Stag Brewery, Mortlake.
Energy Strategy.

To: Anne-Marie Robinson, Katherine Wood, Ioanna Mytilinaiou - GLA

Cc: Guy Duckworth - Dartmouth Capital, Suzanne Robson - Gerald Eve, Anna Gargan – Gerald Eve

From: Richard Harper, Principal Sustainability Consultant

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Project: Stag Brewery, Mortlake

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Responses to GLA Stage 1 Comments

The original (Rev A) note dated 21st August 2018, provided a response to the Stage 1 comments provided within the GLA 'Decision Letter and Report' dated 30th July 2018, and 'Energy Memo: Stage 1 Consultation' dated 2nd July 2018. A second set of comments were received on 25th October and responded to in a Revision B of the note.

This updated note is provided in response to a third set of comments by the GLA Energy Officer received by email on 5th December 2018. Items that have been concluded have been removed from the table below. Green text indicates that an item has met the satisfaction of the GLA energy officer as identified by the response received.

It is anticipated that detailed discussions on the outstanding issues will be able to take place at the meeting scheduled for 15th January 2019.

GLA Comment	Consultant Response (Rev A)	GLA second comment 25.10.2018	Consultant Response (Rev B)	GLA Third comment 5.12.2018	Consultant Response (Rev C)
4. The area weighted average actual and notional cooling demand for the non-domestic buildings (MJ/m^2) should be provided and the applicant should demonstrate that the actual buildings' cooling demand is lower than the notional.	Table 4.4 in the Energy Strategy provides the results of the calculation of Annual Energy Requirement for each use type within Application A and B including the non-domestic buildings. Actual and Notional MJ/m^2 heating and cooling demand of the areas that have been modelled using DSM are included in the BRUKL output documents in the Appendices. Where benchmark data has been used, the cooling demand is shown in Table 4.4. The current and new London Plan do not stipulate that the actual building cooling demand must be lower than the notional demand only that cooling demand should be reduced in line with the cooling hierarchy.	As requested, the applicant should provide the area weighted average actual and notional cooling demand for the non-domestic buildings (MJ/m2). It is the GLA's requirement to demonstrate that the actual buildings' cooling demand is lower than the notional. The information within the Energy Strategy is not considered sufficient to respond to the above comment. **This item is still outstanding.**	The actual and notional cooling demand is taken from the BRUKL output documents for the modelled non-domestic buildings including the Office, Cinema and Hotel. Use Type / Notional / Actual Office / 110.7 / 74 Cinema* / 59 / 77.2 Hotel / 31.9 / 11.5 * The GLA Energy Planning guidance states that where opportunities for reducing cooling demands via passive measures are constrained such as in Cinemas, these can be excluded.	The actual and notional cooling demand has been provided from the BRUKL. For both the offices and the cinema, the actual cooling demand is lower than the notional; this is welcomed. However, for the cinema, this is slightly higher. It is acknowledged that there are uses, such as cinemas, where the opportunities for reducing the cooling demand may be constrained. As such, nothing further is required.	Nothing further required.

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5. An Overheating Analysis using thermal dynamic modelling has been undertaken to assess the overheating risk within the conditioned areas of the building; its results demonstrate that several areas do not meet the CIBSE TM59 criteria. The applicant should investigate further design measures in order to reduce the unwanted solar gains entering the building.	The Energy Strategy sets out that Squire and Partners had advised based on daylighting simulation results by EB7 that further reduction in the amount of glazing and applying external solar shading devices such as shutters, movable screens or brise soleil would have a detrimental impact on the daylight results in the dwellings. As a consequence, reductions in solar gain could be achieved through the specification of an internal blind with high shading coefficient which does not impinge upon the ability of windows or doors to be opened inwards or through reduced g-value (providing it does not reduce visible light transmittance). These options will be considered at detailed design stages.	The applicant has stated that according to the daylight consultant, further reduction in the amount of glazing and applying external solar shading devices such as shutters, movable screens or brise soleil would have a detrimental impact on the daylight results in the dwellings. As such, available options include internal blinds with high shading coefficient which do not impinge upon the ability of windows or doors to be opened inwards or through reduced g-value (providing it does not reduce visible light transmittance). These options need to be further investigated at this stage for the detailed elements of the site and therefore additional modelling should be provided. The applicant should ensure all modelled spaces meet the CIBSE TM59 criteria for the DSY1 weather file. This is a requirement and clear evidence (in a pass/fail format for all modelled units) should be provided for review. **This item is still outstanding.**	See Appendix D of this report for a table of Pass/Fail of the apartments assessed in TM59. A significant majority of rooms meet the criteria of TM59 and are therefore deemed to be of acceptable risk of overheating. The rooms that do not meet the criteria of TM59 have available a number of mitigation measures that have been designed into the development but are not necessarily taken into account in TM59 modelling. The occupants will have the ability to open windows and doors when the room is unoccupied (such as living room windows overnight) as the apartments are largely located on upper floors, internal doors could remain open, windows could be opened at lower temperatures during hot weather periods to allow the dwellings to purge, blinds with a greater shading effect could be used. It is considered that the relatively small number of rooms that fail to meet the criteria would have their overheating risk mitigated by applying one or more of these measures.	A table of Pass/Fail of the apartments assessed in TM59 has been submitted. 33% of the modelled units do not comply with the Criterion 1 and 8% of bedrooms fail to meet Criterion 2. The applicant has stated that the rooms that do not meet the criteria of TM59 have available a number of mitigation measures that have been designed into the development but are not taken into account in TM59 modelling. These include the ability of occupants to open windows and doors when the room is unoccupied (such as living room windows overnight), windows being opened at lower temperatures during hot weather periods and blinds with a greater shading effect. The applicant has stated that, the rooms that fail to meet the criteria would have their overheating risk mitigated by applying one or more of these measures and that this is deemed an acceptable risk of overheating. This is not considered an acceptable performance, particularly given the increased importance of overheating in recent years and the increased presence of the urban heat island in London. The applicant should, investigate additional passive options to further limit the overheating risk for the DSY1 weather file, provide modelling evidence of the mitigation measures considered and submit the revised overheating results. **This item is still outstanding**.	The requirement to undertake this additional modelling is expected to be discussed at the meeting on January 15th 2019. Further to the previous comments, it is considered that the specification of window g-values, blinds and other passive mitigation measures to the appropriate level of detail will occur later in the design of the development and the further modelling will be undertaken at the future design stage when the design details are available.
6. The overheating performance against all CIBSE TM49 weather files should also be submitted.	The new Draft London Plan states 'The Chartered Institution of Building Services Engineers (CIBSE) has produced guidance on assessing and	This item has not been addressed and is **therefore still outstanding.**	DSY2 and 3 will perform worse than DSY1 as this is inherent in the weather file data that is used in the calculations.	The applicant has stated that DSY2 and 3 will perform worse than DSY1. As repeatedly requested, the applicant should present the	The requirement to undertake this additional modelling is expected to be discussed at the meeting on January 15th 2019.

