HOARE LEA

Former Stag Brewery.
London.
Reselton Properties.

SUSTAINABILITY
ENERGY STRATEGY ADDENDUM

REVISION 01 – 05 JUNE 2019

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	25/04/2019	For Issue	R. Harper	T. Wigg	G. Jones
01	05/06/2019	Updated following GLA comments dated 23.05.2019	R. Harper	G. Jones	G. Jones

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Contents.

1. Introduction.

This addendum to the submitted Energy Strategy for the Proposed Development of the Former Stag Brewery sets out the results of further calculations undertaken following the discussion with the GLA energy officer and subsequent comments related to the submitted Energy Strategy and initial addendum to the Energy Strategy. This report captures comments, responses and further responses provided by the GLA and Hoare Lea acting as energy consultant, on behalf of the Applicant.

A number of scenarios have been considered and the results showing calculated CO_2 emission reductions are presented:

Scenario 1 – Gas fired boilers to serve Development Area 1 energy centre on a temporary basis until the energy centre to be provided within Development Area 2 is operational.

Scenario 2 – Development Area 2 energy centre to be provided with a single CHP to serve Development Areas 1 and 2 through a single connected heat network.

Scenario 3 – Development Area 2 energy centre to be provided with heat pumps serving Development Area 1 and 2 through a single connected heat network, using SAP 10 carbon emissions factors in line with the November 2018 updated GLA guidance.

A brief feasibility study has been included setting out the potential CO_2 emissions reductions from LZC technologies for Development Area 1. These would be assessed in more detail should Development Area 2 not be built within a timeframe to be agreed and conditioned in the planning consent.

2. Phasing.

The Proposed Development includes multiple planning applications as follows:

- Application A – hybrid planning application for comprehensive mixed-use redevelopment of the former Stag Brewery site consisting of:
  - Land to the east of Ship Lane applied for in **full detail** (referred to as 'Development Area 1' throughout); and
  - Land to the west of Ship Lane (excluding the school) applied for in **outline** (referred to as 'Development Area 2' throughout).
- Application B – full detail planning application for the school (on land to the west of Ship Lane).
- Application C – full detail planning application for highways and landscape works at Chalkers Corner.

As with the submitted Energy Strategy, this addendum reviews the whole site encompassing Application A and B and accounts for the comments from the GLA relating to the phasing of the Proposed Development and how the Energy Centres will be developed and brought online. Application C does not include any elements that require an Energy Strategy.

Table 1 shows the area schedule for the Proposed Development, including those uses that will come forward as part of Development Area 1, and those which will follow in Development Area 2. Whilst the school was made as a separate application (Application B), for the purposes of this addendum it has been included within all calculations for Development Area 1 and the masterplan for Application A (as per the approach taken for the submitted Energy Strategy).

Table 1: Area schedule for the Proposed Development.

Space use		GIA (m^2)		
		Application A Development Area 1	Application A Development Area 2	Application B
Domestic	Private residential	47,147	-	
	Refurbished apartments	2,968	-	
	Townhouses	-	3,912	
	Affordable	-	21,093	
	Flexible/assisted living	-	14,737	
Non-domestic	Retail A1	2,500	-	
	Hotel	1,668	-	
	Office	2,457	-	
	Cinema	2,120	-	
	Gym	740	-	
	Care home	-	9,472	
	Retail A3	2,164	-	
	School	-	-	9,319

3. Energy Strategy.

3.1 Scenario 1: Gas Boilers to Development Area 1 (Temporary)

To maximise a CHP's efficiency, it is beneficial to maximise the demand being served. The Energy Planning Guidance (March 2016) as approved for use on this application (see GLA comments in Appendix B of this document, comment reference B) indicates that developments with fewer than 500 dwellings should not be provided with CHP due to a relatively low annual thermal demand leading to lower running hours and less cost-effective deployment of the technology.

Comments received from the GLA in response to the submitted Energy Strategy highlighted this guidance. It was also agreed at the meeting on 15th January 2019 between the Applicant and the GLA Energy Officer that given the commitment to review the energy strategy for Development Area 2, when this comes forwards for a reserved matters application, in terms of alternative low/zero carbon technologies such as air source heat pumps etc, then it would be acceptable to remove the CHP from the energy centre in Development Area 1.

As such, to realise the greatest long-term emissions reductions, there would be a need to install gas fired boilers within the Development Area 1 energy centre to provide heating and hot water for Development Area 1 on a temporary basis until such time as Development Area 2 is brought forward for development.

The temporary emissions scenario for Development Area 1 is summarised in Table 2.

Figure 1 shows the overall emissions reductions offered by the gas fired boiler solution. Whilst, on a temporary basis, the emissions reduction is below the policy target, this would be met when the CHP engine in the energy centre as part of Development Area 2 is brought online (see overleaf).

The deployment of a PV array of 520m^2 panel area is calculated to provide an additional 2.0% reduction in regulated CO_2 emissions.

Table 2: Regulated carbon emissions savings from each stage of the energy hierarchy for a temporary energy centre solution for Development Area 1. Note: SAP 2012 carbon factors used.

	Domestic		Non-Domestic	
	Tonnes CO_2/year	Percentage	Tonnes CO_2/year	Percentage
Savings from Be lean.	9	1.2%	26	4.0%
Savings from Be clean.	0	0.0%	0	0.0%
Savings from Be green.	0	0.0%	30	4.6%
Total reduction:	9	1.2%	55	8.6%
Target reduction:	776	100%	226	35%
Annual shortfall	767	98.8%	171	26.4%
Carbon offset payment Rate (£/tCO_2)	£ 1,800		£ 1,800	
Offset payment	£ 1,380,766		£ 307,459	
Total offset payment	£ 1,688,225			

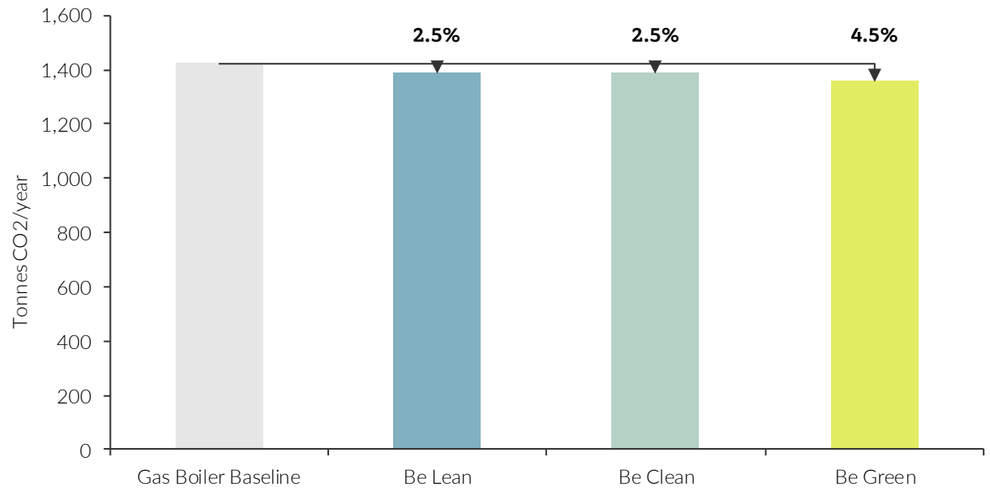


Figure 1: Anticipated reductions in regulated CO_2 emissions anticipated for Development Area 1 served by a temporary energy centre at each stage of the Energy Hierarchy.

Scenario 1 Additional Tables

The following tables are provided in response to the GLA request (23rd May).

Table 3 CO_2 emissions after each stage of the energy hierarchy for domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	776	48
Reduction from Be Lean	767	48
Reduction from Be Clean	767	48
Reduction from Be Green	767	48

Table 4: Regulated CO_2 savings from each stage of the Energy Hierarchy for domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	9	1.2%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	0	0.0%
Total Reduction	**9**	**1.2%**
Total Target Reduction	**776**	**100.0%**
Annual Surplus / Shortfall	**-767**	**98.8%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**£1,380,766**	

Table 5 CO_2 emissions after each stage of the energy hierarchy for non-domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	647	406
Reduction from Be Lean	621	406
Reduction from Be Clean	621	406
Reduction from Be Green	591	406

Table 6: Regulated CO_2 savings from each stage of the Energy Hierarchy for non-domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	26	4.0%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	30	4.6%
Total Reduction	**55**	**8.6%**
Total Target Reduction	**226**	**35.0%**
Annual Surplus / Shortfall	**-171**	**26.4%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**£307,459**	

3.2 Scenario 2: Gas Boilers & CHP to Development Area 1 and 2

This scenario explores the benefits of a gas-fired CHP engine in the Development Area 2 energy centre supplying a heat network connecting Development Area 1 and Development Area 2. This scenario would provide significant thermal demand to allow cost-effective operation of the heat network, providing increased emissions reductions when using SAP 2012 carbon factors. The intention would be that this scenario would be provided in sequence to Scenario 1, when Development Area 2 is brought forward for development.

At Be Lean stage, this strategy is anticipated to achieve a 1.6% reduction in regulated CO_2 emissions through passive design and energy efficiency measures.

Through provision of a single gas-fired CHP with output 1,426kW_e/1,643kW_t to meet up to 50% of the space heating and 100% of the domestic hot water demand of the connected buildings, a further reduction of 39.6% over the GLA's gas boiler baseline would be achieved.

This demonstrates that he strategy enables the Proposed Development to achieve the target 35% reduction in CO_2 emissions on-site, prior to offset payments.

The deployment of a PV array of 520m^2 panel area is calculated to provide an additional 1.2% reduction in regulated CO_2 emissions.

The CO_2 emissions reductions total of 1,069 tonnes; equivalent to a 42.4% reduction over the GLA gas boiler baseline using SAP 2012 carbon factors. Note, this is an improvement of 22.0% over the submitted strategy, increasing the emissions reductions by 553 tonnes.

Table 7 summarises the CO_2 emissions reductions and consequent carbon offset payment anticipated for the single energy centre strategy. This is calculated to be £1,411,809.

Table 7: Regulated carbon emissions savings from each stage of the energy hierarchy for the energy strategy. Note: SAP 2012 carbon factors used.

