/A	N/A
GF - W - Joinery Workshop	YES (+101.9%)	NO
GF - W - Joinery Workshop Offices	NO (-73%)	NO
GF - W - Joinery Workshop Offices	NO (-60.6%)	NO
GF - W - Metal Workshop Ancillary	N/A	N/A
Mezz - E - Public lighting Office	NO (-78.9%)	NO
Mezz - W - Joinery Workshop Office	NO (-78.3%)	NO
Mezz - W - Joinery Workshop Office	NO (-70.9%)	NO
1F - SW - Open plan Office	NO (-18.3%)	NO
GF - E - Offices	N/A	N/A
GF - E - Mens WC	N/A	N/A
GF - E - Discapacitated WC	N/A	N/A
GF - E - Offices	N/A	N/A
1F - W - Housing and community safety CCTV	NO (-39.9%)	NO
1F - W - Parking Enforcement CCTV	NO (-33.2%)	NO
1F - SW - Comms Room 1	NO (-24.9%)	NO
1F - E - Open Plan Office	YES (+61.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1F - E - Comms room 2	NO (-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]	4783.7	4783.7
External area [m^2]	7580.7	7580.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	8	3
Average conductance [W/K]	3931.45	2757.65
Average U-value [W/m^2K]	0.52	0.36
Alpha value* [%]	14.32	16.46

* 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
99	**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
	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
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	29.71	21.54
Cooling	3.63	2.25
Auxiliary	2.31	0.98
Lighting	13.86	15.3
Hot water	33.71	35.93
Equipment*	42.49	42.49
TOTAL**	**83.22**	**75.99**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	4.99	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	2.72	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	189.46	157.97
Primary energy* [kWh/m^2]	141.57	126.86
Total emissions [kg/m^2]	21.9	22

* 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: convectors, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	82.7	38.7	26.8	0	2.1	0.86	0	0.96	0
	Notional	33.2	32.5	10.7	0	0	0.82	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	1395.6	0	182	0	0	2.13	0	3
	Notional	0	1511.4	0	116.6	0	0	3.6	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	92.7	57.4	30	0	2.2	0.86	0	0.96	0
	Notional	71.2	70.4	24.1	0	1.2	0.82	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	121.8	98.1	12.1	12.8	0	2.8	2.13	3	3
	Notional	83.1	134.5	9.5	10.4	0	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	1422.1	0	185.5	0	0	2.13	0	3
	Notional	0	1516	0	117	0	0	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	439.3	159	43.6	20.7	0	2.8	2.13	3	3
	Notional	73.6	130.4	8.4	10.1	0	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	210.8	1119.7	20.9	146	0	2.8	2.13	3	3
	Notional	0	1489.5	0	114.9	0	0	3.6	----	----

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	-	GF000008_W5_0_0
Floor	0.2	0.07	GF00002F_F_-1
Roof	0.15	-	ST000001_C_0_0
Windows, roof windows, and rooflights	1.5	1.6	GF000008_W4-W0
Personnel doors	1.5	1.8	GF000001_W2-W0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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	8

14.0 APPENDIX 4 – BUILDING FABRIC MAKEUP

Peter Edwards

From: Ian Gledsdale <Ian@gledsdale.co.uk>
Sent: 03 June 2016 17:06
To: pe@bspce.com; RRamdhian@pellings.co.uk; 'Graham Burkle'
Cc: Charlie Castellana; 'Steve Willock'
Subject: RE: 1654 - Holmes Road Depot - Building Fabric make-up

Peter,

The roof and first floor construction are solid concrete flat slabs. With the spans involved the roof slab is likely to be 200- 250 thick and the first floor slab 250-300 thick.

Unfortunately there was nowhere where we could check the exact thickness.

Regards,

Ian Gledsdale

GLEDSDALE ASSOCIATES
Tel: 01732 456531
Email: ian@gledsdale.co.uk
Web: www.gledsdale.co.uk

From: Peter Edwards [mailto:pe@bspce.com]
Sent: 03 June 2016 16:22
To: RRamdhian@pellings.co.uk; 'Graham Burkle'
Cc: Charlie Castellana; 'Steve Willock'; Ian Gledsdale
Subject: 1654 - Holmes Road Depot - Building Fabric make-up

Hi Rakesh / Graham,

Following on from our site survey last week I was wondering if you had made some headway into the fabric makeup of the building?