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	mitigating overheating risk in new developments, which can also be applied to refurbishment projects. TM 59 should be used for domestic developments and TM 52 should be used for non-domestic developments. In addition, TM 49 guidance and datasets should also be used to ensure that all new development is designed for the climate it will experience over its design life. Further information will be provided in guidance on how these guidance documents and datasets should be used'. TM59 has been developed for domestic buildings and states 'Developments should refer to the latest CIBSE design summer year (DSY) weather files and be required to pass using the DSY1 file most appropriate to the site location, for the 2020s, high emissions, 50% percentile scenario'. Dynamic simulation modelling (DSM) results have been completed using the most appropriate, CIBSE approved TM59 compliant weather file for the site, which is 'London_LHR_DSY1_2020High50'. This file which forms part of the TM49 data set is used as the minimum requirement to determine overheating risk as per CIBSE TM59 guidance in this part of the UK, and is a projection, based on historical data, of typical weather in the 2020s in a high emission 50% percentile scenario.			**overheating performance against all CIBSE TM49 weather files as the current DSY is not considered to be sufficiently extreme to provide substantial overheating evidence. The plans in place to mitigate any additional overheating risk should be clearly outlined. This item is still outstanding.**	Further to the previous comments, it is considered that the specification of window g-values, blinds and other passive mitigation measures to the appropriate level of detail will occur later in the design of the development and the further modelling will be undertaken at the future design stage when the design details are available. The ability to mitigate additional overheating risk in the future climate scenarios are as follows: the occupants will have the ability to open windows and doors when the room is unoccupied (such as living room windows overnight) as the apartments are largely located on upper floors; internal doors could remain open,;windows could be opened at lower temperatures during hot weather periods to allow the dwellings to purge; blinds with a greater shading effect could be used.
9. The applicant should model additional energy efficiency measures and commit to the development exceeding even further the 2013 Building Regulations through energy efficiency alone. Further measures should be applied to both residential and non-domestic elements.	The design has targeted the CO_2 emissions reductions set out in the London Plan policy 5.2. Table 4.2 of the Energy Strategy provides a summary of the Passive Design and Energy Efficiency Measures targeted by the proposed development in order to reduce CO_2 emissions beyond Part L 2013 compliance at the Be Lean stage. These values improve upon the 2013 Part L limiting values by up to 70%. Dwellings have been designed	The applicant has stated that the passive and energy efficiency measures improve upon the 2013 Part L limiting values by up to 70% and therefore no further improvements can be accommodated. Whereas Table 4.2 of the Energy Statement states that the external wall U-value is 0.12W/m2K, the DER sheets submitted include values that range from 0.18 – 0.20 W/m2K. The	The sheets in the Appendices of this report are the DER and TER sheets for each apartment that has been assessed in the SAP software. The u-value of 0.18 W/m^2K for external walls appears only in the TER worksheets and TER calculations for the dwellings. The external walls in the DER are split between external walls at 0.12	The DER and TER sheets have been provided. The applicant has stated that the u-value of 0.18 W/m2K for external walls appears only in the TER worksheets. The external walls in the DER are split between external walls at 0.12 W/m2K u-value and 0.20 W/m2K for sheltered external walls u-value. There are a number of units where the y-value is as low as	The construction type of the scheme is to be developed during future design stages. Thermal Bridging performance of Accredited Construction Details (ACD) were used as the basis of an improved performance of the thermal bridging within the dwellings SAP calculations and provide a target performance for the design to achieve. As is

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	without cooling to reduce CO_2 emissions in absolute terms. By discussion with the design team, further options to reduce CO_2 emissions have been explored. In order to achieve the current level of CO_2 emissions reduction external wall u-values have been improved to 0.12W/m^2.K. Further reductions will increase wall thicknesses resulting in reduced internal living spaces negatively. There are limited areas of roof and ground floor due to the mid rise nature of the blocks. Glazing performance is achieving good practice levels. The daylight consultant has advised that reducing window sizes would have a negative impact on daylight ingress to the dwellings, increasing the g-value would mean a lower space heating requirement in winter months as the dwellings would receive more beneficial solar gain but would result in an increased risk of overheating. Providing cooling to mitigate this risk would result in higher CO_2 emissions in absolute terms. Given the above, it is felt that there are no further practical measures that could be adopted without impact on other aspects of the design. Consequently, no amendments are proposed.	applicant is required to update their models in line with the assumptions reported within the main body of the report and provide the updated carbon emissions for all stages of the energy hierarchy as well as the updated DER evidence sheets. This item is still outstanding.	W/m^2K u-value and 0.20 W/m^2K for sheltered external walls u-value.	0.06W/m2K; this is considered particularly challenging to achieve. The applicant should confirm the construction type for the scheme and explain if Accredited Construction Details (ACDs) have been used for the calculations. The applicant should also explain the processes in place in order to ensure that achieving this challenging performance level will be possible. **This item is still outstanding.**	standard practice, it is anticipated that as the architectural design is developed into construction details thermal bridging performance calculations will be undertaken to assess the performance of the thermal bridging junction details and further refinement of the design undertaken for the thermal bridging performance to contribute to the overall CO_2 emissions reductions target being achieved.
10. Sample 'be lean' TER, DER and the full BRUKL worksheets should be submitted to verify the savings stated.	Sample Be Lean DER and summary pages from BRUKL outputs have been provided in the Energy Strategy. Full BRUKL output documents are provided in Appendix B of this response.	The sample modelling output files have been submitted. The 'be lean' BRUKL files assume a VRF system for certain zones. This should be updated with gas-fired boiler systems in line with the GLA guidance, which requests gas-based systems to be assumed at 'be lean' stages. The revised BRUKL sheets should be submitted for all three uses (hotel, office, cinema) alongside the revised carbon emissions for baseline and lean scenarios. This item is still outstanding.	The BRUKLs have been updated the comments with gas boilers applied across all systems. See Appendix E for updated tables.	The BRUKLs have been updated with gas boilers applied across all systems; this is welcomed. The revised carbon emissions for the 'be lean' scenario for the non-domestic uses have also been provided, as requested. However, the hotel seems to have a boiler system with a 95% efficiency, whereas the other two BRUKLs have assumed 94%. Clarification is required as it is expected that the efficiency of the boiler will be the same across all uses.	The BRUKLs have been updated to reflect an efficiency of 95%. This is a target efficiency for the gas boilers in the energy centre and the make and model of the boiler will be specified during detailed design. These are provided in Appendix B of this report.

