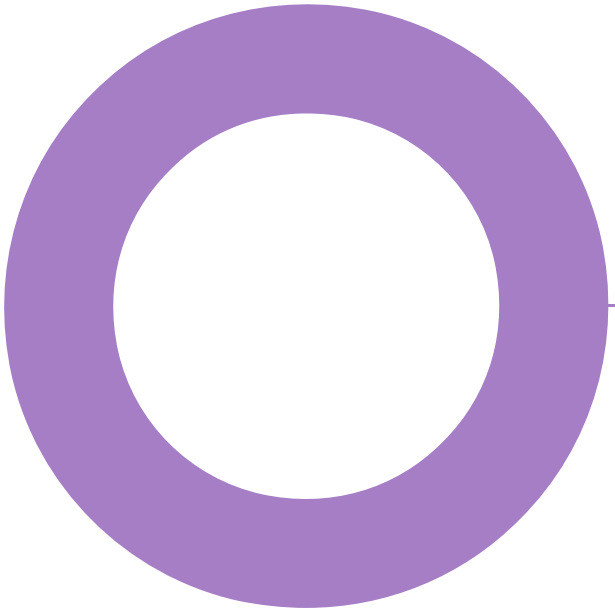
HOARE LEA

Former Stag Brewery. London.

Reselton Properties Ltd.

SUSTAINABILITY
ENERGY STRATEGY ADDENDUM

REVISION D – 22 SEPTEMBER 2020



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
A	21/09/2020	For issue.	R. Harper	T. Brown	
B	22/9/2020	Updated with comments.	R. Harper	T. Brown	
C	22/9/2020	Updated with further comments.	R. Harper	T. Brown	
D	22/9/2020	Further update	R. Harper	T. Brown	

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Contents.

1. Energy Strategy Addendum

This Energy Strategy Addendum has been prepared by Hoare Lea as an additional submission document to the Energy Strategy in respect of the former Stag Brewery Site in Mortlake ('the Site') within the London Borough of Richmond Upon Thames ('LBRuT').

This report sets out the Energy Strategy for the Proposed Development for the whole site encompassing Applications A and B. For the areas of Application A that will be subject to full planning permission (Development Area 1) and Application B, the School, this strategy represents the targeted approach to energy for the Proposed Development.

The Energy Strategy for Development Area 2 is provided in outline and represents the proposals that have been investigated, with further details to follow at the Reserved Matters stage.

Whilst the school was made as a separate application (Application B), for the purposes of this strategy it has been included within all calculations for Development Area 1 and the masterplan for Application A (i.e. the approach remains unchanged).

1.1 Policies & drivers

The following are the pertinent policies and requirements applicable to the Proposed Development and are responded to by this Energy Strategy Addendum.

London Plan Intend to Publish Version (dated December 2019)

Although not currently adopted, the Proposed Development has also considered the proposed policies of the London Plan Intend to Publish Version (dated December 2019).

The most significant changes to the policies, in relation to energy demand and carbon emissions, compared to the adopted Plan are as follows:

- All major development will achieve net zero carbon compared to the Part L baseline, with a minimum of 35% reduction being met on site. Remaining emissions to be offset via carbon offset payment to the Local Authority.
- Non-regulated emissions should be calculated and minimised.
- Residential development should achieve at least a 10% carbon emission reduction at the Be Lean stage of the energy strategy.
- Non-residential development should achieve at least a 15% carbon emission reduction at the Be Lean stage of the energy strategy.
- Whole life-cycle carbon emissions should be calculated and demonstrate actions to reduce.
- Carbon emissions are calculated using proposed SAP10.0 carbon factors.
- Combined Heat and Power (CHP) engines can only be considered where there is a case to enable the delivery of an areas-wide heat network and meet the development's electricity demands and provide demand response to the local electricity network.

This energy strategy addendum seeks to respond to the Intend to Publish London Plan and the Energy Planning Guidance (2018), by making use of the updated SAP 10.0 carbon emission factors in this report.

1.2 Approach

A sample of dwellings of the Amended Proposed Development have been assessed using Part L1A approved SAP methodology. Non-residential spaces have been modelled using Part L compliant software. This has provided the basis for the analysis of the designed building and the consideration of all applicable passive design, energy efficiency and Low or Zero Carbon (LZC) technologies.