	Domestic		Non-Domestic	
	Tonnes CO_2/year	Percentage	Tonnes CO_2/year	Percentage
Savings from Be lean.	14	1.0%	26	2.3%
Savings from Be clean.	598	42.8%	401	35.7%
Savings from Be green.	0	0.0%	30	2.6%
Total reduction:	612	43.8%	457	40.6%
Target reduction:	1,396	100%	394	35%
Annual shortfall	784	56.2%	0	0%
Carbon offset payment Rate (£/tCO_2)	£ 1,800		£ 1,800	
Offset payment	£ 1,411,809		£ 0	
Total offset payment	£ 1,411,809			

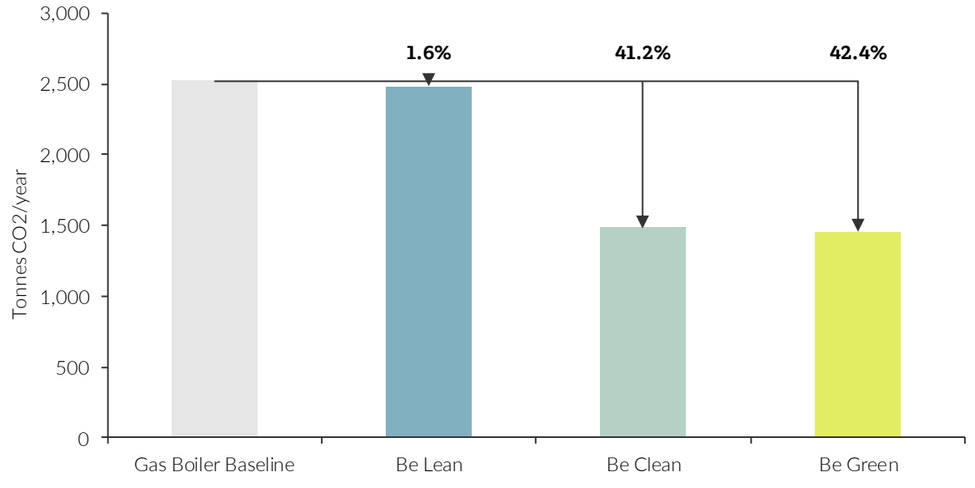


Figure 2: Anticipated reductions in regulated CO_2 emissions anticipated for the single energy centre strategy at each stage of the Energy Hierarchy.

Scenario 2 Additional Tables

The following tables are provided in response to the GLA request (23rd May).

Table 8 CO_2 emissions after each stage of the energy hierarchy for domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	1,396	310
Reduction from Be Lean	1,382	310
Reduction from Be Clean	784	310
Reduction from Be Green	784	310

Table 9: Regulated CO_2 savings from each stage of the Energy Hierarchy for domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	14	1.0%
Reduction from Be Clean	598	42.8%
Reduction from Be Green	0	0.0%
Total Reduction	**612**	**43.8%**
Total Target Reduction	**1,396**	**100.0%**
Annual Surplus / Shortfall	**-784**	**56.2%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**£1,411,809**	

Table 10 CO_2 emissions after each stage of the energy hierarchy for non-domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	1,125	538
Reduction from Be Lean	1,099	538
Reduction from Be Clean	698	538
Reduction from Be Green	668	538

Table 11: Regulated CO_2 savings from each stage of the Energy Hierarchy for non-domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	26	2.3%
Reduction from Be Clean	401	35.7%
Reduction from Be Green	30	2.6%
Total Reduction	**457**	**40.6%**
Total Target Reduction	**394**	**35.0%**
Annual Surplus / Shortfall	**63**	**-5.6%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**0**	

3.3 Scenario 3: Heat Pumps to Development Area 1 and 2 (following Nov. 2018 Guidance)

It is understood that the GLA's updated energy assessment guidance (November 2018) gave a change of direction, favouring all-electric strategies over formerly encouraged CHP strategies. This is a consequence of the guidance to use adjusted carbon factors.

To reflect this change in guidance, a heat pump-based strategy is also presented.

At the Be Lean stage, the strategy is anticipated to achieve a 2.6% reduction in regulated CO_2 emissions through passive design and energy efficiency measures. This is calculated using SAP10 emission factors, hence the slight difference to the previous scenario.

Through provision of heat pumps, with a seasonal coefficient of performance of 3 for space and domestic hot water heating and 5 for space cooling, to serve all buildings (100% of hot water, space heating and cooling), a 60.0% reduction in regulated CO_2 over the GLA's gas boiler baseline (using SAP10 carbon factors as per November 2018 guidance) could be achieved. The coefficients of performance presented are considered to be suitable values for an air-source system.

The deployment of a PV array of 520m^2 panel area is calculated to provide an additional 1.2% reduction in regulated CO_2 emissions.

The CO_2 emissions reduction for a heat-pump led energy strategy total 1,348 tonnes; equivalent to a 63.2% reduction over the GLA gas boiler baseline using SAP10 carbon factors. Note, this is an improvement of 42.8% over the approved strategy, increasing the emissions reductions by 832 tonnes.

Table 12 summarises the CO_2 emissions reductions and consequent carbon offset payment anticipated for the heat pump led energy strategy. This is calculated to be £771,464.

If, at the point at which Reserved Matters is submitted for Development Area 2, a heat-pump strategy is followed then the potential reduction in carbon emissions would increase beyond the policy compliant position as presented in Scenario 2.

Table 12: Regulated carbon emissions savings from each stage of the energy hierarchy for the submitted energy strategy. Note: SAP 2010 carbon factors used.

	Domestic		Non-Domestic	
	Tonnes CO_2/year	Percentage	Tonnes CO_2/year	Percentage
Savings from Be lean.	51	4.0%	5	0.6%
Savings from Be clean.	0	0.0%	0	0.0%
Savings from Be green.	789	62.2%	504	58.3%
Total reduction:	840	66.2%	509	58.9%
Target reduction:	1,268	100%	303	35%
Annual shortfall	429	33.8%	0	0%
Carbon offset payment Rate (£/tCO$_2$)	£ 1,800		£ 1,800	
Offset payment	£ 771,464		£ 0	
Total offset payment	£ 771,464			

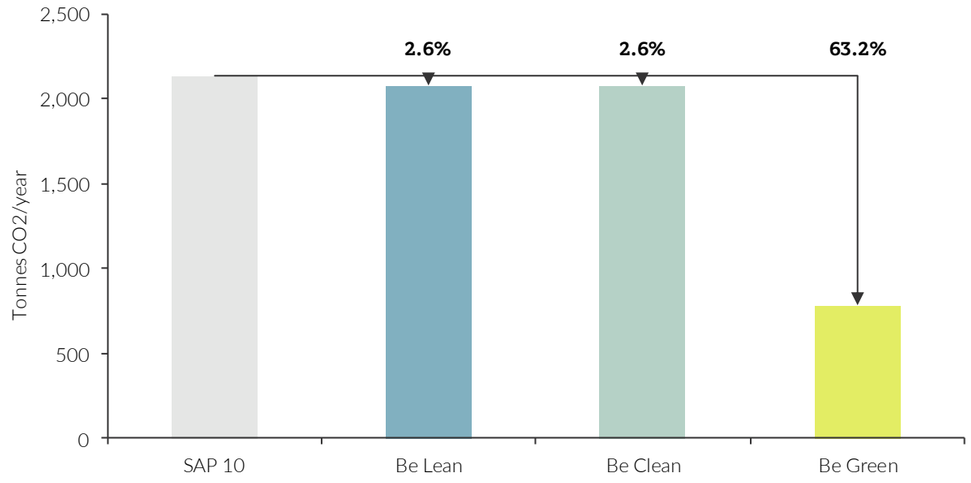


Figure 3: Anticipated reductions in regulated CO_2 emissions anticipated for the heat pump strategy at each stage of the Energy Hierarchy.

Scenario 3 Additional Tables

The following tables are provided in response to the GLA request (23rd May).

Table 13 CO_2 emissions after each stage of the energy hierarchy for domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	1,268	139
Reduction from Be Lean	1,217	139
Reduction from Be Clean	1,217	139
Reduction from Be Green	429	139

Table 14: Regulated CO_2 savings from each stage of the Energy Hierarchy for domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	51	4.0%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	789	62.2%
Total Reduction	**840**	**66.2%**
Total Target Reduction	**1,268**	**100.0%**
Annual Surplus / Shortfall	**-429**	**33.8%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**£771,461**	

Table 15 CO_2 emissions after each stage of the energy hierarchy for non-domestic buildings

	Carbon Dioxide Emissions (tonnes CO_2 per annum)	
	(Regulated)	(Unregulated)
Gas Boiler Baseline	864	241
Reduction from Be Lean	859	241
Reduction from Be Clean	859	241
Reduction from Be Green	356	241

Table 16: Regulated CO_2 savings from each stage of the Energy Hierarchy for non-domestic buildings

Dwellings	Regulated Carbon Dioxide Emission Savings	
	(tonnes/yr)	(%)
Reduction from Be Lean	5	0.6%
Reduction from Be Clean	0	0.0%
Reduction from Be Green	504	58.3%
Total Reduction	**509**	**58.9%**
Total Target Reduction	**303**	**35.0%**
Annual Surplus / Shortfall	**206**	**-23.9%**
Residential carbon offset payment rate (£/tCO_2)	£1,800	
Total Offset Payment	**0**	

4. Development Area 1 Brief LZC Feasibility Assessment.

In response to the GLA's request, the following section outlines the Low and Zero Carbon (LZC) technologies that could be considered to reduce CO_2 emissions in Development Area 1 only, if Development Area 2 was not constructed within an agreed timeframe.

The LZC technologies considered in this brief feasibility assessment are:

- Combined Heat and Power (CHP)
- Biomass boilers
- Hair source heat pumps

The potential for these technologies to reduce CO_2 emissions would be considered further in a detailed feasibility study should Development Area 2 not be brought forward for development within a time frame to be agreed in a suitable planning condition. The subsequent feasibility study would include further detail such as:

- Energy generated from LZC energy source per year
- Carbon dioxide savings from LZC energy source per year
- Life cycle cost of the potential specification, accounting for payback
- Local planning criteria, including land use and noise
- Feasibility of exporting heat/electricity from the system
- Any available grants
- All technologies appropriate to the site and energy demand of the development.
- Reasons for excluding other technologies
- Where appropriate connecting the proposed building to a new source of heat or power with the potential to export heat or power to the development.

The following table provides a summary of the brief LZC feasibility assessment.

Table 17: Summary of Brief LZC feasibility for Development Area 1 only.

Technology	Annual Thermal Output	Annual Electrical Output	CO_2 Emissions Reduction	CO_2 Emissions Reduction (beyond Part L)	Notes
	(kWh/year)	(kWh/year)	(kgCO2/year)	(%)	
~400kWe CHP with DEN	2,585,800	2,036,400	298,500	23.9%	Running for ~5100 hours per year to provide up to 50% of the space heating and 100% of the hot water demand.
~1600kW Wood Pellets Boiler	3,527,300	-	666,700	53.4%	Running for ~2300 hours per year to provide 100% of the space heating and 100% of the hot water demand.
~754kW Air Source Heat Pump	3,757,000	-57,400	338,400	27.1%	Sized to provide 100% of the space heating and 100% of the hot water demand.

The following considerations are noted at this stage for each of the technologies assessed in brief above. These considerations would require further review if the need for a detailed feasibility assessment is triggered, as per the condition (to be agreed).

CHP.
The GLA Energy Strategy Planning Guidance (2016) indicates that a CHP engine with heat network feeding greater than 500 dwellings is deemed to provide the minimum demand for effective use. As such, it may not be considered suitable for Development Area 1 to include a CHP engine.

Biomass.
Biomass boilers require a large fuel store to maintain continuous operation during the winter months. As such, area take for such plant is high. Furthermore, fuel deliveries in city-centre locations can prove difficult and security of fuel supply is an important consideration.

Biomass boilers also result in higher emission of Nitrous Oxide (NOx) in comparison with gas boilers. This can have a negative impact on the local air quality. Policies in London seek to protect and enhance local air quality. Any proposal for biomass heating would be required to demonstrate the scheme would be 'air quality neutral'.

Given the above, it is considered highly unlikely that biomass would be a suitable option and is therefore discounted.