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				Manufacturer's datasheet for this challenging boiler performance should be submitted as evidence. **This item is still outstanding.**	
12. The applicant has carried out an investigation and there are no existing or planned district heating networks within the vicinity of the proposed development. The applicant has, however, provided a commitment to ensuring that the development is designed to allow future connection to a district heating network should one become available. The applicant should outline the means in place to future proof the site.	The development will be provided with a single point of connection to future district heat networks that could be extended to connect to the site. This is shown on MEP schematic in Appendix C.	The applicant has stated that the development will be provided with a single point of connection to future district heat networks. The schematic provided does not show the means in place to future proof the site, as requested. The applicant should outline the means in place to future proof the site. This item is still outstanding.	Blanked off pipework connections would be provided within the proposed energy centre to allow for future connection subject to legal, technical and economic feasibility to a district heat network that would be provided by others.	It has been stated that blanked off pipework connections would be provided within the proposed energy centre to allow for future connection to a district heat network. This should be secured through a condition. Nothing further required for now.	Nothing further required.
13. The applicant is proposing to install a site heat network. However, the applicant should confirm that all apartments and non-domestic building uses will be connected to the site heat network. A drawing showing the route of the heat network linking all buildings on the site should be provided.	The proposed Site Wide Heat Network is intended to connect all areas in Development Area 1 with a high thermal demand such as the dwellings will connect to the network. Use types with limited thermal demand such as A1 Retail will be provided with capped connections and this scenario has been included in the Energy Strategy results. The Energy Strategy calculations present approximately 1% of the Proposed Development hot water demand and approximately 3% of heating demand not being connected to the network in Development Area 1. This is shown on MEP schematic in Appendix C. The Reserved Matters submission for Development Area 2 will provide further details on connections and network in this area.	The applicant has stated that the proposed Site Wide Heat Network is intended to connect all areas in Development Area 1 with a high thermal demand such as the dwellings. Use types with limited thermal demand such as A1 Retail will be provided with capped connections. A relevant schematic has been provided. It has also been stated that the Reserved Matters submission for Development Area 2 will provide further details on connections and network in this area. It is important that a site-wide heat network is secured at the outset for the entire development (detailed and outline). As such, the applicant should provide indicative drawings showing that the site will host a site-wide heat network linking all buildings on site. A commitment for a site-wide heat network is required to be secured at this stage. **This item is still outstanding.**	The request for a commitment to provide a single site wide heat network for the whole development of Development Area 1 and 2 of Application Area A, is not appropriate in order to secure the highest CO_2 emissions reductions for the overall site. If Development Area 2 submits a reserved matters application with a heat pump strategy (either building based or as a network within the Development Area 2) in order to provide commitment to greater CO_2 emissions reductions than would be achievable with the connection to the gas fired CHP led heat network of Development Area 1, then the interconnectivity of the two networks would not be suitable as they are likely to run at different temperatures and with differing requirements. The comment below (No. 14) suggests that the submission should allow for flexibility of differing technologies but in this comment it is being requested to move forward with a single heat network which will be connected to a gas fired CHP energy centre for the whole development, removing the flexibility.	See item 19.	
14. The applicant is proposing that each area of the Proposed Development will have an energy centre; a roof level energy	Initial energy strategy calculations at the pre-app stage demonstrated that using a single energy centre with CHP	The applicant has stated that the School has its own energy centre as it will be subject to separate	The number of energy centres on the site have been minimised in line with phasing and control of the	See item 19.	

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centre is proposed for the school, a basement energy centre for development area 1 and another basement energy centre for development area 2. The townhouses within development area 2 are considered to be serviced through individual boilers. Further justification should be submitted to support the multiple energy centre proposals. Discussions held during the pre-application stage focused on the minimisation of energy centres across the site where possible and where inherent constraints are not present.	for Phase 1 compared with multiple energy centres has a minor impact on the CO_2 emissions reductions of a 1.5% decrease. The proposals submitted for planning have proposed a single energy centre for Development Area 1. The flexibility for the reserved matters submission of the elements applied for outline permission in Development Area 2, will enable a suitable Energy Strategy with CO_2 emissions reduction strategy to be developed without the burden of connecting to an Energy Centre targeting compliance with an Energy Strategy submitted under what is likely to be previous Building Regulations versions and older planning policy. The School has its own energy centre as the land for the school will be handed to the local planning authority and the construction of the school and the energy centre will be delivered by another party (i.e. not the Applicant). The future emissions scenarios indicate that CHP may not be an effective method of reducing CO_2 over electrically based heating systems such as air source heat pumps is relevant in the timescales for the reserved matters submission of the outline areas of the Proposed Development.	ownership to the development of Application A and will be brought forward by the local authority. The applicant has allowed for flexibility during the reserved matters submission of the elements applied for outline permission in Development Area 2 to enable a suitable Energy Strategy with CO2 emissions reduction strategy to be developed without the burden of connecting to an Energy Centre targeting compliance with an Energy Strategy submitted under what is likely to be previous Building Regulations versions and older planning policy. Given the changes associated with the decarbonisation of the grid and the Draft London Plan, the applicant is welcomed to investigate alternative centralised heating technologies that could offer higher carbon savings under future emissions scenarios. The applicant is encouraged to consider a strategy that will be future-proofed to achieve zero carbon emissions on-site by 2050 and provide proposals setting this out. The number of energy centres should still be minimised and various technologies could be accommodated within the same energy centre. **This item is still outstanding.**	areas associated with the Proposed Development. Development Area 1 application has been made in full with CHP network as per discussion held with the GLA at the pre-app stage. At this stage the decarbonisation of the grid was brought up by the consultant but in accordance with the discussions around the policy and guidance that was in place at the time the development proceeded to develop a CHP led heat network for Development Area 1 as a means to meet the policy and demonstrate CO_2 emissions reductions as per the Energy Strategy. It is considered appropriate that Development Area 2 is maintained as a separate heat network in order to benefit from decarbonisation and with or without a heat network can make use of suitable technologies to enable a reduction in CO_2 emissions. The method of achieving the CO_2 emissions reductions set out in the Energy Strategy will be set out in the reserved matters submission.		
17. Sample 'be clean' DER and the full BRUKL worksheets should be submitted to verify the savings stated.	Sample Be Lean DER and summary pages from BRUKL outputs have been provided in the Energy Strategy. The results of these assessments have been used to apply calculations on a site wide basis for the proposed development areas at the Be Clean and Be Green stages. The results of these calculations are set out in the Energy Strategy. Iterations of the SAP and BRUKL outputs have not been undertaken for Be Clean and Be Green stages as allocation of thermal demand met by CHP to each calculation and allocation	The information requested has not been submitted. The applicant has stated that iterations of the SAP and BRUKL outputs have not been undertaken for Be Clean and Be Green stages as allocation of thermal demand met by CHP to each calculation and allocation of PV arrays to buildings and further to uses within the buildings is not feasible at this stage of the development's design. This statement is not acceptable. The applicant should provide the modelling outputs for the domestic ('be clean' DER sheets) and the non-	These outputs are provided in Appendix F (DER and TER) and Appendix G (BRUKLs).	These have been provided. However, for the cinema the 'be clean' BRUKL seems to have a worse performance compared to 'be lean' one and Part L compliance is not achieved. Clarification is required and the applicant should ensure that Part L is met in all uses. **This item is still outstanding**	The BRUKL for the Be Clean scenario has been re-run and an amended BRUKL is provided in Appendix G at the end of this document. This shows that Part L is met in all uses at all stages.