Based on what we saw on site, I have the following (outside to inside);
Ground Floor – ???
External Wall – 104mm outer leaf brick, un-insulated cavity, 100mm inner leaf block, 15mm plasterboard;
Internal Wall (Type 1) – 15mm plasterboard, 100mm lightweight block, 15mm plasterboard;
Internal Wall (Type 2) – 15mm plasterboard, 100mm lightweight block, 15mm plasterboard;
Intermediate floor (Type 1) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 15mm plasterboard;
Intermediate floors (Type 2) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 200mm service void & 15mm ceiling tile;
Roof – Asphalt covering (say 5mm?), 100mm Concrete deck, 50mm service void, 15mm plasterboard;
Windows – Single glazing with aluminium frames.

Is this how you see it or do you have something different? Did you identify any other construction types if so can you let me know where?

Many thanks

Peter Edwards
brinson / staniland / partnership
T: 0208 466 6131 / E: pe@bspce.com / M: 07876 364 164 / **www.bspce.com**

Please consider the environment before printing this e-mail

Peter Edwards

From: Rakesh Ramdhian <RRamdhian@pellings.co.uk>
Sent: 18 July 2016 10:34
To: pe@bspce.com
Cc: Graham Burkle; Matthew Godwin; Charlie Castellana; 'Steve Willock'
Subject: RE: 1654 - Holmes Road Depot - Building Fabric make-up

Unfortunately not, it's a bit all-over the place to be honest.

In terms of the wall cavity, I would say approx. 75mm.

Kind Regards

Rakesh Ramdhian
Building Surveyor
Pellings
t 020 8441 8500 **m** 07742 538882

From: Peter Edwards [mailto:pe@bspce.com]
Sent: 18 July 2016 10:20
To: Rakesh Ramdhian <RRamdhian@pellings.co.uk>
Cc: Graham Burkle <GBurkle@pellings.co.uk>; Matthew Godwin <MGodwin@pellings.co.uk>; Charlie Castellana <cc@bspce.com>; 'Steve Willock' <sw@bspce.com>
Subject: RE: 1654 - Holmes Road Depot - Building Fabric make-up

Thanks for the below.

Do you have a mark-up where the differing construction types are? Do you have any idea on the dimension of the external wall cavities??

Many thanks

Peter Edwards
brinson / staniland / partnership
T: 0208 466 6131 / E: pe@bspce.com / M: 07876 364 164 / **www.bspce.com**

From: Rakesh Ramdhian [mailto:RRamdhian@pellings.co.uk]
Sent: 18 July 2016 10:05
To: pe@bspce.com
Cc: Graham Burkle <GBurkle@pellings.co.uk>; Matthew Godwin <MGodwin@pellings.co.uk>
Subject: RE: 1654 - Holmes Road Depot - Building Fabric make-up

Peter,

Apologies, the details you have provided seems correct, I have added additional elements:

Reinforced Concrete Framed structure, consisting of the following:

Ground Floor (Type 1) – Carpet tiles (approx. 7mm), screed, concrete deck (cannot confirm thicknesses);
Ground Floor (Type 2) – Sheet Vinyl (approx. 2.5mm), screed, concrete deck (cannot confirm thicknesses);

Ground Floor (Type 3) – Non-slip concrete coating finish, concrete slab laid in sections (min. 150mm but cannot confirm thicknesses);

External Wall (Type 1) – 104mm outer leaf brick, un-insulated cavity, 100mm inner leaf block, approx. 13mm plaster/render coat;
External Wall (Type 2) – 104mm outer leaf brick, un-insulated cavity, 100mm inner leaf block, 15mm plasterboard;
External Wall (Type 3) – 104mm outer leaf brick, un-insulated cavity, 100mm inner leaf block, Decorated finish;
External Wall)Type 4) = Outer leaf pre-cast concrete panel with a flat exposed aggregate finish, un-insulated cavity, 100mm inner leaf block;

Internal Wall (Type 1) – 15mm plasterboard, 100mm lightweight block, 15mm plasterboard;
Internal Wall (Type 2) – 15mm plasterboard, 100mm lightweight block, Cavity, 15mm plasterboard;

Intermediate floor (Type 1) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 15mm plasterboard;
Intermediate floors (Type 2) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 200mm service void & 15mm ceiling tile;

Roof (Type 1) – Built up felt roof, reinforced Concrete deck (min. 200mm but cannot confirm thicknesses), service void & 15mm ceiling tile;
Roof (Type 2) – Built up felt roof, reinforced Concrete deck (min. 200mm cannot confirm thicknesses)

Window (Type 1) – Single glazing with aluminium frames.
Window (Type 2) – uPVC double glazing

Hoe the information above is sufficient in completing your section of the project.