Heat Pumps.
A significant proportion of roof area has been allocated to green roof leaving limited area to locate sufficient external plant to accommodate ASHP for the whole development. However, it could be possible to locate a heat pump array elsewhere. This would require further assessment.

5. Overheating Risk Assessment.

This addendum summarises the results of additional overheating risk assessments undertaken to demonstrate that the sample residential spaces at the Proposed Development can achieve the overheating risk criteria for the Design Summer Year 1 (DSY1) weather file appropriate to the location. The results for the DSY2 and DSY3 weather files are also presented.

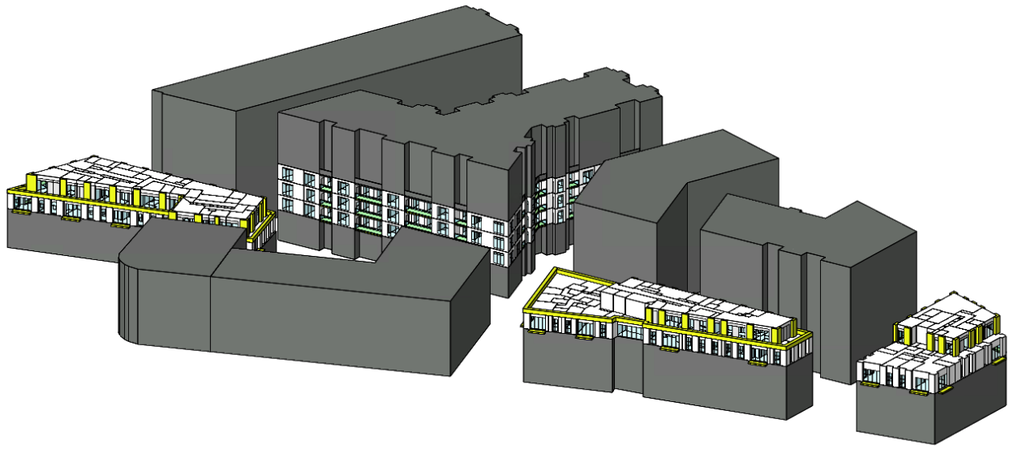


Figure 4: IES model used for the assessment.

5.1 Assessment criteria.

CIBSE TM59:2017 provides a standardised methodology for assessing and reporting overheating risk in new and refurbished homes.

Table 18 provides a summary of the overheating risk criteria.

Table 18: Summary of TM59 assessment criteria.

CIBSE Residential Overheating Criteria	
Adaptive Criteria:	For living rooms, kitchens and bedrooms: Internal temperatures should not exceed a threshold (linked to outside air temperature) for more than 3% of occupied hours (May – Sept). Additionally, for bedrooms only: At night (22:00-07:00hrs) internal temperatures should not exceed 26°C for more than 1% of occupied hours (Jan – Dec).
Communal Corridors	
Recommended test to ensure that corridors do not exceed operative temperature of 28°C for more than 3% of total annual hours (262 hours or less).	

5.2 Sample spaces.

A total of 20 dwellings have been assessed which are considered both representative of the dwellings at the Proposed Development and likely represent some of the more challenging areas for overheating risk. The sample dwellings account for changes in orientation, glazing ratio, internal layouts and external environmental conditions.

Dwellings assessed are highlighted blue in Figure 5 below.

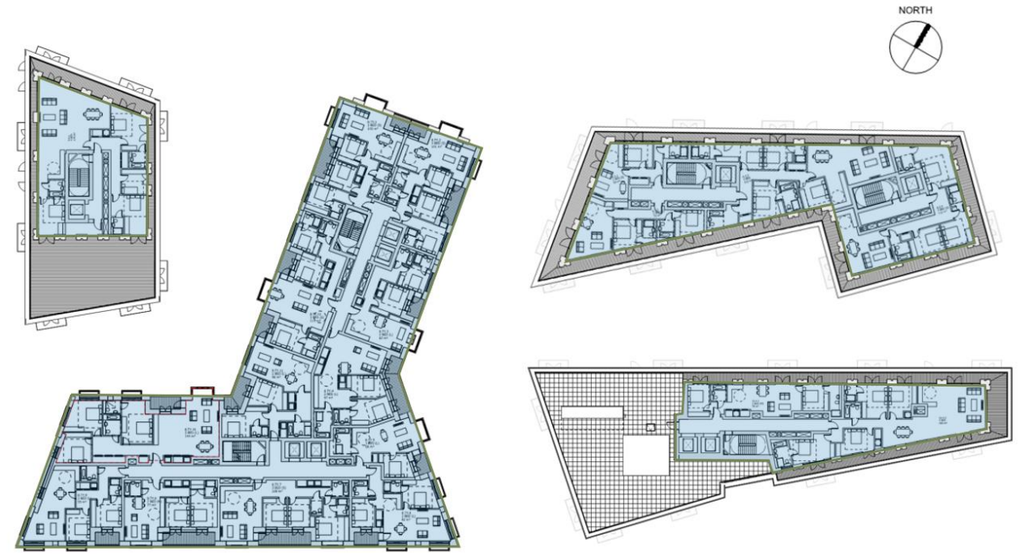


Figure 5: Dwellings assessed (highlighted blue).

5.3 Results.

DSY1.

Table 19 demonstrates that the assessed dwellings can meet the CIBSE TM59 adaptive criteria for DSY1. Please refer to Appendix G for a full breakdown of assessment results.

The criteria have been met on the basis of a hybrid ventilation strategy where natural and mechanical ventilation is being used concurrently, with blinds.

Table 19: Summary of adaptive criteria results based on various ventilation scenarios – DSY1.

	% meeting adaptive comfort criteria		Corridors
	TM59 criterion 1 Kitchens, living rooms and bedrooms <3% occ. hours exceed comfort temp (May – Sept)	TM59 criterion 2 Bedrooms only <26°C for <1% occ. hours	28°C operative temperature target <3% of annual hours
Hybrid ventilation with blinds	100%	100%	100%

DSY2.

In addition to the assessment using DSY1, the dwellings have been assessed using the DSY2 summer year. Results are presented in the table below.

Table 20: Summary of adaptive criteria results based on various ventilation scenarios – DSY2.

	% meeting adaptive comfort criteria		Corridors
	TM59 criterion 1 Kitchens, living rooms and bedrooms <3% occ. hours exceed comfort temp (May – Sept)	TM59 criterion 2 Bedrooms only <26°C for <1% occ. hours	28°C operative temperature target <3% of annual hours
Hybrid ventilation with blinds	85%	85%	100%

DSY3.

A final model iteration was run using the DSY3 weather file.

Table 21: Summary of adaptive criteria results based on various ventilation scenarios – DSY3.

	% meeting adaptive comfort criteria		Corridors
	TM59 criterion 1 Kitchens, living rooms and bedrooms <3% occ. hours exceed comfort temp (May – Sept)	TM59 criterion 2 Bedrooms only <26°C for <1% occ. hours	28°C operative temperature target <3% of annual hours
Hybrid ventilation with blinds	57%	0%	100%

It is our understanding that the driver of risk when utilising DSY2 and DSy3 weather files is the high external air temperatures that may arise in those situations. Were these circumstances to arise in reality, a means of mitigating the risk would be to counter the impacts of the air temperature.

6. Conclusion.

Figure 6 presents the CO_2 emissions for the Proposed Development for the three scenarios as follows:

- Scenario 1: Gas fired boilers to serve Development Area 1 energy centre on a temporary basis until the energy centre to be provided within Development Area 2 is operational.
- Scenario 2: Development Area 2 energy centre to be provided with a single CHP to serve Development Areas 1 and 2 through a single connected heat network.
- Scenario 3: Development Area 2 energy centre to be provided with heat pumps serving Development Area 1 and 2 through a single connected heat network, using SAP 10 carbon emissions factors in line with the November 2018 updated GLA guidance.

Scenario 1 calculates the overall emissions using the SAP 2012 carbon factors (as per March 2016 GLA guidance). These are the carbon factors used in the submitted energy strategy. In this scenario, gas fired boilers to serve Development Area 1 prior to the construction of Development Area 2, therefore the scenario represents a temporary solution for serving the thermal demands within Development Area 1.

Scenario 2 demonstrates the reduction (using SAP 2012 carbon factors as per March 2016 GLA guidance) of a gas-fired CHP connected to Development Area 1 and Development Area 2. The CO_2 emissions reductions for this scenario totals 1,069 tonnes; equivalent to a 42.4% reduction over the GLA gas boiler baseline. This represents a policy compliant position whereby 35% emissions reduction is achieved (exceeded) on-site, prior to the use of offset payments.

Scenario 3 makes use of SAP 10 carbon factors as per the November 2018 GLA guidance. The results indicate the heat pumps could provide up to a 60% reduction in regulated CO_2 emissions if these were to be implemented following a review of the energy strategy to be undertaken at the submission of Reserved Matters for Development Area 2.

In each scenario it is anticipated that the LZC technologies will include the deployment of a PV array of 520m^2 panel area to provide an additional reduction in regulated CO_2 emissions.

The overheating risk assessment has demonstrated that the criteria of TM59 are met in all assessed spaces when using the DSY1 weather file. The results for DSY2 and DSY3 weather files are also provided.

A brief LZC feasibility study for Development Area 1 has shown that a number of technologies could provide CO_2 emission reductions in line with the submitted Energy Strategy for Application A.

Figure 6: CO_2 emissions of the Proposed Development for the three Scenarios.

Appendix A: Previous Memo Addendum to Energy Strategy.

To:	Ioanna Mytilinaiou (GLA), Anne Marie Robinson, Katherine Wood
Cc:	Guy Duckworth - Dartmouth Capital, Anna Gargan - Gerald Eve, Suzanne Robson - Gerald Eve
From:	Richard Harper, Principal Sustainability Consultant
Date:	05 June 2019
Project:	Former Stag Brewery
File ref:	REP-2310513-5A-TW-20190415-Energy Strategy Addendum-Rev01 (002)

This note is provided following receipt of comments from the GLA dated 2nd July, 30th July and 25th October 2018, and provision of responses prepared by Hoare Lea dated 21st August 2018 and 10th January 2019 and the meeting with the GLA on 15th January 2019 to discuss an appropriate Energy Strategy for Application A (ref. 18/0547/FULL) of the submission for the Former Stag Brewery, Richmond, London.

Application A Energy Strategy

The Energy Strategy submitted in support of the Application A (ref. 18/0547/FULL) for the Former Stag Brewery included a site wide heat network led by gas-fired Combined Heat and Power (CHP) to provide distribution of heat to the dwellings and other non-domestic uses at the Proposed Development, in line with GLA policy in place at the time of submission in February 2018).

Following discussion at the meeting the following amendments to the Energy Strategy were agreed:

1. An agreement that there will be two energy centres, one serving Development Area 1 proposed to include gas fired boilers only and the other serving Development Area 2.
2. The discussion at the meeting concluded that it was suitable to exclude the CHP from the energy centre in Development Area 1 and for the site initially to be served by gas fired boilers only. This related to the scale of the Development not being suitable for implementation of a gas-fired CHP.
3. Subsequently when the Reserved Matters submission is provided for Development Area 2 it will include a review of suitable low and zero carbon technologies that can be incorporated into Development Area 2 in order to provide a CO_2 emissions reduction in line with the Energy Strategy submitted in support of Application A (ref. 18/0547/FULL).
4. It was agreed that the energy assessment and review in point 3 will be undertaken in line with the Energy Planning Guidance (October 2016) that was in place at the time of submission (February 2018) given the pre-application advice received and the advanced nature of the scheme design.
5. Provision of a suitable site-wide heat network for Development Area 1 and 2 of Application A (ref. 18/0547/FULL).