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	of PV arrays to buildings and further to uses within the buildings is not feasible at this stage of the development's design.	domestic elements ('be clean' BRUKL sheets), as originally requested. This item is still outstanding.			
19. Given the site's scale and density, a CHP engine is not considered the most appropriate technology for developments of less than 500 units; this is in line with the GLA guidance. The applicant should therefore ensure that a single CHP engine will supply the entire site (Application A) or consider other more appropriate heating technologies for the site.	Application A, Development Area 1 to the East of Ship Lane is proposing 443 residential units which whilst not meeting the figure of 500 units deemed appropriate by the GLA is of sufficient scale to allow CHP to be operated effectively supplying a heat network in order to reduce CO_2 emissions. The non-dwelling areas such as the hotel will also have a connection to the network and with significant demand for heating and hot water will further improve the viability of the heat network and CHP in the Development Area 1 energy centre. The flexibility for the reserved matters submission of the elements applied for outline permission in Development Area 2, will enable a suitable Energy Strategy with CO_2 emissions reduction strategy to be developed.	The applicant has stated that Application A, Development Area 1 to the East of Ship Lane is proposing 443 residential units which whilst not meeting the figure of 500 units deemed appropriate by the GLA is of sufficient scale to allow CHP to be operated effectively supplying a heat network in order to reduce CO_2 emissions. The non-dwelling areas such as the hotel will also have a connection to the network and with significant demand for heating and hot water will further improve the viability of the heat network and CHP in the Development Area 1 energy centre. For Development Area 2 (outline), flexibility is allowed to enable a suitable Energy Strategy with CO_2 emissions reduction strategy to be developed. Please refer to Item 14 above.	As per the response to item 14 the Development Area 1 application has been made in full with CHP network as per discussion held with the GLA at the pre-app stage. At this stage the decarbonisation of the grid was brought up by the consultant but in accordance with the discussions around the policy and guidance that was in place at the time the development proceeded to develop a CHP led heat network for Development Area 1 as a means to meet the policy and demonstrate CO_2 emissions reductions as per the Energy Strategy. It is considered appropriate that Development Area 2 is maintained as a separate heat network in order to benefit from decarbonisation and with or without a heat network can make use of suitable technologies to enable a reduction in CO_2 emissions. The method of achieving the CO_2 emissions reductions set out in the Energy Strategy will be set out in the reserved matters submission.	A combined response to Items 13, 14 and 19 has been provided below due to their overlap in terms of policy areas. The applicant has stated that the Development Area 1 application has been made in full with CHP network as per discussion held with the GLA at the pre-application stage. Note that the original pre-application discussions were held in February 2017. Since this time, there has been a new GLA Energy Assessment Guidance published which encourages planning applicants to use the new SAP 10 emission factors. It also re-states the expectation that small-medium sized residential sites are not typically expected to incorporate CHP. The proposed heating strategy is therefore not considered sufficient. The applicant is required to closely investigate the potential of providing a single centralised energy centre led by an appropriate technology (e.g. heat pumps) and should consider using the SAP 10 emission factors as encouraged in the new guidance. A site-wide heat network is required. The applicant has not provided substantial technical justification explaining why a site-wide heat network served by a single energy centre is not appropriate for this site. In light of the above, a centralised solution supplying a future proofed site-	It is intended that this response will be discussed at the meeting on Tuesday 15th January 2019. Application of the new Energy Planning Guidance would alter the submitted energy strategy dated February 2017, for the development to such an extent that the proposed development submitted for planning would need to be significantly re-designed to accommodate the plant areas of the different technologies that would be applicable. The pre-app discussions were undertaken on the basis of gas-fired CHP as per London Plan policy 5.6. Discussions at this time were also held on the changing carbon factor of electricity from the national grid and the suitability of gas fired CHP were queried with the Energy Officer by the consultant, however it was concluded that the Proposed Development should follow the GLA policy in place at that point in time. Development Area 1 was therefore developed in line with the Energy Planning Guidance (Oct 2016). Prior to the update of the London Planning Policy in the new London Plan the Energy Planning Guidance was altered to reflect the SAP 10 emission factors in October 2018. The split of the two energy centres is necessary due to phasing of the

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				wide heat network will be expected. All the supporting necessary evidence (heat network schematics, energy centre layouts etc.) should be submitted for review. **This item is still outstanding.**	site and there is the potential for the energy centres to be connected in the future and subject to legal, financial and technical feasibility and as and when Development Area 1 and 2 have been sufficiently developed. To take account of the anticipated effect of revisions to carbon emission factors that were suggested by the consultant during the pre-app discussions in Feb 2017 the outline Energy Strategy for Development Area 2, is separated from the network in Dev Area 1 in order to benefit from decarbonisation and with or without a heat network can make use of suitable technologies to enable a reduction in CO_2 emissions. The method of achieving the CO_2 emissions reductions set out in the Energy Strategy will be set out in the reserved matters submission. Heat network schematic for Dev Area 1 has been submitted.
22. The applicant should provide information on the anticipate PV provision of the outline stages of the design.	This will be provided in the Energy Strategy of the reserved matters submission. It is currently expected that additional provision of renewable energy technology will be incorporated into the Proposed Development but details are not available at this stage.	The applicant has stated that this will be provided in the Energy Strategy of the reserved matters submission. It is currently expected that additional provision of renewable energy technology will be incorporated into the Proposed Development but details are not available at this stage. However, given that savings from renewable energy generation have been applied to the outline elements of the Proposed Development, the applicant should outline the proposals for this PV provision. The assumed PV area for the outline stages for the design should be provided and the applicant should	The Outline application for Development Area 2 has provided a commitment to achieve a reduction in CO_2 emissions via the inclusion of a suitable PV array. Sizing of the array has provided an indicative area of 200m^2 . Suitable roof areas will be identified in the reserved matters application however, at this stage allocation of the area to the individual buildings cannot be confirmed due to the outline nature of the application.	The Outline application for Development Area 2 has provided a commitment to achieve a reduction in CO2 emissions via the inclusion of a suitable PV array. Sizing of the array has provided an indicative area of 200m2 . Suitable roof areas will be identified in the reserved matters application however, at this stage allocation of the area to the individual buildings cannot be confirmed due to the outline nature of the application. Maximising the PV provision for Development Area 2 should be	Nothing further required.