Kind Regards

Rakesh Ramdhian
Building Surveyor
Pellings
t 020 8441 8500 **m** 07742 538882

From: Peter Edwards [mailto:pe@bspce.com]
Sent: 15 July 2016 16:47
To: Rakesh Ramdhian <RRamdhian@pellings.co.uk>
Cc: Charlie Castellana <cc@bspce.com>; 'Steve Willock' <sw@bspce.com>; 'Ian Gledsdale' <Ian@gledsdale.co.uk>; Graham Burkle <GBurkle@pellings.co.uk>; Matthew Godwin <MGodwin@pellings.co.uk>
Subject: RE: 1654 - Holmes Road Depot - Building Fabric make-up

Rakesh,

Have you had a chance to look at the below yet?? I've had a response from Ian, but nothing from you yet and I'm being put under some pressure to finish & issue my report. TO do this I need your feedback on the below.

Can you provide me with a response by COB on Monday 18th at the latest so I have a chance of hitting the agreed delivery dates for this project.

Many thanks

Peter Edwards
brinson / staniland / partnership
T: 0208 466 6131 / E: pe@bspce.com / M: 07876 364 164 / **www.bspce.com**

From: Peter Edwards [mailto:pe@bspce.com]
Sent: 03 June 2016 16:22
To: 'RRamdhian@pellings.co.uk' <RRamdhian@pellings.co.uk>; 'Graham Burkle' <GBurkle@pellings.co.uk>
Cc: Charlie Castellana <cc@bspce.com>; 'Steve Willock' <sw@bspce.com>; 'Ian Gledsdale' <Ian@gledsdale.co.uk>
Subject: 1654 - Holmes Road Depot - Building Fabric make-up

Hi Rakesh / Graham,

Following on from our site survey last week I was wondering if you had made some headway into the fabric makeup of the building?

Based on what we saw on site, I have the following (outside to inside);
Ground Floor – ???
External Wall – 104mm outer leaf brick, un-insulated cavity, 100mm inner leaf block, 15mm plasterboard;
Internal Wall (Type 1) – 15mm plasterboard, 100mm lightweight block, 15mm plasterboard;
Internal Wall (Type 2) – 15mm plasterboard, 100mm lightweight block, 15mm plasterboard;
Intermediate floor (Type 1) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 15mm plasterboard;
Intermediate floors (Type 2) – carpet tiles, 50mm screed, 100mm Concrete deck, 50mm service void, 200mm service void & 15mm ceiling tile;
Roof – Asphalt covering (say 5mm?), 100mm Concrete deck, 50mm service void, 15mm plasterboard;
Windows – Single glazing with aluminium frames.

Is this how you see it or do you have something different? Did you identify any other construction types if so can you let me know where?