The current Energy Strategy (submitted with Application A (ref. 18/0547/FULL)) remains relevant as it sets out the CO_2 emissions reduction that Application A (ref. 18/0547/FULL) is anticipated to achieve.

It is anticipated that the points above will be secured by condition. Potential wording of the condition is suggested as follows:

DRAFT CONDITION WORDING

The Reserved Matters submission for the Outline proposals (Development Area 2) of Application A (ref. 18/0547/FULL) will include a review of suitable technologies that could be incorporated to provide a carbon dioxide emissions reduction commensurate with the Energy Strategy submitted for Application A (Development Area 1 and Development Area 2). The review would be undertaken in line with the Energy Planning Guidance (October 2016) that was in place at the time of submission of Application A (February 2018).

Appendix B: Summary of GLA Comments and Responses.

The following table captures the comments, and responses to the comments provided by the GLA to the Energy Strategy for Stag Brewery. This includes the comments received in the email from Katherine Wood to Anna Gargan on 23rd May 2019.

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
A	The applicant is required to submit an Energy Strategy Addendum in line with the discussions held at the meeting on 15/01/2019.	The applicant has provided an Addendum to Energy Strategy, dated 18 January 2019. This addresses some of the points below but not all. The applicant has claimed that the previously submitted energy strategy remains relevant as it sets out the CO_2 emissions reduction that the current application is anticipated to achieve, which equates to an overall saving of 535 Tonnes of CO_2 per year (21%). They should update the Energy Strategy Addendum to address all the outstanding comments, and include updated carbon emissions figures for all stages of the energy hierarchy for both phases. This item remains outstanding.	The Energy Strategy submitted as part of the planning application was prepared on the basis that the eastern side of the development was a full planning application whereas the western side of the site was at outline planning application stage. Therefore, the western side will be subject to a separate reserved matters application following the determination of the current application. The overall approach to the energy strategy dated 13th February 2018 was developed in conjunction with the GLA and the London Borough of Richmond Upon Thames which equated to an overall carbon emissions saving of 21%. The energy calculations that form part of the overall assessment are based on the architectural layouts, elevations and sections that were submitted for both the eastern and western sides of the site - which resulted in the level of detail being provided for the energy strategy being aligned with the overall application. As the overall planning strategy is for an application full planning permission for the eastern side and only an outline planning application for the western side (which would then be subject to a reserved matters application), given the level of detail the western part of the site has not been developed to it is not feasible at this stage to undertake a further assessment (over and above what has already been prepared) to include this.	We could provide an updated energy strategy or re-worked addendum to show: - Gas boilers only Ph1 until Ph2 is brought online - Ph2 to include CHP or Heat Pumps to serve both phases of the masterplan Calculations could be undertaken following March 2016 guidance (previously agreed approach) and November 2018 updated guidance (using SAP10) carbon factors to demonstrate the potential improvement.	The applicant has submitted a revised energy strategy addendum, which is welcomed, although it is not sufficiently addressing all items, and should be revised. The carbon emissions tables should be presented as per GLA requirements for each scenario, e.g. to Tables 1-4 of the GLA energy assessment guidance. This item is outstanding.	These have been included in this updated addendum to the Energy Strategy.

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
			This approach formed the basis of the overall planning application and whilst the design of the western side of the site will evolve as part of a future full planning application the commitment will be to achieve a minimum 21% reduction in carbon emissions as outlined in the Energy Strategy dated 13th February 2018. It is suggested that in order to secure this commitment a suitably worded planning condition is included.			
B	Given that this application was referred to the GLA July 2018, it is considered acceptable for the energy strategy to be based on the guidance document at the time of the application (March 2016 version).	The applicant has confirmed that they intend to base the application on the guidance document at the time. Nothing further required.	Noted.	It should be noted that whilst this comment is clear in agreeing that the March 2016 guidance is the version applicable to this application, many of the comments (such as comment reference G below) received make reference to the November 2018 guidance. We are clear that the March 2016 guidance remains the relevant approach for this application.	-	-
C	For clarity, the GLA expects that the energy strategy for the development should be a joined up approach for both the detail and outline elements as it is a single planning application. Separate CHP led solutions for the detailed and outline phases of the development is not considered an acceptable strategy and is not line with the GLA Energy Assessment Guidance (March 2016 and October 2018). Similarly, a CHP-led approach for the school only would not be considered acceptable due to the anticipated load and heat profile of the school.	The applicant is proposing to serve Phase 1 with gas boilers only, and Phase 2 with low and zero carbon technologies, which will also be sized to supply low-carbon heating to the Phase 1 development. They need to present this proposal in more detail in an updated Addendum, including the anticipated programme for developing the Phase 2 outline part of the scheme and the proposed low and zero carbon technologies to be used alongside the update carbon performance. This item remains outstanding.	The overall approach to the energy strategy including the provision of the number and location of the energy centres was discussed and agreed during the pre application planning process. As outlined above it is not feasible to provide further assessments at this stage, albeit this level of information will be provided in conjunction with the future reserved matters application for the western side of the site. It was agreed at the meeting on 15th January 2019 that given the commitment to review the energy strategy for the western side when this comes forwards for a reserved matters application in terms of alternative low/zero carbon technologies such as air source heat	As per comment to item A. We could provide an updated energy strategy or re-worked addendum to show: - Gas boilers only Ph1 until Ph2 is brought online - Ph2 to include CHP or Heat Pumps to serve both phases of the masterplan Calculations could be undertaken following March 2016 guidance (previously agreed approach) and November 2018 updated guidance (using SAP10) carbon factors to demonstrate the potential improvement. Updated addendum to also include; - Programme details - Indicative heat network distribution routes	The applicant proposes to provide an indicative programme for Phases 1 and 2; this is not present in the addendum and they should provide this. The applicant is proposing that they will submit this application on the basis of temporary gas boiler for Phase 1 and a CHP led network for Phase 2. However, when the reserved matters application for Phase 2 comes forward, they will undertake a full assessment of low and zero carbon technology options for the energy centre. They have provide an initial assessment of a heat pump strategy (and on the basis of SAP 10 emissions factors), which is welcomed. This item is outstanding.	The Framework Construction Management Plan (FCMP) submitted with the original planning applications included an indicative phasing programme (see Appendix B of the FCMP). The programme has been appended (Appendix F) to this addendum for ease of reference.

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
			pumps etc then it would be acceptable to remove the CHP from the eastern side energy centre. This proposal is also on the basis that the energy centre located on the eastern side would be linked to the energy centre on the western side via a network of pipework. This connectivity would be included in the design of the eastern side energy centre so that the overall development is future proofed in this regard. As noted above, in doing this the commitment will be to achieve as a minimum the 21% reduction in carbon savings as stated in the submitted Energy Strategy dated 13th February 2018.			
D	The Addendum therefore needs to demonstrate how the number of energy centres on site (entire application, both detailed and outline) has been minimised and that a single site wide network has been thoroughly investigated. It is understood that the outline application is less defined. However, the applicant should demonstrate that the possibility of increasing the LZC capacity within the footprint of the Phase 1 energy centre to serve the outline application has been investigated e.g. additional boiler capacity top-up could be included in later phases. The applicant should therefore include layout drawings of the Phase 1 energy centre within the energy addendum document.	The applicant has confirmed their intention to provide two energy centres. The applicant intends to provide a site wide network covering Phase 1 and 2, however, no detail is provided. The applicant needs to demonstrate how the creation of a site wide network will be enabled by the Phase 1 works. They should also demonstrate the possibility of increasing the LZC capacity within the footprint of the Phase 1 energy centre to serve the outline application, particularly given the uncertainty around Phase 2. **This item remains outstanding.**	As outlined in Appendix E of the Energy Strategy dated 13th February 2018 there are 2 energy centres included within the development proposals – one for the eastern side and one for the western side – Appendix E includes an indicative layout drawing for the 2 energy centres. The 2 energy centres will be connected together via a network of pipework which in essence will create a single site wide heat network. The design of the eastern side energy centre will be future proofed to facilitate this connectivity, given the western side of the site is only at outline stage. The proposal to provide renewable energy technologies across the development includes photovoltaics. Appendix D included within the Energy Strategy dated 13th February 2018 includes a proposed layout for the photovoltaic panels serving the eastern side of the site.	A revised energy strategy / addendum could cover these aspects. Phase 1 will enable the network by centralising boiler plant to one location, with heat network distribution to buildings from that point. When Phase 2 energy centre is built, a CHP / LZC technology (eg Heat Pumps) would come online and connect to the Ph1 energy centre, and buildings in Ph1. The comment around increasing Ph1 energy centre to serve Ph2 is contrary to the agreement that Ph1 would be provided only with gas boilers with LZC technologies to be included in Ph2 when there is a suitable density of demand on-site (Ph1 is less than 500 dwellings – as per March 2016 guidance, and comment 19 from original Stage 1 responses).	The applicant has confirmed the intention to ultimately provide a site wide network served by an energy centre in Phase 2; this is welcomed. They have provided a drawing showing the site-wide network layout. The applicant should update the energy strategy addendum to provide a brief feasibility assessment of increasing the LZC capacity within the footprint of Phase 1, in the case that Phase 2 does not come forward. **This item is outstanding.**	As per the proposed condition wording of item H, the detailed LZC feasibility study would be undertaken and provided to LBRuT and GLA, if 5 years after occupation of Development Area 1, Development Area 2 has not become operational. A brief feasibility assessment of the potential inclusion of appropriate LZC technologies to serve Development Area 1 has been included in this addendum.