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		confirm that there is roof availability for such an installation. This item is still outstanding.		secured through a condition. Nothing further required for now.	
24. Sample 'be green' DER and the full BRUKL worksheets should be submitted to verify the savings stated.	Sample Be Lean DER and BRUKL outputs have been provided in the Energy Strategy. Full BRUKL output documents are provided in Appendix B of this response. The results of these assessments have been used to apply calculations on a site wide basis for the proposed development areas at the Be Clean and Be Green stages. The results of these calculations are set out in the Energy Strategy. Iterations of the SAP and BRUKL outputs have not been undertaken for Be Clean and Be Green stages as allocation of thermal demand met by CHP to each calculation and allocation of PV arrays to buildings and further to uses within the buildings is not feasible at this stage of the developments design.	As per comment 17, the applicant should provide the modelling outputs for the domestic ('be green' DER sheets) and the non-domestic elements ('be green' BRUKL sheets), as originally requested. This item is still outstanding.	The PV arrays are expected to be connected to the landlords areas which have not been modelled and therefore DER outputs for the dwellings will be as per the Be Clean stage. Be Green outputs incorporating heat pumps for certain systems in the non-domestic areas are provided in Appendix H.	Be Green outputs incorporating heat pumps, but not PVs, have been provided. The applicant has also stated that PV arrays are expected to be connected to the landlords areas which have not been modelled and therefore DER outputs for the dwellings will be as per the Be Clean stage. There is an element of PV that has not been accounted towards the carbon savings and this is not representative of the proposals. This should be reflected in the carbon emissions so that it can be conditioned as a carbon reduction. The total PV provision should be accounted for in one of the models. This should equate to 520m2 of PV, as originally agreed. The total kWp should also be confirmed. **This item is still outstanding.**	The PV is unlikely to be connected to a single building electrical system as the array will be spread across the roofs of the buildings at the Proposed Development in order to allow space for plant and green roofs as per plans submitted with the application. An indicative BRUKL is provided at the end of this document that includes the total area of PV for Development Area 1 allocated to the cinema. This BRUKL is provided in Appendix H. The total kWp of the PV arrays is set out in the submitted Energy Strategy as 74kWp.

Appendix A provided in previous revision of the responses and omitted in this revision.

Appendix B – BRUKL outputs for gas boiler baseline

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name **Shell and Core**

171024 Stag Brewery B1 Office Rev02

As designed

Date: Thu Dec 20 15:46:28 2018

Administrative information

Building Details

Address: 171024 Stag Brewery B1 Office Rev02, London, SW14 7ED

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

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 must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	16.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	16.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	12.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	00000008:Surf[2]
Floor	0.25	0.2	0.2	00000008:Surf[0]
Roof	0.25	0.2	0.2	0000000D:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	00000008:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

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

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

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

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

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

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

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Building services

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

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

1- Stag Brewery Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

2- Stag Brewery VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	5	0	0	0.85
Standard value	0.91*	0.7	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- Stag Brewery POU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.91	-
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

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
00_WCs	-	-	0.4	-	-	-	-	-	-	-	N/A
02_Open Plan Office 01	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 03- Perimeter	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 03 - Core	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 02 - Perimeter	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 02 - Core	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 03 - Perim	-	0.4	0	-	-	-	-	-	-	-	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
01_Open Plan Office 03 - Core	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 02 - Perim SE	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 02 - Core	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 01 - Perim S	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 01 - Core	-	0.4	0	-	-	-	-	-	-	-	N/A
01_Open Plan Office 01 - Perim N	-	0.4	0	-	-	-	-	-	-	-	N/A
00_Open Plan Office - Perim	-	0.4	0	-	-	-	-	-	-	-	N/A
00_Open Plan Office - Perim	-	0.4	0	-	-	-	-	-	-	-	N/A
00_Open Plan Office - Core	-	0.4	0	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
00_Lobby	NO
00_WCs	NO
00_Stairs 01	NO
00_Office Lobby	NO
00_Stairs 03	NO
02_Open Plan Office 01	NO
01_Open Plan Office 03- Perimeter	NO
01_Open Plan Office 03 - Core	NO
01_Open Plan Office 02 - Perimeter	NO
01_Open Plan Office 02 - Core	NO
01_Open Plan Office 03 - Perim	NO
01_Open Plan Office 03 - Core	NO
01_Open Plan Office 02 - Perim SE	NO
01_Open Plan Office 02 - Core	NO
01_Open Plan Office 01 - Perim S	NO
01_Open Plan Office 01 - Core	NO
01_Open Plan Office 01 - Perim N	NO
00_Open Plan Office - Perim	NO
00_Open Plan Office - Perim	NO
00_Open Plan Office - Core	NO

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
00_Lobby	-	60	-	120
00_WCs	-	60	-	265
00_Stairs 01	-	60	-	74
00_Office Lobby	-	60	-	152
00_Stairs 03	-	60	-	71
02_Open Plan Office 01	60	-	-	2911
01_Open Plan Office 03- Perimeter	60	-	-	2546

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
01_Open Plan Office 03 - Core	80	-	-	636
01_Open Plan Office 02 - Perimeter	60	-	-	735
01_Open Plan Office 02 - Core	80	-	-	801
01_Open Plan Office 03 - Perim	60	-	-	2480
01_Open Plan Office 03 - Core	60	-	-	848
01_Open Plan Office 02 - Perim SE	60	-	-	1561
01_Open Plan Office 02 - Core	60	-	-	691
01_Open Plan Office 01 - Perim S	60	-	-	1754
01_Open Plan Office 01 - Core	80	-	-	558
01_Open Plan Office 01 - Perim N	60	-	-	1128
00_Open Plan Office - Perim	60	-	-	1450
00_Open Plan Office - Perim	60	-	-	907
00_Open Plan Office - Core	80	-	-	480

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?
02_Open Plan Office 01	NO (-14%)	NO
01_Open Plan Office 03- Perimeter	NO (-76.6%)	NO
01_Open Plan Office 03 - Core	NO (-85.6%)	NO
01_Open Plan Office 02 - Perimeter	NO (-43.9%)	NO
01_Open Plan Office 02 - Core	YES (+24.5%)	NO
01_Open Plan Office 03 - Perim	NO (-66.7%)	NO
01_Open Plan Office 03 - Core	NO (-83.9%)	NO
01_Open Plan Office 02 - Perim SE	NO (-66%)	NO
01_Open Plan Office 02 - Core	NO (-86.9%)	NO
01_Open Plan Office 01 - Perim S	NO (-63.2%)	NO
01_Open Plan Office 01 - Core	NO (-80.7%)	NO
01_Open Plan Office 01 - Perim N	NO (-69.4%)	NO
00_Open Plan Office - Perim	NO (-66.4%)	NO
00_Open Plan Office - Perim	NO (-60.2%)	NO
00_Open Plan Office - Core	NO (-78.7%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2222.1	2222.1
External area [m²]	1701.2	1701.2
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	1010.3	1177.74
Average U-value [W/m²K]	0.59	0.69
Alpha value* [%]	9.53	10