Many thanks

Peter Edwards
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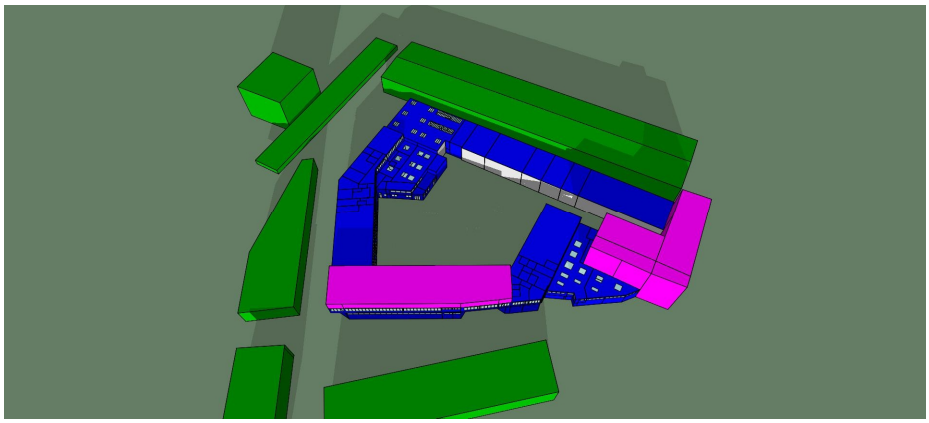
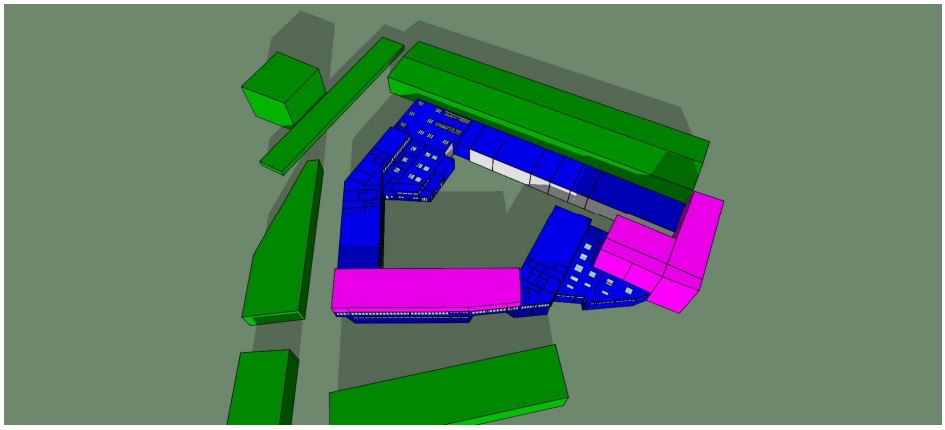
15.0 APPENDIX 5 – PV OVERSHADING ANALYSIS

An initial over-shading analysis has been undertaken for the site to assist in identifying the optimum orientation and hence the sizing for the PV array. This has been based on the insolation data within the weather file used in the IES model. The following images show the shading from the depot and the surrounding buildings.