The assessment makes use of the Mayor of London's Energy Hierarchy Be lean – Be Clean – Be Green, and the cooling hierarchy from the London Plan (2016).

In line with current GLA guidance, carbon emission reductions have been calculated using the carbon factors set out in the draft SAP10 guidance.

1.3 Be Lean - Passive design & energy efficiency measures.

Passive design measures to be implemented at the Proposed Development include:

1. Suitable glazing ratio and glass g-value (0.29) to balance heat losses, heat gains and daylight ingress.
2. Fabric insulation levels achieving improvements over Building Regulations Part L (2013) requirements of 25% - 100%.
3. Fabric air permeability achieving improvements over Building Regulations Part L (2013) requirements of 75% and 70% for dwellings and commercial spaces respectively.

Energy efficiency measures to be implemented at the Proposed Development include:

1. Efficient space heating systems with zonal, programmable and thermostatic controls, with separate programmer for hot water.
2. Efficient low-energy lighting throughout all dwellings. External and communal lighting will be coupled to daylight and presence detection sensors to minimise unnecessary use.
3. Efficient mechanical ventilation with heat recovery which will limit the need for space heating in winter months, aid the mitigation of high internal temperatures in summer months (where openable windows cannot be used due to ambient acoustic conditions), and maintain good indoor air quality.
4. Appropriately insulated pipework and ductwork (and air sealing to ductwork) to minimise losses and gains.
5. Variable speed pumps and fans to minimise energy consumption for distribution of services

The above measures would also be considered for the areas within the outline application of the Proposed Development.

1.3.1 Whole Site – Application A

It is anticipated that the areas within Application A site will perform to a comparable level to the Part L calculations undertaken for Development Area 1.

Based on this level of performance the areas of the Proposed Development would be expected to achieve ~8.1% reduction in CO_2 emissions beyond the requirements of the Part L gas boiler 'baseline' on a site wide basis.

1.3.2 Application A – Development area 1

These measures are anticipated to achieve ~8.3% reduction in regulated CO_2 emissions beyond the requirements of the Building Regulations Part L (2013) 'baseline' for the areas within the application. When considering the residential elements alone, it is anticipated that a ~11.9% reduction in CO_2 emissions beyond the requirements of the Building Regulations Part L (2013) 'baseline' will be achieved.

Furthermore, it has been calculated based on the parameters outlined within this report and the SAP calculations undertaken that the dwellings will improve upon the requirements of Target Fabric Energy Efficiency (TFEE) included in Part L1A 2013.

As a result, the Proposed Development will achieve compliance with the requirements of the Building Regulations Part L 2013 through passive design and energy efficiency measures alone.

1.3.3 Application A – Development area 2

The passive design measures are anticipated to achieve an 8.8% reduction in regulated CO_2 emissions to demonstrate compliance with the Building Regulations Part L (2013) 'baseline' for the areas within the application at the Be Lean stage. Opportunities to implement passive design measures to achieve a reduction in CO_2 emissions at the Be Lean stage would be considered in detailed design and submitted in the Energy Strategy at the reserved matters stage.

As a result, the Proposed Development could achieve compliance with the requirements of the Building Regulations Part L 2013 through passive design and energy efficiency measures.

1.3.4 Application B - School

These measures are anticipated to achieve ~1.4% reduction in regulated CO_2 emissions beyond the requirements of the Part L gas boiler 'baseline' for the school.

As a result, the Proposed Development will achieve compliance with the requirements of the Building Regulations Part L 2013 through passive design and energy efficiency measures.

1.4 Be Clean - Infrastructure and low-carbon supply of energy.

The Proposed Development is proposing a staggered approach across the two Development Areas of Application A. The overall emissions are calculated using the SAP 2012 carbon factors (as per March 2016 GLA guidance). These are the carbon factors used in the submitted energy strategy.

An energy centre is proposed to be provided within the basement of each development area as per discussions with the GLA. This will provide flexibility for the areas that will be subject to a reserved matters application (Development Area 2) to maximise the availability of CO_2 emissions reductions when this area is brought forward for development. The energy centre in Development Area 1 will include gas fired boilers to serve Development Area 1 prior to the construction of Development Area 2, therefore this represents a temporary solution for serving the thermal demands within Development Area 1.