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.68	6.61
Cooling	5.07	7.48
Auxiliary	1.47	2.04
Lighting	12.47	18.32
Hot water	4.53	2.92
Equipment*	39.57	39.57
TOTAL**	**32.23**	**37.36**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	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/m²]	96.06	122.51
Primary energy* [kWh/m²]	73.03	94.93
Total emissions [kg/m²]	12.5	16.1

* 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] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	24	74	7.5	5.5	1.5	0.89	3.74	0.91	5
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	95.8	0	29.8	0	1.6	0.89	0	0.95	0
	Notional	17.3	110.7	5.6	8.1	2.1	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	75.7	0	24.4	0	1.9	0.86	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	00000008:Surf[2]
Floor	0.2	0.2	00000008:Surf[0]
Roof	0.15	0.2	0000000D:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	00000008:Surf[1]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

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

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

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

181220 Stag Hotel Be Lean

As designed

Date: Thu Dec 20 16:49:29 2018

Administrative information

Building Details

Address: Stag B C1 Hotel, London, SW14 7ED

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

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 must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	41.6
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	41.6
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	40.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	01000001:Surf[2]
Floor	0.25	0.2	0.2	BS000000:Surf[0]
Roof	0.25	0.2	0.2	01000001:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	01000001:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

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

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

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

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

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

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

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Building services

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

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

1- Stag Brewery VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	5	0	0	0.85
Standard value	0.91*	3.2	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

2- Stag Brewery Radiator

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
01_4ppl Suite 4	-	0.3	0	-	-	-	-	-	-	-	N/A
01_4ppl Suite4 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 3	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 3 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 5	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 5 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 6	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 6 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 7	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 7 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 8	-	0.3	0	-	-	-	-	-	-	-	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
01_2ppl Suite 8 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 9 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 9	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 10	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 10 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_4ppl Suite 11 Suite	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 2	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 2 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_2ppl Suite 1	-	0.3	0	-	-	-	-	-	-	-	N/A
01_2ppl Suite 1 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
01_4ppl Suite 11 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
02_2ppl Suite 15	-	0.3	0	-	-	-	-	-	-	-	N/A
02_4ppl Suite 16	-	0.3	0	-	-	-	-	-	-	-	N/A
02_2ppl Suite 12 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
02_2ppl Suite 13 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
02_2ppl Suite 14 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
02_2ppl Suite 14	-	0.3	0	-	-	-	-	-	-	-	N/A
02_2ppl Suite 15 Bathroom	-	-	0.5	-	-	-	-	-	-	-	N/A
02_2ppl Suite 16	-	0.3	0	-	-	-	-	-	-	-	N/A
02_2ppl Suite 12	-	0.3	0	-	-	-	-	-	-	-	N/A
02_2ppl Suite 13	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Hotel Reception	-	0.3	0	-	-	-	-	-	-	-	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	
01_4ppl Suite 4	-	90	-	98
01_4ppl Suite4 Bathroom	-	90	-	26
01_Housekeeping/Storage	90	-	-	21
01_2ppl Suite 3	-	90	-	66
01_2ppl Suite 3 Bathroom	-	90	-	27
01_2ppl Suite 5	-	90	-	48
01_2ppl Suite 5 Bathroom	-	90	-	25
01_2ppl Suite 6	-	90	-	46
01_2ppl Suite 6 Bathroom	-	90	-	25
01_2ppl Suite 7	-	90	-	40
01_2ppl Suite 7 Bathroom	-	90	-	25
01_2ppl Suite 8	-	90	-	51
01_2ppl Suite 8 Bathroom	-	90	-	28
01_2ppl Suite 9 Bathroom	-	90	-	26
01_2ppl Suite 9	-	90	-	45
01_2ppl Suite 10	-	90	-	46
01_2ppl Suite 10 Bathroom	-	90	-	26

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
01_4ppl Suite 11 Suite	-	90	-	86
01_2ppl Suite 2	-	90	-	50
01_2ppl Suite 2 Bathroom	-	90	-	27
01_Hotel Corridor	-	90	-	115
01_Hotel Lounge	-	90	-	98
01_2ppl Suite 1	-	90	-	70
01_2ppl Suite 1 Bathroom	-	90	-	27
01_4ppl Suite 11 Bathroom	-	90	-	32
02_2ppl Suite 15	-	90	-	56
02_Hotel Corridor	-	90	-	87
02_4ppl Suite 16	-	90	-	111
02_2ppl Suite 12 Bathroom	-	90	-	22
02_2ppl Suite 13 Bathroom	-	90	-	30
02_2ppl Suite 14 Bathroom	-	90	-	21
02_2ppl Suite 14	-	90	-	62
02_2ppl Suite 15 Bathroom	-	90	-	23
02_2ppl Suite 16	-	90	-	15
02_2ppl Suite 12	-	90	-	60
02_2ppl Suite 13	-	90	-	59
00_Hotel Reception	-	90	90	92
BS01_Hotel BOH	90	-	-	135
BS01_Hotel BOH	90	-	-	206

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?
01_4ppl Suite 4	NO (-45.2%)	NO
01_2ppl Suite 3	NO (-69.9%)	NO
01_2ppl Suite 5	NO (-37.4%)	NO
01_2ppl Suite 6	NO (-41.6%)	NO
01_2ppl Suite 7	NO (-55.5%)	NO
01_2ppl Suite 8	NO (-74.6%)	NO
01_2ppl Suite 9	NO (-49.7%)	NO
01_2ppl Suite 10	NO (-43%)	NO
01_4ppl Suite 11 Suite	NO (-55.3%)	NO
01_2ppl Suite 2	NO (-51.9%)	NO
01_2ppl Suite 1	NO (-54%)	NO
02_2ppl Suite 15	N/A	N/A
02_4ppl Suite 16	NO (-95%)	NO
02_2ppl Suite 14	NO (-64.4%)	NO
02_2ppl Suite 16	N/A	N/A
02_2ppl Suite 12	NO (-85.4%)	NO
02_2ppl Suite 13	NO (-78.9%)	NO
00_Hotel Reception	NO (-23.5%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	1169.6	1169.6
External area [m²]	1341.5	1341.5
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	371.12	501.61
Average U-value [W/m²K]	0.28	0.37
Alpha value* [%]	9.84	10

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	28.11	25.86
Cooling	0.39	1.35
Auxiliary	3.84	3.56
Lighting	4.94	9.08
Hot water	136.51	133.99
Equipment*	5.82	5.82
TOTAL**	**173.79**	**173.84**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	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/m²]	95.5	98.71
Primary energy* [kWh/m²]	228.28	236.89
Total emissions [kg/m²]	40.2	41.6

* 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] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	41.8	11.5	13	0.9	2.4	0.89	3.74	0.91	5
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	404.1	0	125.8	0	7.5	0.89	0	0.95	0
	Notional	43.9	40.8	14.1	3	4.5	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	341.9	0	110.2	0	8.5	0.86	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	01000001:Surf[2]
Floor	0.2	0.2	BS000000:Surf[0]
Roof	0.15	0.2	01000001:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	01000001:Surf[1]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