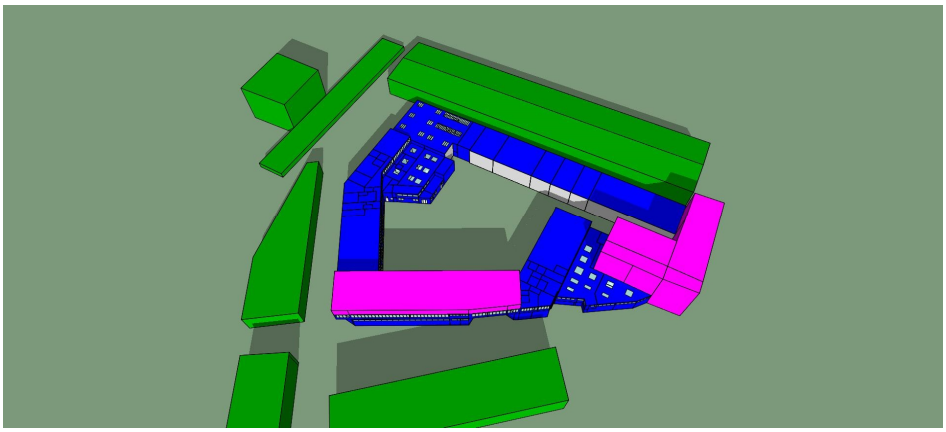
January 10th



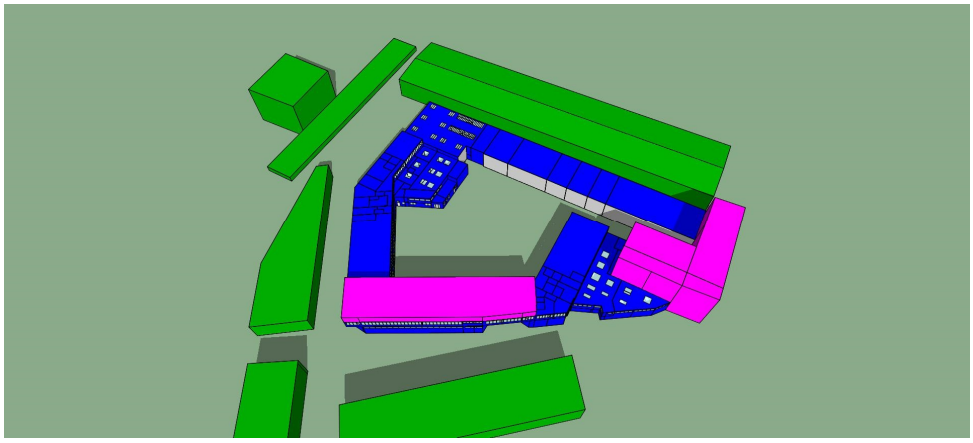
February 10th



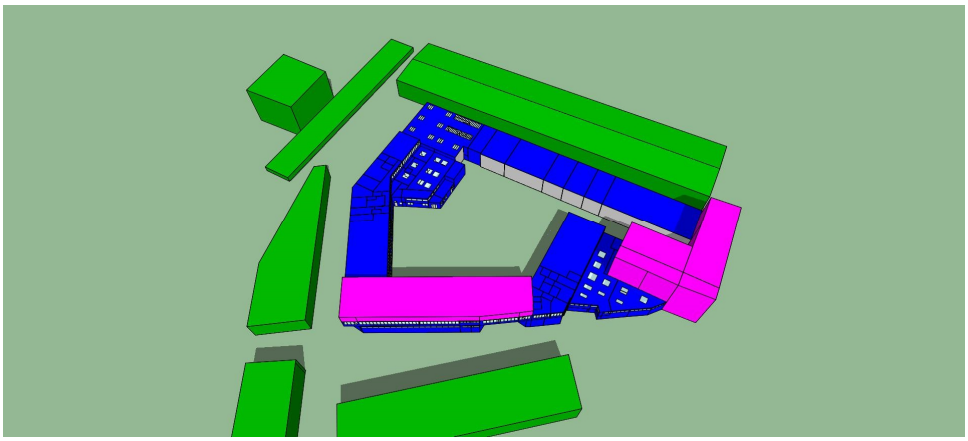
March 10th



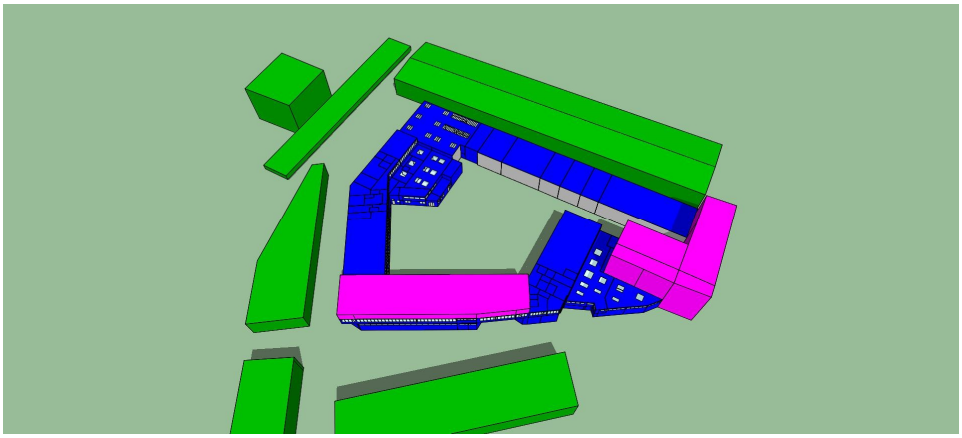
April 10th



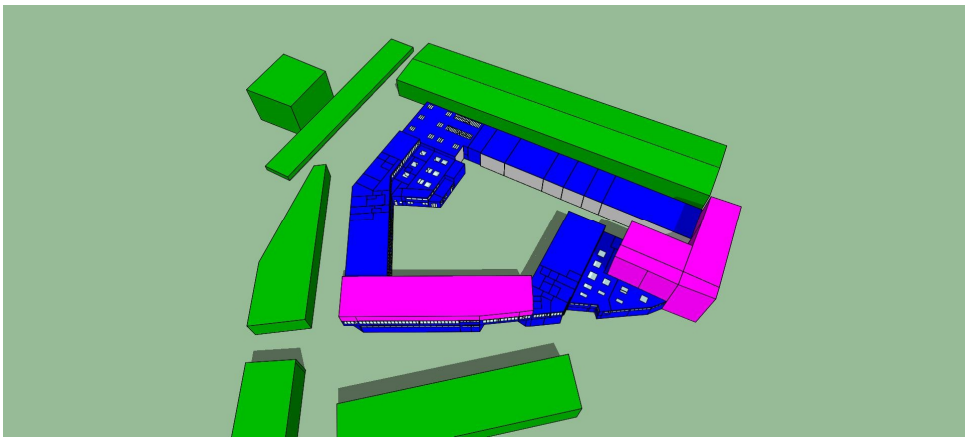
May 10th



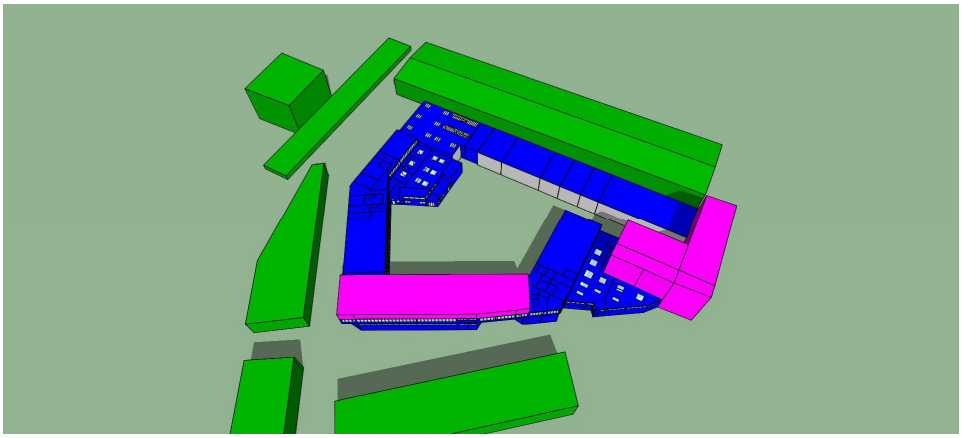
June 10th



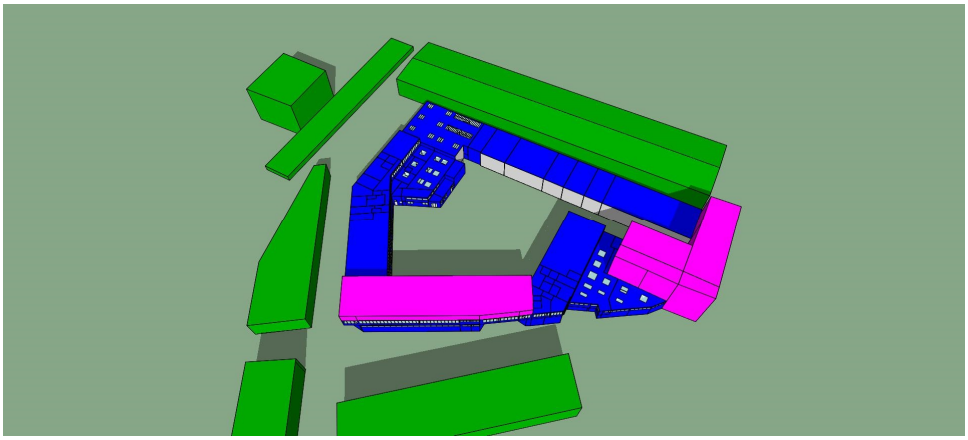
July 10th



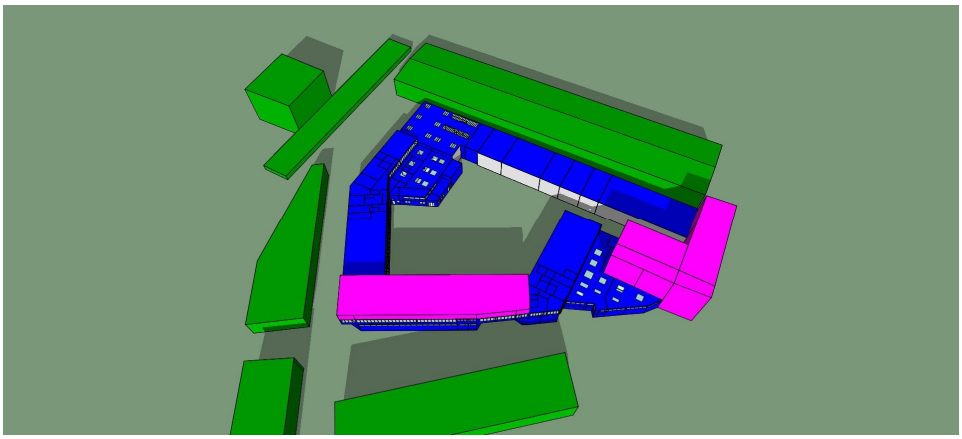
August 10th



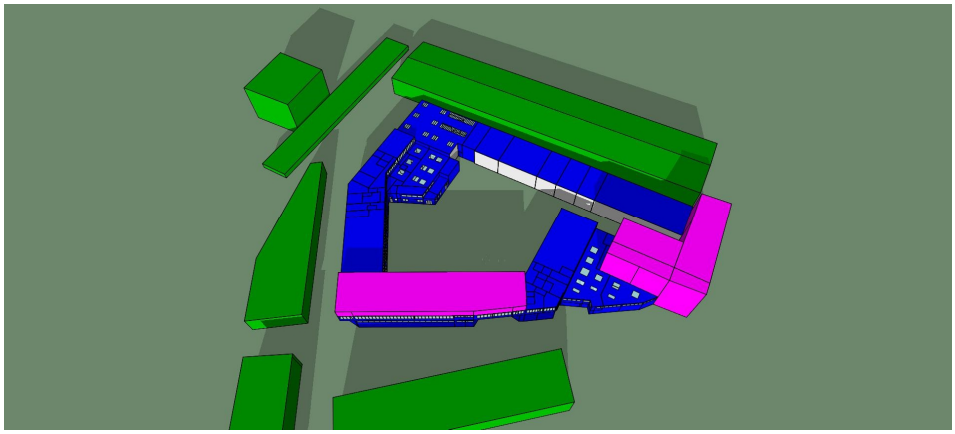
September 10th



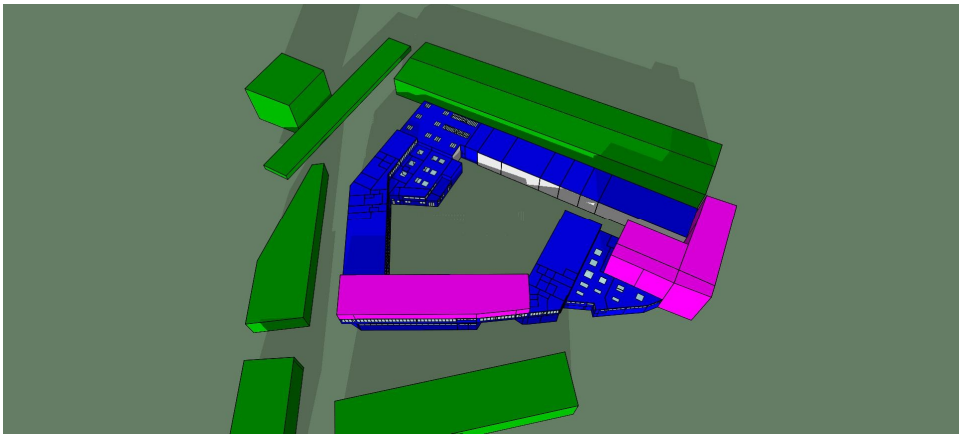
October 10th