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
			The area of these has been maximised based on the available roof area and the overall architectural aesthetics of the design. However, as the design of the eastern side evolves during the subsequent work stages, if it is feasible, consideration will be given to maximising the area of photovoltaic panels further. In terms of the full application for the western side of the site a full detailed appraisal will be undertaken to evaluate the most beneficial low / zero carbon technologies (including photovoltaics, solar hot water, ground source heat pumps, air source heat pumps, wind etc) in order that the carbon savings from this are maximised to their full potential. This study will form part of the reserved matters application for the western side as has been undertaken for the eastern side. As noted above, It is suggested that in order to secure this commitment a suitably worded planning condition is included.			
E	The current maximum permissible amount of energy centres on site is two, one for the school and one for the rest of the site. The applicant should aim to minimise the amount of energy centres throughout the site and needs to provide robust evidence and justification to explain the number of energy centres proposed.	The applicant has confirmed their intention to provide two energy centres. They should provide robust evidence and justification to explain the number of energy centres proposed. **This item remains outstanding.**	As noted above the overall approach to the number and location of the energy centres serving the overall development evolved during the pre application stage of the planning process – which then formed the basis of the Energy Strategy dated 13th February 2018. The strategy behind this was driven predominantly by the eastern and western side development phasing proposals and the fact that the school is subject to a separate application and ultimately ownership.	The rationale for the energy centres: - Ph1 to include central gas boiler provision to enable a future masterplan-wide heat network. If Ph1 was built-out with individual plant rooms per building, a site-wide network would be more difficult to achieve - Ph2 to include the LZC technology to come online after the 500th dwelling is occupied. This is in-line with the GLA March 2016 guidance regarding CHP (see Appendix D) and comment 19 from original Stage 1 responses, and	The applicant is proposing a temporary energy centre in Phase 1 with gas boilers, which will be replaced by the single energy centre for the site in Phase 2. They should clarify whether the school is included in this application and whether it is to be connected to the site-wide heat network. **This item is outstanding.**	It was defined in the submission that the School is within Application B and is not intended to connect to the heat network (Executive Summary of the submitted Energy Strategy, Page 6 Paragraph 1.3.4). The indicative distribution of the heat network included in the Energy Strategy addendum also showed that the school is not anticipated to connect to the network (Appendix C Figure C4). It is anticipated that the school will be serviced from a plant room within the building, independently from the heat networks associated with Application A. The programme

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
			Notwithstanding this, for the eastern and westerns sides of the development the 2 energy centres will be networked linked via interconnecting pipework which in essence create a single site wide heat network. For reference the initial proposal that was discussed with the GLA during the pre application process included for circa 5 energy centres across the development, however, in conjunction with the GLA, this strategy evolved and has resulted in the current proposal, which was the agreed strategy by all parties.	enables consideration at the time to RM submission of other, potentially more suitable technologies that were not supported by policy at the time of pre-app discussion (eg Heat Pumps).		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 applicants control and therefore the energy strategy allows for Application B to be brought forward independently. It is anticipated that the school design team will evaluate the most suitable and feasible opportunities for appropriate LZC technologies to be included in the detailed design of the school such as connecting to the site wide network or incorporating its own technology.
F	The applicant should also demonstrate the likely connection point for the outline and detailed elements of the application in order to create a single heat network on the site which will eventually supply all phases. A condition at each stage of the reserved matters for the outline application will be required to ensure that the applicant will use best endeavours to create the site wide heat network.	The applicant has not addressed this item and it remains outstanding.	Appendix E of the submitted Energy Strategy provides an indicative layout of the proposed energy centres on the eastern and western sides of the overall site. There is a commitment to connect the 2 energy centres together via a network of inter connecting pipework to create a single site wide heat network. As noted in the comment it is accepted that this approach is dealt with by a suitably worded planning condition.	Detailed layouts for the energy centres are provided in Appendix C (as previously submitted) indicating how the two are connected, and how they interface with the distribution network, as provided in Appendix A (as previously submitted). The drawings demonstrate how the components will interface to create a single network on-site.	The applicant has provided drawings showing the connection point for the outline and detailed elements of the application in order to create a site-wide heat network. A condition will be required to secure the site-wide network. The applicant has not considered this. However, here is GLA's proposed wording: "The Reserved Matters submission for the Outline proposals (Development Area 2) of Application A (ref. 18/0547/FULL) will demonstrate that connection will be made between the heat networks for Development Area 1 and Development Area 2, thereby creating a single site-wide heat network covering the full site covered by Application A." This item is outstanding.	The proposed condition wording is considered to be in line with what has been submitted to-date. The wording will require review by the Applicant to agree, however from a technical perspective this in line with the expectation to provide two energy centres either side of Ship Lane to create a single heat network for Application A.

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
G	Although use of the March 2016 guidance document is considered acceptable for this application, the applicant is encouraged to update the site wide energy strategy based on the latest guidance document (including the GLA's position on SAP 10 emission factors). Given that the design is far progressed at the moment an interim boiler-only solution for the initial plots could be considered acceptable. This should be on the basis that a condition is included to develop an updated energy strategy to meet GLA targets and to adopt a low carbon solution for the scheme, which will also supply part of the load of the Phase 1 development. This approach should be secured by condition with an appropriate trigger point for the development of an updated energy strategy.	The applicant has not updated the site wide energy strategy based on the latest guidance document; this should be submitted. The applicant has proposed an interim gas boiler solution for the initial plots, and they have proposed a condition to address the carbon emissions shortfall: "The Reserved Matters submission for the Outline proposals (Development Area 2) of Application A (ref. 18/0547/FULL) will include a review of suitable technologies that could be incorporated to provide a carbon dioxide emissions reduction commensurate with the Energy Strategy submitted for Application A (Development Area 1 and Development Area 2). The review would be undertaken in line with the Energy Planning Guidance (October 2016) that was in place at the time of submission of Application A (February 2018)." The condition proposed for the Reserved Matters energy statement should include using best endeavours to meet the applicable policy at the time and should commit the developer to connecting both phases. **This item remains outstanding.**	For the reasons outlined above it is not feasible at this stage to provide an updated energy strategy, therefore, our suggestion would be to secure this commitment via a suitably worded planning condition as drafted above.	Please refer to comment reference B above. It has been agreed that the relevant document for this application is the March 2016 guidance, however this comment makes reference to 'latest guidance' which is inappropriate. Ph1 will be provided with gas boilers, and would subsequently connect to the ph2 energy centre where a suitable LZC technology would be included to serve phases 1 and 2. The planning condition could be worded to define that for the overall application, a 21% emissions reduction would be achieved once ph1 and ph2 energy centres are operational, accepting that ph1 would be served by gas boilers on a temporary basis.	As previously advised, the applicant's proposed condition is not acceptable. Here is a proposed revision, with additions in italics: "The Reserved Matters submission for the Outline proposals (Development Area 2) of Application A (ref. 18/0547/FULL) will include a review of suitable low and zero carbon technologies that could be incorporated to provide a carbon dioxide emissions reduction at least commensurate with the Energy Strategy submitted for Application A (Development Area 1 and Development Area 2). The review would be undertaken in line with the *energy policy* ~~*Energy Planning Guidance (October 2016) that was*~~ in place at the time of submission of *the Reserved Matters submission*~~*Application A (February 2018)*~~*. The review shall be submitted to GLA for review and comment*" **This item is outstanding.**	The proposed condition wording has been amended to include 'where feasible to do so' (see highlighted section below) in relation to the potential change in energy policy. Energy policy changes in the future are unknown and may present an unfeasible target at the point of the Reserved Maters submission. The wording will require review by the Applicant legal team to agree wording. "The Reserved Matters submission for the Outline proposals (Development Area 2) of Application A (ref. 18/0547/FULL) will include a review of suitable low and zero carbon technologies that could be incorporated to provide a carbon dioxide emissions reduction at least commensurate with the Energy Strategy submitted for Application A (Development Area 1 and Development Area 2). The review would be undertaken where feasible to do so in line with the *energy policy* in place at the time of submission of *the Reserved Matters submission*. *The review shall be submitted to GLA for review and comment*"

Ref	Initial Comment	Further Comment	Response	Response (9th April)	Comment (23rd May)	Response
H	If an interim solution is proposed for Development Phase 1, a condition should be applied should Development Phase 2 not go forward. This should request alternative low carbon solutions to be considered for Development Phase 1.	The applicant proposes an interim gas boiler solution for Phase 1, but they have not addressed this comment. A condition should be sought ensuring that should Phase 2 not go forward within a certain number of years, alternative low carbon solutions should be implemented for Phase 1 to ensure the agreed target is met. Note the applicant should demonstrate how low carbon technologies could be added to the Phase 1 energy centre to allow this to happen. This remains outstanding.	Noted, this approach is considered acceptable on the basis that in the unlikely event that Phase 2 (western side) does not move forwards then the CHP included within the Energy Strategy dated 13th February 2018 could be re-introduced to the eastern side. In addition, as noted above, as the eastern side (Phase 1) design develops through the subsequent design stages, if there is a potential to increase the area of photovoltaics then this will be integrated.	A draft condition should be provided to the applicant's team for consideration and review. In the unlikely event that ph2 is not built-out, a review of the ph1 energy strategy could be undertaken with a view to understanding if LZC technologies could be included. Alternatively, if LZC options are not possible for ph1, it could be possible to procure a portion of zero-carbon green-gas for ph1 to limit CO_2 emissions in-line with the 21% emissions reduction target. A space allocation within the ph1 energy centre could be made to enable this, however this would attract additional cots and could compromise viability.	A condition will be required to secure a low carbon technology for Phase 1 in the event that Phase 2 does not come forward. The applicant has not considered this. However, here is GLA's proposed wording: "In the event that the Development Area 2 of Application A (ref. 18/0547/FULL) does not become operational within 5 years of the first occupation of Development Area 1, the Owner shall submit a low and zero carbon technology feasibility report to the London Borough of Richmond Upon Thames and Greater London Authority for approval. This should review the options to replace the gas boilers in the Phase 1 energy centre with the connection to the site-wide heat network proposed in Application A, or, if this is not available, an alternative low and zero carbon technology to serve the Phase 1 energy centre. Based on the review, the applicant will be expected to replace the gas boilers with the identified technology, prioritising the connection to the site-wide network, and they should demonstrate a carbon dioxide emissions reduction at least commensurate with the Energy Strategy submitted for Application A." This item is outstanding.	Please refer to the response provided to item D in this tracking document. As per the proposed condition wording of item H, the detailed LZC feasibility study would be undertaken and provided to LBRuT and GLA, if 5 years after occupation of Development Area 1, Development Area 2 has not become operational. A brief feasibility assessment of the potential inclusion of a number of LZC technologies to serve Development Area 1 has been included in this addendum.

Previous Stage 1 Submission Comments
GLA have commented that the following points are still required to be addressed.

In summary the points numbered 10, 13, 19, and 17 all note that nothing further is required in the email comments from the GLA dated 23rd May 2019. The comments were met with the energy strategy addendum dated 25th April 2019 and information provided previously.

- *Items 5&6: they still need to provide a revised overheating analysis demonstrating that they have investigated 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. The analysis needs to be carried out for both DSY2 and DSY3 weather files.*
  - Response:
    - We acknowledge this further request and confirm that this will be undertaken and results submitted to the GLA (modelling to demonstrate the TM59 criteria are met under DSY1 weather file and modelling and provide the results for DSY2 and DSY3). However, further to our previous response, clarity has not been given to the specific measures the GLA would like to be tested.
- *Items 8&9&24: Conditions should be applied on the thermal bridging calculations and the PV provision.*
  - Response:
    - Please provide condition wording for review by the Applicant's team.
- *Item 10 still needs the revised carbon emissions of the be lean scenario and the boiler datasheet.*
  - Response:
    - The comment notes that *'revised carbon emissions have been provided. The Boiler datasheet has also been provided and therefore nothing further is required'*. We are therefore assuming that nothing further is required as this is stated.