At the time of the submission of the reserved matters submission it is expected that Air Source Heat Pumps (ASHP) could be specified in Development Area 2 to provide heat to a heat network in Development Area 2. A connection could be made between the heat network in Development Area 1 and the heat network in Development Area 2 to create a site wide heat network with flows between the two.

The school will be serviced by its own energy centre independently from the heat networks associated with Application A. The programme for construction of the school is anticipated to be brought forward at the same time as Development Area 1. The development of the school site is not under the applicant's control and therefore the energy strategy allows for Application B to be brought forward independently. This revised energy strategy allows for the use of ASHP to supply the school with heating and hot water.

The townhouses within Development Area 2 are also anticipated to be serviced separately with individual ASHP located suitably for each townhouse. Further details will be provided at the reserved matters stage.

As such there are no CO_2 emissions reductions applicable to the Be Clean stage of the Energy Hierarchy.

1.5 Be Green - On-site renewable energy generation.

The inclusion of on-site renewable energy generation has been assessed.

1.5.1 Whole site – Application A

It is anticipated that a PV array with a total area of 360m^2 would be provided on the roof area of the Proposed Development. Based on the solar irradiance data for London, an array of this size would generate approximately 56,000kWh of electricity per annum, reducing CO_2 emissions by 13.1 tonnes per annum. This is equivalent to a reduction in regulated CO_2 emissions of 0.7% beyond the Part L gas boiler 'baseline' for the anticipated emissions of the Proposed Development (Application A). Further opportunities to increase the area of the PV array would be provided in the reserved matters submission(s), however the proposed potential incorporation of ASHP into Development Area 2 is likely to limit the area of roof that is suitable for PV array.

PV is therefore anticipated to be a suitable addition to the Proposed Development in pursuit of further reductions in regulated CO_2 emissions.

Due to the changes in carbon factors for grid electricity in SAP 10, it is expected that carbon emission reductions from ASHP are greatly improved compared to previous iterations of SAP.

In order to serve a proportion of heating and hot water for the Proposed Development, an ASHP system could be installed at the Proposed Development to generate a proportion of heating and cooling for the scheme. Due

to the requirements for hot water cylinders within the dwellings when using lower temperature distribution associated with ASHP, the Development Area 1 dwellings are not suitable to be connected to a heat network that operates at lower temperatures. Therefore it is proposed that the heat network could be a hybrid system fed by gas fired boilers for Development Area 1 and ASHP in Development Area 2. The dwellings in Development Area 1 have been designed to accommodate an HIU to interface with the heat network and would require complete re-design to accommodate a hot water cylinder.

The design proposals for Development Area 2 present certain constraints on the buildings. The feasibility of installing ASHPs on to the roofs of the buildings proposed in Development Area 2 have been investigated and and at this stage, based on a number of assumptions (given that the design is in outline), it is considered that the ASHPs could be accommodated on the site without any significant impact on the maximum heights set out within the submission.

The dwellings in Development Area 2 would need to take account of the necessary space requirements to connect to a lower temperature distribution network that is supplied by ASHP. Details would be provided at the reserved matters stage.

However, when flow and return temperatures allow the ASHP in Development Area 2 could feed into the heat network in Development Area 1 creating a connection between the two area heat networks to maximise CO_2 emissions reductions.

It is anticipated that as ASHP technology improves, there could be a point in the future when the gas boilers in Development Area 1 energy centre could be substituted for high temperature ASHP to supply the thermal demand of Development Area 1, enabling low carbon heat for the whole development.

This system is expected to result in regulated CO_2 emission reductions of 28.0% beyond the Building Regulations Part L (2013) 'baseline' on a site-wide basis.

Air Source Heat Pumps could be incorporated and will be investigated for the Proposed Development.

1.5.2 Application A – Development area 1

Considering the available roof space of Development Area 1, and allowing for access and maintenance requirements, a total solar PV system size in the region of 360m^2 array area will be included in the Proposed Development.