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

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

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

181220 Stag B Cinema -Be Lean

As designed

Date: Thu Dec 20 14:38:04 2018

Administrative information

Building Details

Address: 181220 Stag B Cinema, London, SW14 7ED

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

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 must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	26
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	26
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	24.1
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 fixed building services should achieve reasonable overall standards of energy efficiency

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	01000000:Surf[1]
Floor	0.25	0.2	0.2	02000000:Surf[0]
Roof	0.25	0.2	0.2	01000000:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	01000005:Surf[1]
Personnel doors	2.2	2.2	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(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	5

Building services

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

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

1- Stag Brewery VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	5	0	0	0.85
Standard value	0.91*	3.2	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

2- Stag Brewery Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
01_Medium Screen	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Female Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Cinema Office	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Kitchen	-	-	1	-	-	-	-	-	1	-	N/A
02_Restaurant	-	0.3	0	-	-	-	-	-	-	-	N/A
02_Dining Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
02_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02_WCs	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Bar	-	0.3	0	-	-	-	-	-	-	-	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
00_Large Screen	-	0.3	0	-	-	-	-	-	-	-	N/A
00_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00_Bar	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Small screen	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Tickets Office	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Waiting Hall	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Entrance Lobby	-	0.3	0	-	-	-	-	-	-	-	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	
01_Medium Screen	-	80	-	927
01_Stairs 01	-	80	-	75
01_Store 01	80	-	-	28
01_Projection Rm	80	-	-	1091
01_Female Toilet	-	80	-	269
01_Cinema Office	80	-	-	1120
01_Toilet	-	80	-	106
01_Stairs 02	-	80	-	71
01_Lobby	-	80	-	126
02_Kitchen	-	80	-	834
02_Restaurant	-	80	-	760
02_Dining Rm	-	80	-	126
02_Stairs 02	-	80	-	64
02_Stairs 01	-	80	-	60
02_WC	-	80	-	63
02_Store	80	-	-	21
02_WCs	-	80	-	177
02_Bar	-	80	-	77
00_Large Screen	-	80	-	1460
00_BOH	80	-	-	88
00_Stairs02	-	80	-	101
00_Store TBC	80	-	-	20
00_WC	-	80	-	63
00_Bar	-	80	-	65
00_Projection Rm	80	-	-	368
00_Small screen	-	80	-	653
00_Lobby	-	80	-	87
00_Enrance Hall	-	80	-	86
00_Stairs01	-	80	-	76
00_Tickets Office	-	80	80	145

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
00_Storage TBC	80	-	-	23
00_Lobby	-	80	-	31
00_Projection Rm	80	-	-	356
01_Waiting Hall	-	80	-	449
02_Corridor	-	80	-	82
00_Entrance Lobby	-	80	-	1303

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?
01_Medium Screen	N/A	N/A
01_Projection Rm	N/A	N/A
01_Cinema Office	YES (+41.3%)	NO
02_Restaurant	YES (+97.5%)	NO
02_Dining Rm	YES (+107%)	NO
02_Bar	YES (+191.3%)	NO
00_Large Screen	N/A	N/A
00_Bar	YES (+73.5%)	NO
00_Projection Rm	N/A	N/A
00_Small screen	N/A	N/A
00_Tickets Office	YES (+45.5%)	NO
00_Projection Rm	N/A	N/A
01_Waiting Hall	YES (+91.1%)	NO
00_Entrance Lobby	YES (+64%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2146.9	2146.9
External area [m²]	3962.1	3962.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	1799.29	1479.32
Average U-value [W/m²K]	0.45	0.37
Alpha value* [%]	9.79	10

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	29.05	23.06
Cooling	4.16	3.13
Auxiliary	3.55	4.68
Lighting	14.22	20.98
Hot water	31.02	29.9
Equipment*	34.01	34.01
TOTAL**	**82**	**81.73**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	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/m²]	148.97	114.19
Primary energy* [kWh/m²]	138.91	150.75
Total emissions [kg/m²]	24.1	26

* 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] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	89.1	77.4	27.7	5.8	2.9	0.89	3.74	0.91	5
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	128.3	0	40.4	0	4.2	0.88	0	0.95	0
	Notional	67.7	59	21.8	4.3	5.3	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	101.5	0	32.7	0	3.7	0.86	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	01000000:Surf[1]
Floor	0.2	0.2	02000000:Surf[0]
Roof	0.15	0.2	01000000:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	01000005:Surf[1]
Personnel doors	1.5	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

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

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

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

Appendix C-F provided in previous revision of the responses and omitted in this revision

Appendix G – BRUKL Output at Be Clean - Cinema

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

181220 Stag B Cinema -Be Clean

As designed

Date: Thu Dec 20 17:55:46 2018

Administrative information

Building Details

Address: 181220 Stag B Cinema, London, SW14 7ED

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

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 must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	24.6
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	24.6
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	19.6
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	01000000:Surf[1]
Floor	0.25	0.2	0.2	02000000:Surf[0]
Roof	0.25	0.2	0.2	01000000:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	01000005:Surf[1]
Personnel doors	2.2	2.2	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(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	5

Building services

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

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

1- Stag Brewery VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	5	0	0	0.85
Standard value	0.91*	3.2	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

2- Stag Brewery Radiators

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

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
01_Medium Screen	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Female Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Cinema Office	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Kitchen	-	-	1	-	-	-	-	-	1	-	N/A
02_Restaurant	-	0.3	0	-	-	-	-	-	-	-	N/A
02_Dining Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
02_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02_WCs	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Bar	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Large Screen	-	0.3	0	-	-	-	-	-	-	-	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
00_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00_Bar	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Small screen	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Tickets Office	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Waiting Hall	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Entrance Lobby	-	0.3	0	-	-	-	-	-	-	-	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	
01_Medium Screen	-	80	-	927
01_Stairs 01	-	80	-	75
01_Store 01	80	-	-	28
01_Projection Rm	80	-	-	1091
01_Female Toilet	-	80	-	269
01_Cinema Office	80	-	-	1120
01_Toilet	-	80	-	106
01_Stairs 02	-	80	-	71
01_Lobby	-	80	-	126
02_Kitchen	-	80	-	834
02_Restaurant	-	80	-	760
02_Dining Rm	-	80	-	126
02_Stairs 02	-	80	-	64
02_Stairs 01	-	80	-	60
02_WC	-	80	-	63
02_Store	80	-	-	21
02_WCs	-	80	-	177
02_Bar	-	80	-	77
00_Large Screen	-	80	-	1460
00_BOH	80	-	-	88
00_Stairs02	-	80	-	101
00_Store TBC	80	-	-	20
00_WC	-	80	-	63
00_Bar	-	80	-	65
00_Projection Rm	80	-	-	368
00_Small screen	-	80	-	653
00_Lobby	-	80	-	87
00_Enrance Hall	-	80	-	86
00_Stairs01	-	80	-	76
00_Tickets Office	-	80	80	145
00_Storage TBC	80	-	-	23