The following are points raised from the 'previous stage 1 submission':

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
05	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 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	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	The applicant has stated 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. **This item is still outstanding.**	The energy strategy included an over-heating assessment for the development which included the modelling against the DSY1 weather file. Whilst it was acknowledged that not all apartments met the criteria further passive measures were recommended which included opening windows at lower temperatures, opening windows when dwelling is not occupied, blinds with a greater shading effect etc. The inclusion of these will have a significant impact on the risk of over-heating and given that the layouts are still being developed the detailed assessment of this will be carried out as	Additional modelling could be undertaken to discharge this comment. It would be helpful if GLA could note specific assessments that they require.	The applicant is required to undertake further dynamic overheating analysis to demonstrate full compliance against DSY 1 at this stage. **This item remains outstanding.**	Additional modelling has been undertaken against TM59 criteria under DSY1, 2 and 3 weather files. The results provided in this addendum demonstrate that the criteria are met using DSY1 weather file.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
		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.	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.		part of the next design stages. Therefore, the requirement for further modelling should be secured by a suitably worded planning condition. There are no intentions to change the basis of the assessment relating to the design of the dwellings under this planning application. Any changes would require a suitable application to be made and further overheating analysis would be undertaken on the new designs should this be necessary. Reduction of the areas of windows would have a detrimental impact on daylighting to the dwellings. During the development of specifications during the subsequent design stages the selection of a suitable blind fabric will also be investigated and the performance of the product can be tested for effectiveness of providing shading to the dwellings/reflectance of solar gain to mitigate the risk of overheating.		

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
06	The overheating performance against all CIBSE TM49 weather files should also be submitted.	This item has not been addressed and is therefore still outstanding.	The applicant has stated that DSY2 and 3 will perform worse than DSY1. As repeatedly requested, the applicant should present the 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.	It has been stated that 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. **This item is still outstanding.**	It would be more appropriate during the next design stages to undertake an assessment under DSY 2 and 3 weather files. We believe that there is no merit in undertaking DSY 2 and 3 pre-planning as the results will be worse than the results presented under DSY1. DSY1 includes resilience for the development as it includes an allowance for future weather conditions. The development has been assessed using DSY for London Heathrow with the 2020 High 50 emissions scenario. TM59 recognises this where it states in Section 3.2 that the use of additional weather files are recommended to explore performance where there is particular concern. The sample dwellings tested for the development are considered to be a sample of the most onerous performing dwelling types. The sample tested includes a greater proportion of South orientated dwellings than is present on the actual development. This alleviates concerns, as typically dwellings across the development will perform better than the sample analysed for overheating.	It is unclear who provided the text highlighted yellow in the previous column as this is not from Hoare Lea. Further modelling could be undertaken with DSY2 and DSY3 weather files, however we do not expect these results to add any value to the overheating risk assessment.	The applicant is reluctant to provide further modelling to DSY2 and DSY3, and has suggested they feel this offers limited value in this case. The applicant is welcome to clarify their position on this robustly in a written response, however our requirement is that applicants undertake dynamic overheating analysis against DSY2 and DSY3. Therefore, the applicant should submit a revised overheating analysis covering all three weather years (DSY1, DSY2 and DSY3). **This item remains outstanding.**	This addendum includes additional modelling against TM59 criteria under DSY1, 2 and 3 weather files.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
08/09	The development is estimated to achieve a reduction of 48 tonnes per annum (2%) in regulated CO_2 emissions compared to a 2013 Building Regulations compliant development; these savings are applicable to the entire site for both detailed and outline elements. 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 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/m^2.K, the DER sheets submitted include values that range from 0.18 – 0.20 W/m^2.K. The 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.	The DER and TER sheets have been provided. The applicant has stated that the u-value of 0.18 W/m^2.K for external walls appears only in the TER worksheets. The external walls in the DER are split between external walls at 0.12 W/m^2.K u-value and 0.20 W/m^2.K for sheltered external walls u-value. There are a number of units where the y-value is as low as 0.06W/m^2.K; 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.	It has been stated that 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. 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. The undertaking of thermal bridging calculations should be secured through a condition. Nothing further required for now.	Yes this should be agreed by a suitably worded planning condition.	We note that a commitment by condition to undertake detailed thermal bridging modelling is significantly beyond typical planning conditions seen for other similar developments.	Conditions should be applied on the thermal bridging calculations and the PV provision.	An appropriate condition related to these two items is potentially acceptable. Proposed wording to be provided by the GLA or LBRuT for review by the Applicant's team.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
10	Sample 'be lean' TER, DER and the full BRUKL worksheets should be submitted to verify the savings stated.	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.	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. Manufacturer's datasheet for this challenging boiler performance should be submitted as evidence.	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. Revised carbon emissions should still be submitted alongside the manufacturer's datasheet, as previously requested. **This item is still outstanding.**	The boiler that will be specified during the subsequent design stages will be to achieve a minimum 95% efficiency. As the final selection of the boilers is not available at this stage it is accepted the performance of the plant will be subject to a suitably worded planning condition.	Please refer to Appendix B for an indicative gas boiler specification indicating 95% efficiency.	The applicant has provided a gas boiler datasheet to demonstrate the efficiency assumed. They have submitted the revised carbon emissions although these need to be revised as per comment above. Nothing further required on this.	An updated Energy Strategy Addendum (Rev 00) has been provided with the revised carbon emissions calculations as per comment A above. As the comment closes with 'nothing further required on this' we will consider the item closed.
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 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	-	-	-	Please refer to Appendix A for a drawing indicating site wide distribution, as previously provided.	-	Nothing further required.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
		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.						
14	The applicant is proposing that each area of the Proposed Development will have an energy centre; a roof level energy 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.	The applicant has stated that the School has its own energy centre as it will be subject to separate 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 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. 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	-	-	-	Unclear if this comment requires action. We could provide a further energy strategy with the RM submission which could investigate options using SAP10 approach, as per comments made above.	-	Nothing further required.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
		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.						
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.	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.	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	This item will be addressed through an Energy Strategy Addendum, the requirements of which are outlined further up.	Please refer to our responses above which outlines the proposed strategy in terms of integrating a single site wide heat network etc. As discussed at the meeting on 15th January 2019 the energy strategy that will be submitted in support of the full planning application for the western side will be based on the Energy Planning Guidance (October 2016) as this was the policy at the time of the submission (February 2018).	The 500th dwelling would be occupied after the Ph2 energy centre is created. The Ph2 energy centre will include a suitable LZC technology to achieve CO_2 emissions reduction.	-	Nothing further required.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
			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-wide heat network will be expected. All the supporting necessary evidence (heat network schematics, energy centre layouts etc.) should be submitted for review.					
17	Sample 'be clean' DER and the full BRUKL worksheets should be submitted to verify the savings stated.	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-domestic elements ('be clean' BRUKL sheets), as originally requested.	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.	The BRUKL for the Be Clean scenario has been re-run and an amended BRUKL has been provided. This shows that Part L is met in all uses at all stages. This is accepted but is anticipated to be amended following on from the Energy Strategy Addendum.	Please refer to our responses above and as discussed at the meeting on 15th January 2019 the energy strategy that will be submitted in support of the full planning application for the western side will be based on the Energy Planning Guidance (October 2016) as this was the policy at the time of the submission (February 2018).	To amend these, we'd need to re-run the various models without CHP. This is the same as the current 'Be Lean' case therefore the value of undertaking this exercise is questionable.	Nothing further has been provided, but it is accepted that the applicant is assessing the hybrid application on the basis of a CHP at this stage; therefore, the BRUKL provided is accepted. Nothing further required.	Noted. Nothing further required.

Ref	Comment 1	Comment 2	Comment 3	Comment 4	Response	Response (9th April)	Comment (23rd May)	Response
24	Sample 'be green' DER and the full BRUKL worksheets should be submitted to verify the savings stated.	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.	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 520m^2 of PV, as originally agreed. The total kWp should also be confirmed.	The applicant has provided an indicative BRUKL file that includes the total area of PV for Development Area 1 allocated to the cinema. The total kWp of the PV array has also been confirmed to be 74kWp. The PV provision should be conditioned. Nothing further required for now.	Noted and agreed but suitable wording to be agreed.	-	Conditions should be applied on the thermal bridging calculations and the PV provision.	Proposed wording to be provided by the GLA or LBRuT for review by the Applicant's team.

Appendix C: Indicative Heat Network Distribution.

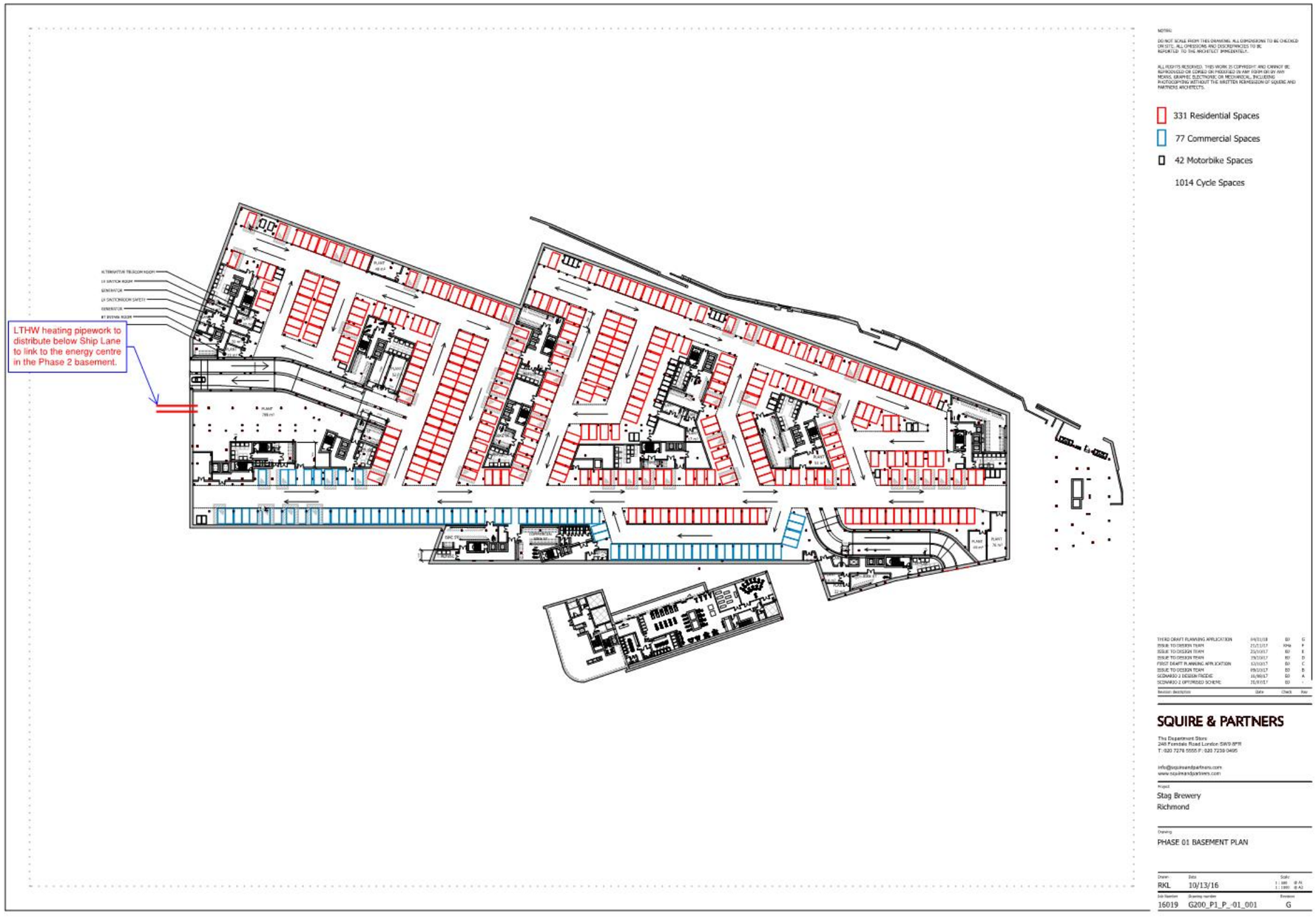


Figure C1: Connection to Development Area 1 energy centre.