Based on the solar irradiance data for London, an array of this size would reduce CO_2 emissions by 13.1tonnes per annum. This is equivalent to a reduction in regulated CO_2 emissions of 1.1% beyond the Building Regulations Part L (2013) 'baseline' on the CO_2 emissions of Development Area 1.

PV is therefore deemed to be a suitable addition to the Proposed Development in pursuit of further reductions in regulated CO_2 emissions.

A connection to the heat network will be provided for heating and hot water demand. With the inter-connection of the two heat networks it is expected that 10% of heat will be provided by the connection to Development Area 2 and therefore by the air source heat pumps.

Due to the changes in carbon factors for grid electricity, it is expected that carbon emission reductions from ASHP are greatly improved compared to previous iterations of SAP.

This system is expected to result in regulated CO_2 emission reductions of 3.8% beyond the Building Regulations Part L (2013) 'baseline'. The performance parameters of the ASHP that have been used in these calculations has been taken as follows; Heating SCoP 4.0; Hot water SCoP 3.0; Cooling SEER 4.0. Further technical parameters of the heat pumps will be determined and provided at the reserved matters stage.

1.5.3 Application A – Development area 2

At the reserved matters submission, the available roof space of Development Area 2, for the installation of a solar PV system size would be considered. However, the areas of roof space suitable for PV are likely to be low due to the potential proposals for ASHP and other plant on the roofs of the buildings.

ASHP have been investigated as a technology that could provide heating and hot water to the dwellings in Development Area 2. This system is expected to result in regulated CO_2 emission reductions of 63.1% beyond the Building Regulations Part L (2013) 'baseline'.

The performance parameters of the ASHP that have been used in these calculations has been taken as follows; Heating SCoP 4.0; Hot water SCoP 3.0; Cooling SEER 4.0. Further technical parameters of the heat pumps would be determined and provided at the reserved matters stage.

1.5.4 .Application B – School

PV is not proposed to be located on the school building as the roof area is being used to provide a play area and is also allocated for plant.

ASHP are proposed to be used to meet the heating and hot water demands of the school building resulting in a CO_2 emissions reduction of 57.7% beyond the SAP 10 gas boiler baseline.

1.6 Overall carbon dioxide emissions reduction.

A summary of the anticipated CO_2 emissions and reduction at each step of the energy hierarchy is given in Table 1 below. This captures the CO_2 emissions that would be used to calculate a potential offset payment for the whole site including the areas associated with Application A and B. The calculation of the Carbon Offset payment needs to be dealt with on a bespoke basis for a mixed-use scheme of this scale.

1.6.1 Application A

Table 1: Summary of CO_2 emissions reductions.

Site wide	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	Regulated	Unregulated
Part L Gas Boiler Baseline	1,982	204
Reduction from Be Lean	1,813	204
Reduction from Be Clean	1,813	204
Reduction from Be Green	1,258	204
	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	169	8.5%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	555	28.0%
Total Reduction	724	36.5%
Dwelling Reduction	718	36.2%
Non-Dwelling Reduction	7	0.3%

1.6.2 Dwelling only summary

Dwellings	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Part L Gas Boiler Baseline	1,640	26
Reduction from Be Lean	1,470	26
Reduction from Be Clean	1,470	26
Reduction from Be Green	922	26

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	170	10.4%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	548	33.4%
Total Reduction	**718**	**43.8%**
Total Target Reduction	**1,640**	**100.0%**
Annual Surplus / Shortfall	**-922**	**56.2%**

1.7 Non-Dwellings

Non-Dwellings	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Part L Gas Boiler Baseline	342	178
Reduction from Be Lean	343	178
Reduction from Be Clean	343	178
Reduction from Be Green	336	178

Non-Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	-1	-0.3%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	8	2.2%
Total Reduction	**7**	**2.0%**
Total Target Reduction	**120**	**35.0%**
Annual Surplus / Shortfall	**113**	**33.0%**

1.7.1 Application A – Development area 1

A summary of the anticipated CO_2 emissions and reductions at each step of the energy hierarchy is given in Table 2 below. The Proposed Development achieves an overall 12.2% reduction in regulated CO_2 emissions when considering the Development Area 1 of Application A.

Table 2: Summary of CO_2 emissions reductions for Development Area 1.