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
00_Lobby	-	80	-	31
00_Projection Rm	80	-	-	356
01_Waiting Hall	-	80	-	449
02_Corridor	-	80	-	82
00_Entrance Lobby	-	80	-	1303

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?
01_Medium Screen	N/A	N/A
01_Projection Rm	N/A	N/A
01_Cinema Office	YES (+41.3%)	NO
02_Restaurant	YES (+97.5%)	NO
02_Dining Rm	YES (+107%)	NO
02_Bar	YES (+191.3%)	NO
00_Large Screen	N/A	N/A
00_Bar	YES (+73.5%)	NO
00_Projection Rm	N/A	N/A
00_Small screen	N/A	N/A
00_Tickets Office	YES (+45.5%)	NO
00_Projection Rm	N/A	N/A
01_Waiting Hall	YES (+91.1%)	NO
00_Entrance Lobby	YES (+64%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2146.9	2146.9
External area [m²]	3962.1	3962.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	1799.29	1479.32
Average U-value [W/m²K]	0.45	0.37
Alpha value* [%]	9.79	10

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	28.51	22.05
Cooling	4.16	3.13
Auxiliary	3.55	4.68
Lighting	14.22	20.98
Hot water	29.47	28.64
Equipment*	34.01	34.01
TOTAL**	**79.9**	**79.47**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	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/m²]	148.97	114.19
Primary energy* [kWh/m²]	110.95	135.06
Total emissions [kg/m²]	19.6	24.6

* 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] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	89.1	77.4	27.7	5.8	2.9	0.89	3.74	0.91	5
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] District heating, [HFT] District Heating, [CFT] Electricity										
	Actual	128.3	0	37.9	0	4.2	0.94	0	1	0
	Notional	67.7	59	21.8	4.3	5.3	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	101.5	0	28.2	0	3.7	1	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	01000000:Surf[1]
Floor	0.2	0.2	02000000:Surf[0]
Roof	0.15	0.2	01000000:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	01000005:Surf[1]
Personnel doors	1.5	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

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

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

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

Appendix H – BRUKL Output at Be Green - Cinema with PV

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

181221 Stag B Cinema Be Green with PV As designed

Date: Tue Jan 08 14:42:17 2019

Administrative information

Building Details

Address: Stag B Cinema, London, SW14 7ED

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

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 must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	23.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	23.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	10.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	01000000:Surf[1]
Floor	0.25	0.2	0.2	02000000:Surf[0]
Roof	0.25	0.2	0.2	01000000:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	01000005:Surf[1]
Personnel doors	2.2	2.2	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(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	5

Building services

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

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

1- Stag Brewery VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.85
Standard value	2.5*	3.2	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for 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- Stag Brewery Radiators

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

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

Local mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
01_Medium Screen	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Female Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Cinema Office	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Toilet	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Kitchen	-	-	1	-	-	-	-	-	1	-	N/A
02_Restaurant	-	0.3	0	-	-	-	-	-	-	-	N/A
02_Dining Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
02_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02_WCs	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Bar	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Large Screen	-	0.3	0	-	-	-	-	-	-	-	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
00_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00_Bar	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Small screen	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Tickets Office	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Projection Rm	-	0.3	0	-	-	-	-	-	-	-	N/A
01_Waiting Hall	-	0.3	0	-	-	-	-	-	-	-	N/A
00_Entrance Lobby	-	0.3	0	-	-	-	-	-	-	-	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	
01_Medium Screen	-	62	-	2391
01_Stairs 01	-	102	-	118
01_Store 01	107	-	-	21
01_Projection Rm	44	-	-	1982
01_Female Toilet	-	74	-	586
01_Cinema Office	43	-	-	2062
01_Toilet	-	130	-	130
01_Stairs 02	-	82	-	139
01_Lobby	-	96	-	209
02_Kitchen	-	64	-	2096
02_Restaurant	-	60	-	2027
02_Dining Rm	-	73	-	275
02_Stairs 02	-	73	-	140
02_Stairs 01	-	91	-	106
02_WC	-	159	-	63
02_Store	94	-	-	18
02_WCs	-	75	-	376
02_Bar	-	65	-	191
00_Large Screen	-	60	-	3895
00_BOH	47	-	-	150
00_Stairs02	-	86	-	188
00_Store TBC	120	-	-	13
00_WC	-	174	-	58
00_Bar	-	63	-	166
00_Projection Rm	93	-	-	315
00_Small screen	-	66	-	1594
00_Lobby	-	94	-	148
00_Enrance Hall	-	117	-	118
00_Stairs01	-	103	-	117
00_Tickets Office	-	70	80	330
00_Storage TBC	120	-	-	15

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
00_Lobby	-	140	-	35
00_Projection Rm	77	-	-	370
01_Waiting Hall	-	68	-	1059
02_Corridor	-	88	-	148
00_Entrance Lobby	-	78	-	2670

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?
01_Medium Screen	N/A	N/A
01_Projection Rm	N/A	N/A
01_Cinema Office	YES (+41.3%)	NO
02_Restaurant	YES (+97.5%)	NO
02_Dining Rm	YES (+107%)	NO
02_Bar	YES (+191.3%)	NO
00_Large Screen	N/A	N/A
00_Bar	YES (+73.5%)	NO
00_Projection Rm	N/A	N/A
00_Small screen	N/A	N/A
00_Tickets Office	YES (+45.5%)	NO
00_Projection Rm	N/A	N/A
01_Waiting Hall	YES (+91.1%)	NO
00_Entrance Lobby	YES (+64%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2146.9	2146.9
External area [m²]	3962.1	3962.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	1799.29	0
Average U-value [W/m²K]	0.45	0
Alpha value* [%]	9.79	10

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

Building Use

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	9.32	11.6
Cooling	4.78	3.13
Auxiliary	3.55	4.68
Lighting	27.39	20.98
Hot water	29.47	28.64
Equipment*	34.01	34.01
TOTAL**	**74.51**	**69.02**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	25.08	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	136.54	114.19
Primary energy* [kWh/m²]	148.87	147.62
Total emissions [kg/m²]	10.8	23.9

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

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	74.1	88.9	5.2	6.6	2.9	3.92	3.74	4	5
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: radiators, [HS] District heating, [HFT] District Heating, [CFT] Electricity										
	Actual	83.8	0	24.8	0	4.2	0.94	0	1	0
	Notional	67.7	59	7.3	4.3	5.3	2.56	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	101.5	0	28.2	0	3.7	1	0	----	----

Key to terms

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

Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	01000000:Surf[1]
Floor	0.2	0.2	02000000:Surf[0]
Roof	0.15	0.2	01000000:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	01000005:Surf[1]
Personnel doors	1.5	2.2	01000003:Surf[3]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

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

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

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