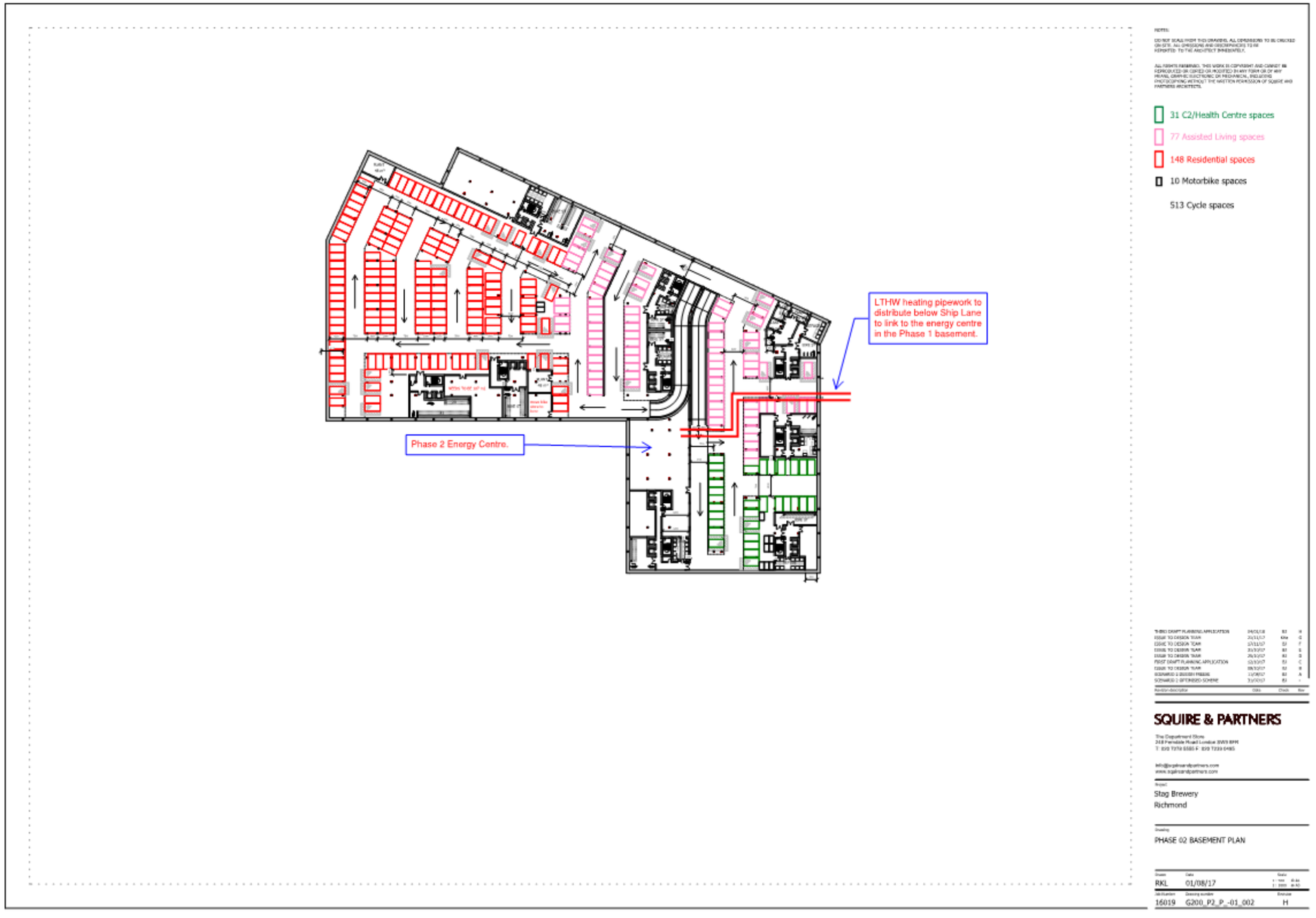


Figure C2: Connection to Development Area 2 energy centre.

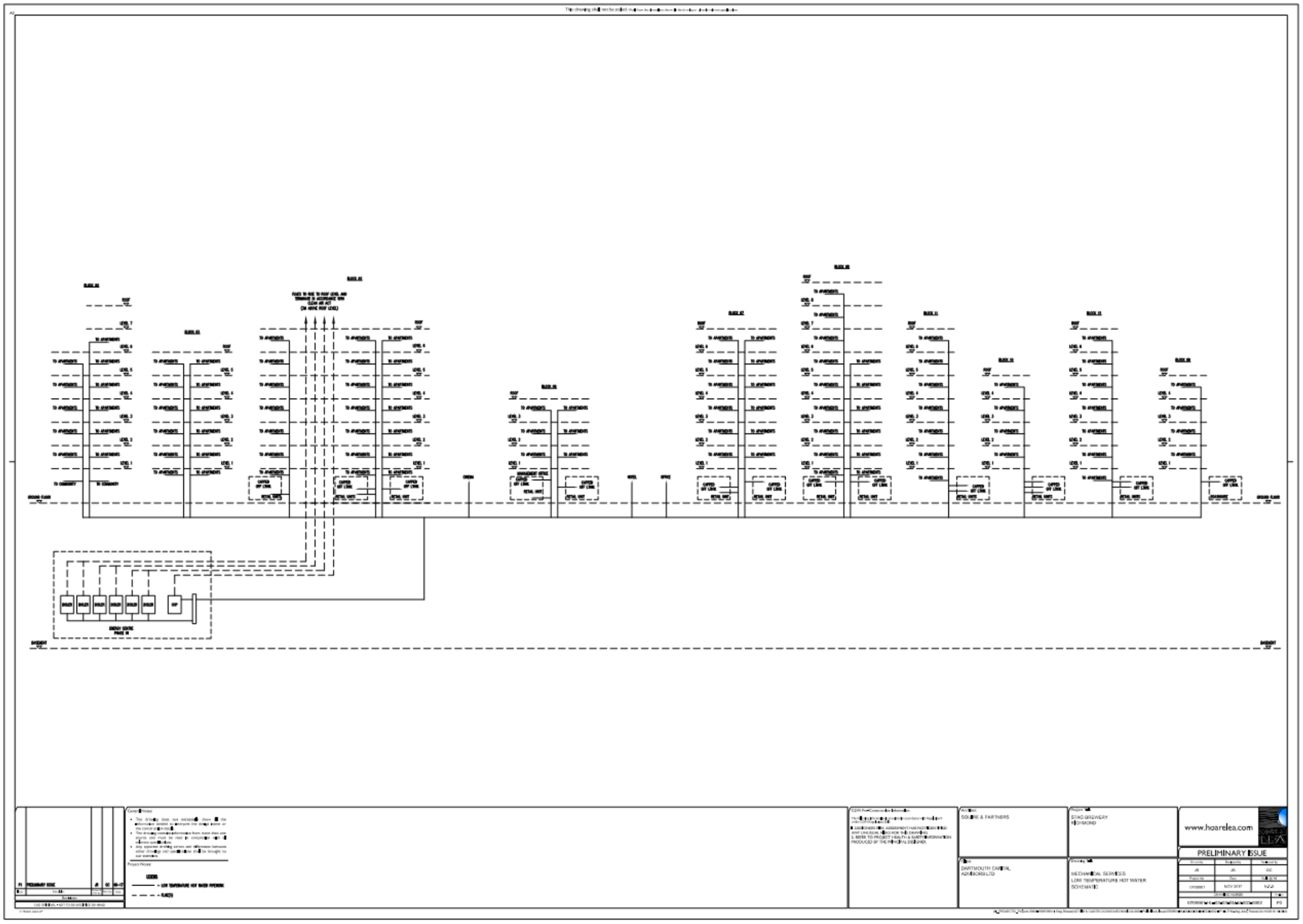


Figure C3: Indicative heat network schematic.

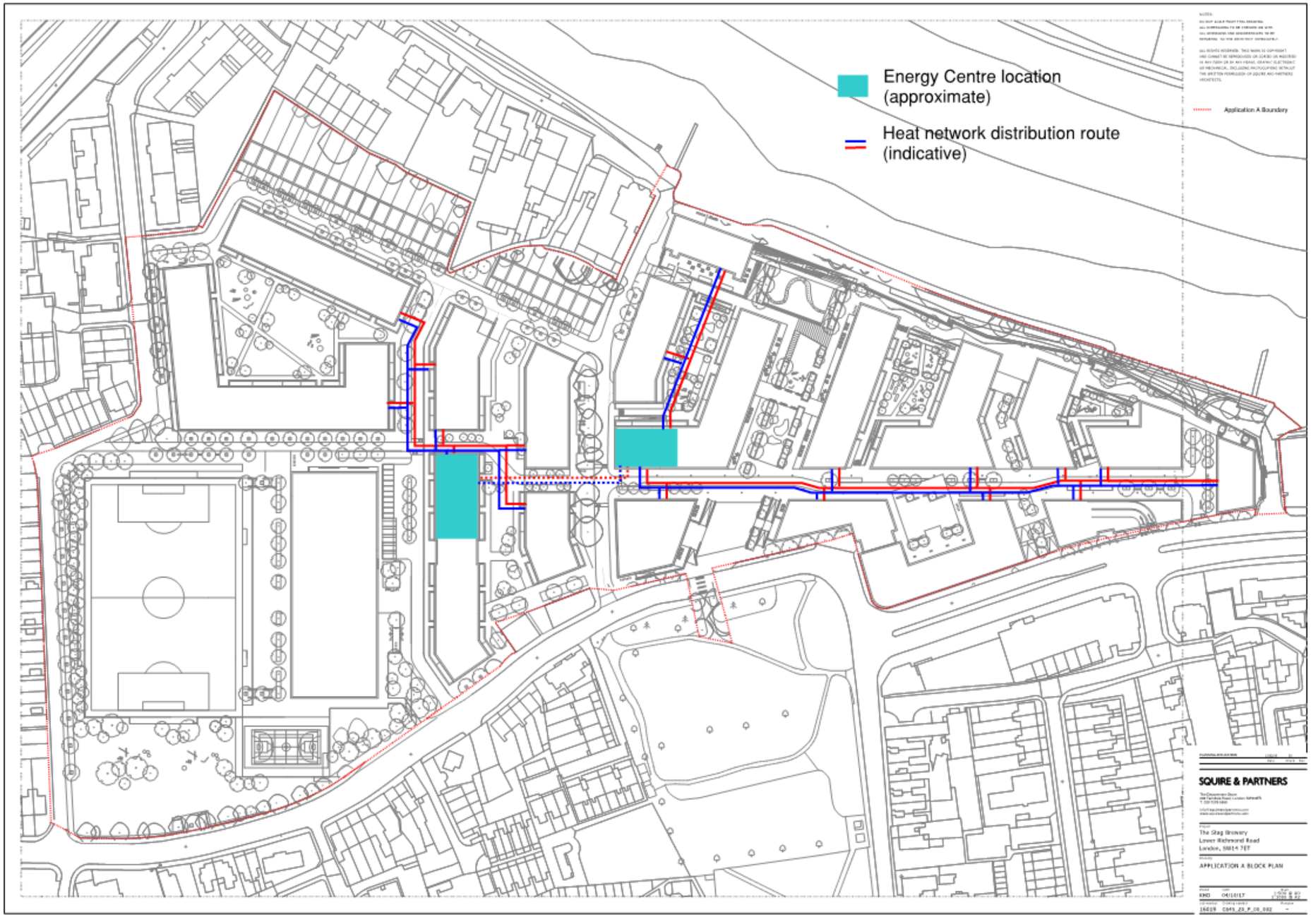


Figure C4: Indicative heat network route and connections.