November 10th



December 10th



16.0 APPENDIX 6 – BREEAM ENE1 COMPLIANCE CHECKER

My Projects

Projects **Documents and Tools**

NC Ene 1 Compliance Checker

NC 2011 Compliance Checker

BREEAM NEW CONSTRUCTION 2014 ENE 01 COMPLIANCE CHECKER

ASSESSMENT CRITERIA

Indicates required fields *

Country *

England

Actual building - Energy Demand *

189.46 MJ/m2/year

Notional building - Energy Demand *

157.97 MJ/m2/year

Actual building - Primary Energy *

133.03 kWh/m2/year

Notional building - Primary Energy *

126.86 kWh/m2/year

Actual building - Emissions (BER) *

20.6 kgCO2/m2/year

Notional building - Emissions (TER) *

22 kgCO2/m2/year

Does this building contain areas that require a SAP assessment?

No

CALCULATE SCORE

BUILDING SCORE

Total BREEAM credits achieved

1.0

Heating and cooling demand energy performance ratio (EPRed)

0.0

Primary consumption energy performance ratio (EPRpc)

0.0

CO2 energy performance ratio (EPRco2)

0.088

Overall building energy performance ratio (EPRnc)

0.087

% improvement BER/TER

6.4

FOR MORE INFORMATION

Contact BREEAM on +44 (0)333 321 8811, or email us at info@breeam.org