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Part L Gas Boiler Baseline	1,176	200
Reduction from Be Lean	1,078	200
Reduction from Be Clean	1,078	200
Reduction from Be Green	1,033	200

	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	98	8.3%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	45	3.8%
Total Reduction	143	12.2%
Dwelling Reduction	134	11.4%
Non-Dwelling Reduction	9	0.8%

1.7.2 Application A – Development area 2

A summary of the anticipated CO_2 emissions and reductions at each step of the energy hierarchy is given in Table 2 below. The Proposed Development achieves an overall 71.9% reduction in regulated CO_2 emissions when considering the Development Area 2 of Application A.

Table 3: Summary of CO_2 emissions reductions for Development Area 1.

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Part L Gas Boiler Baseline	806	5
Reduction from Be Lean	735	5
Reduction from Be Clean	735	5
Reduction from Be Green	227	5

	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	71	8.8%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	509	63.1%
Total Reduction	579	71.9%
Dwelling Reduction	579	71.9%
Non-Dwelling Reduction	0	0.0%
Total Target Reduction	806	100%
Annual Surplus / Shortfall	-227	28.1%

1.7.3 Application B – The School

A summary of the anticipated CO_2 emissions and reduction at each step of the energy hierarchy is given in Table 4 below. The application for the School achieves an overall 59.1% reduction in regulated CO_2 emissions when considering the School.

Table 4: Summary of CO_2 emissions reductions for the School (Application B).

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Part L Gas Boiler Baseline	133	45
Reduction from Be Lean	132	45
Reduction from Be Clean	132	45
Reduction from Be Green	55	45

Non-Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	2	1.4%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	77	57.7%
Total Reduction	**79**	**59.1%**
Total Target Reduction	**47**	**35.0%**
Annual Surplus / Shortfall	**+32**	**+24.1%**

1.8 Carbon offset – current policy

Table 6 shows the anticipated CO_2 emissions that will be subject to a carbon offset charge to be agreed with LBRuT. The table below sets out the carbon offset at £60 per tonne per year with dwellings offset to 100% and non-dwellings to 35% as per current policy of London Plan (2016) and Energy Planning Guidance (2018).

Table 5: Carbon offset to current policy.

Whole Site (Application A and B) Total		Carbon Offset (tonnes)	Cost (£) @ £60 per tonne
Development Area 1	Annual Offset (Residential Areas)	700 tCO_2	£1,260,000
	Annual Offset (Non-residential Areas)	113 tCO_2	£203,400
Development Area 2	Annual Offset (Residential Areas)	227 tCO_2	£408,600
	Annual Offset (Non-residential Areas)	n/a	
School	Annual Offset (School)	0 tCO_2	0
Total carbon offset		1,040	£ 1,872,000

1.9 Carbon offset – future policy

The table below sets out the carbon offset charges at £60 per tonne per year if it is considered a requirement that both residential and non-residential CO_2 emissions are offset to 100%.

Table 6: Carbon Offset to 100% for non-domestic areas at current offset rate.

Whole Site (Application A and B) Total		Carbon Offset (tonnes)	Cost (£) @£60 per tonne
Development Area 1	Annual Offset (Residential Areas)	700 tCO_2	£1,260,000
	Annual Offset (Non-residential Areas)	336 tCO_2	£604,800
Development Area 2	Annual Offset (Residential Areas)	227 tCO_2	£408,600
	Annual Offset (Non-residential Areas)	n/a	
School	Annual Offset (School)	55 tCO_2	£99,000
Total carbon offset		1,318	£ 2,372,400

If the policy set out in the London Plan Intend to Publish and the updated Carbon Offset rate of £95 per tonne is applied then the table below sets out the carbon offset charges that could apply.

Table 7: Carbon offset to future policy

Whole Site (Application A and B) Total		Carbon Offset (tonnes)	Cost (£) @£95 per tonne
Development Area 1	Annual Offset (Residential Areas)	700 tCO_2	£1,995,000
	Annual Offset (Non-residential Areas)	336 tCO_2	£957,600
Development Area 2	Annual Offset (Residential Areas)	227 tCO_2	£646,950
	Annual Offset (Non-residential Areas)	n/a	£0
School	Annual Offset (School)	55 tCO_2	£156,750
Total carbon offset		1,318	£ 3,756,300

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