Appendix D: Indicative Gas Boiler Specification.

Extracts from HOVAL Gas Condensing Boiler Catalogue

DESCRIPTION

UltraGas® (250D-2300D)

10 YEAR HEAT EXCHANGER WARRANTY AVAILABLE

Flexibility to suit any need

With the move towards renewable energy, an ever-evolving range of technologies is being integrated into building heating systems. TopTronic®E can control systems with up to eight heat generators and sixteen mixing circuits. Therefore, a wide range of energy sources such as solar and biomass can be utilised together, delivering a well-coordinated system to meet your heating demands

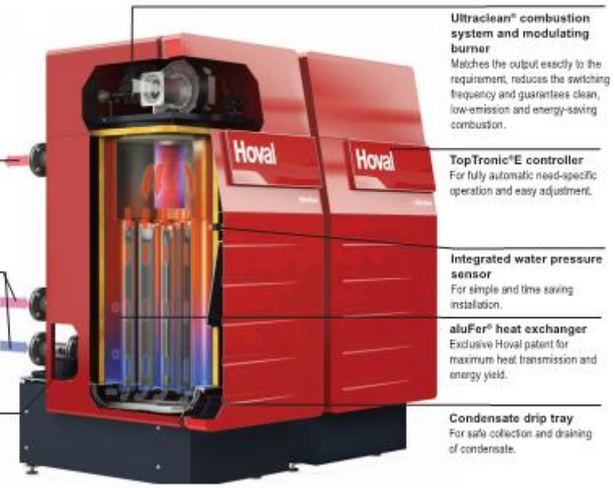
Domestic hot water

Hoval offers a wide variety of domestic hot water storage units ranging from 160 to 10,000 litres.

Our extensive product range can provide solutions to meet most building conditions producing hot water as economically and ecologically as possible.

DESCRIPTION

UltraGas® (250D - 2300D)
Highly efficient, low-NOx design for large commercial applications



UltraGas® (250D-2300D)

Hoval

TECHNICAL DATA

Type			(1440D)	(1700D)	(2000D)	(2300D)
• Nominal output 80/ 60 °C with natural gas		kW	127-1330	148-1576	199-1854	208-2120
• Nominal output 40/ 30 °C with natural gas		kW	142-1440	166-1700	224-2000	233-2300
• Nominal output 80/ 60 °C with liquid gas [1]		kW	169-1310	235-1578	269-1854	-
• Nominal output 40/ 30 °C with liquid gas [1]		kW	185-1440	257-1701	295-2000	-
• Heat input net CV basis with natural gas		kW	130-1354	152-1604	205-1886	214-2164
• Heat input net CV basis with liquid gas [1]		kW	175-1354	238-1606	272-1886	-
• Working pressure heating max./min. [2]		bar	6.0 / 1.2	6.0 / 1.2	6.0 / 1.2	6.0 / 1.2
• Working temperature max.		°C	90	90	90	90
• Boiler water content		l	956	1720	1586	1474
• Minimum water flow rate [3]		l/h	0	0	0	0
• Boiler weight (without water content, incl. casing)		kg	2792	3700	3930	4046
• Boiler efficiency	Part load 30% at 50/30°C (gross)	%	97.3	97.4	97.4	97.4
• Boiler efficiency	Full load 100% at 80/60°C (gross)	%	88.6	88.6	88.6	88.6
• Part L UK Seasonal efficiency		%	95.6	95.7	95.7	95.7
• Stand-by loss at 70 °C		Watt	2000	2400	2400	2400
• Emission rate	Nitrogen oxides [4]	mg/kWh	35	37	39	38
	Carbon monoxide	mg/kWh	20	20	16	-
• Content of CO_2 in the exhaust gas maximum/minimum output		%	9.0 / 8.8	9.0 / 8.8	9.0 / 8.8	9.0 / 8.8
• Dimensions			See table of dimensions			
• Connections	Flow/return	DN	DN150/PN6	DN150/PN6	DN150/PN6	DN150/PN6
	Gas x2	Inches	2"	2"	2"	2"
	Flue gas Ø inside	mm	356	502	502	502
• Gas flow pressure minimum/maximum						
Natural gas E		mbar	18-80	15-30	15-30	15-30
Propane gas		mbar	37-57	37-57	37-57	-
• Gas connection value at 0 °C / 1013 mbar:						
Natural gas E - (Wo = 15,0 kWh/m³) H_s = 9,97 kWh/m³		m³/h	135.5	160.5	188.6	216.4
Propane gas (H_s = 32,7 kWh/m³)		m³/h	52.3	61.9	72.8	-
• Operation voltage		V/Hz	230/50	230/50	1x 230/50 3x400/50	1x 230/50 3x400/50
• Control voltage		V/Hz	24/50	24/50	24/50	24/50
• Minimum/maximum electrical power consumption		Watt	65/2300	52/2020	212/4840	212/5460
• Stand-by		Watt	18	18	18	18
• IP rating (integral protection)		IP	20	20	20	20
Acoustic power level max.		dB(A)	80	80	85	-
• Acoustic pressure level max.		dB(A)	70	70	75	-
• Condensate quantity (natural gas) at 40/ 30 °C		l/h	127.3	150.8	177.8	204.4
• pH value of the condensate		pH	ca. 4.2	ca. 4.2	ca. 4.2	ca. 4.2
• Values for flue calculation:						
Temperature class			T120	T120	T120	T120
Flue gas mass flow		kg/h	2248	2663	3130	3600
Flue gas temperature with operating conditions 80/ 60 °C		°C	71	69	69	71
Flue gas temperature with operating conditions 40/ 30 °C		°C	46	49	49	50
Volume flow rate combustion air		Nm³/h	1676	1984	2334	3684
usable overpressure for air duct/flue system		Pa	60	60	60	60

[1] UltraGas (1440D-2000D) can also be operated with propane/butane (liquid gas) mixtures.
[2] Boiler test pressure is 1.5 times max. operating pressure.
[3] Although generally the UltraGas boilers do not require a minimum water flow, it does not mean that the pump and burner can be switched off together when the unit is operating at full output. There should be a pump overrun to dissipate any residual heat within the boiler to avoid nuisance high temperature lockouts.
[4] NOx emissions to EN676 are dry and at 0% excess oxygen.
• Boiler flow resistance see separate page.
• Note, from a controls point of view UltraGas D boilers are seen as two units. This means that each unit will require its own power supply and controls signals.

Appendix E: Energy Centre Layouts.

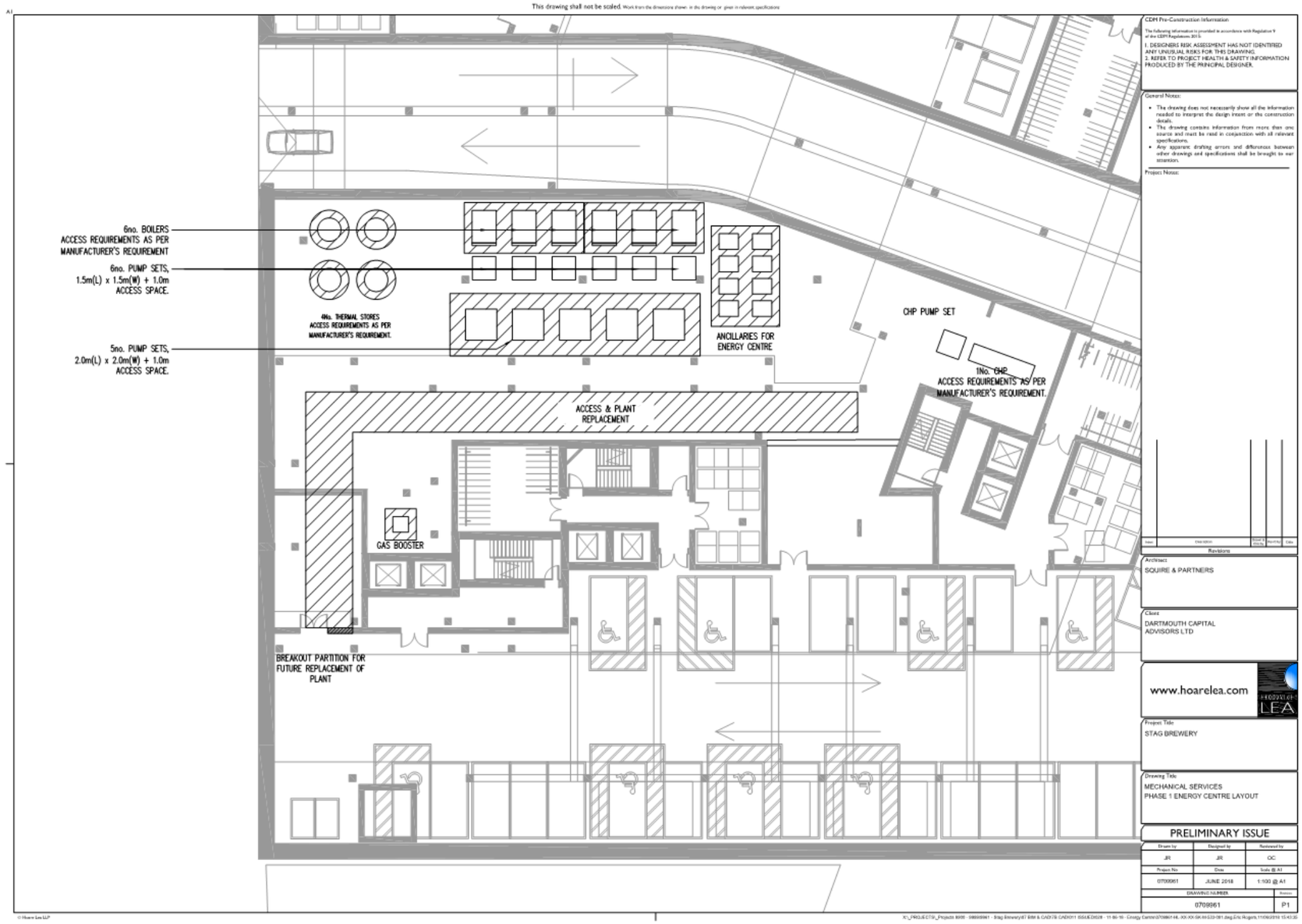


Figure E1: Development Area 1 basement energy centre indicative layout.

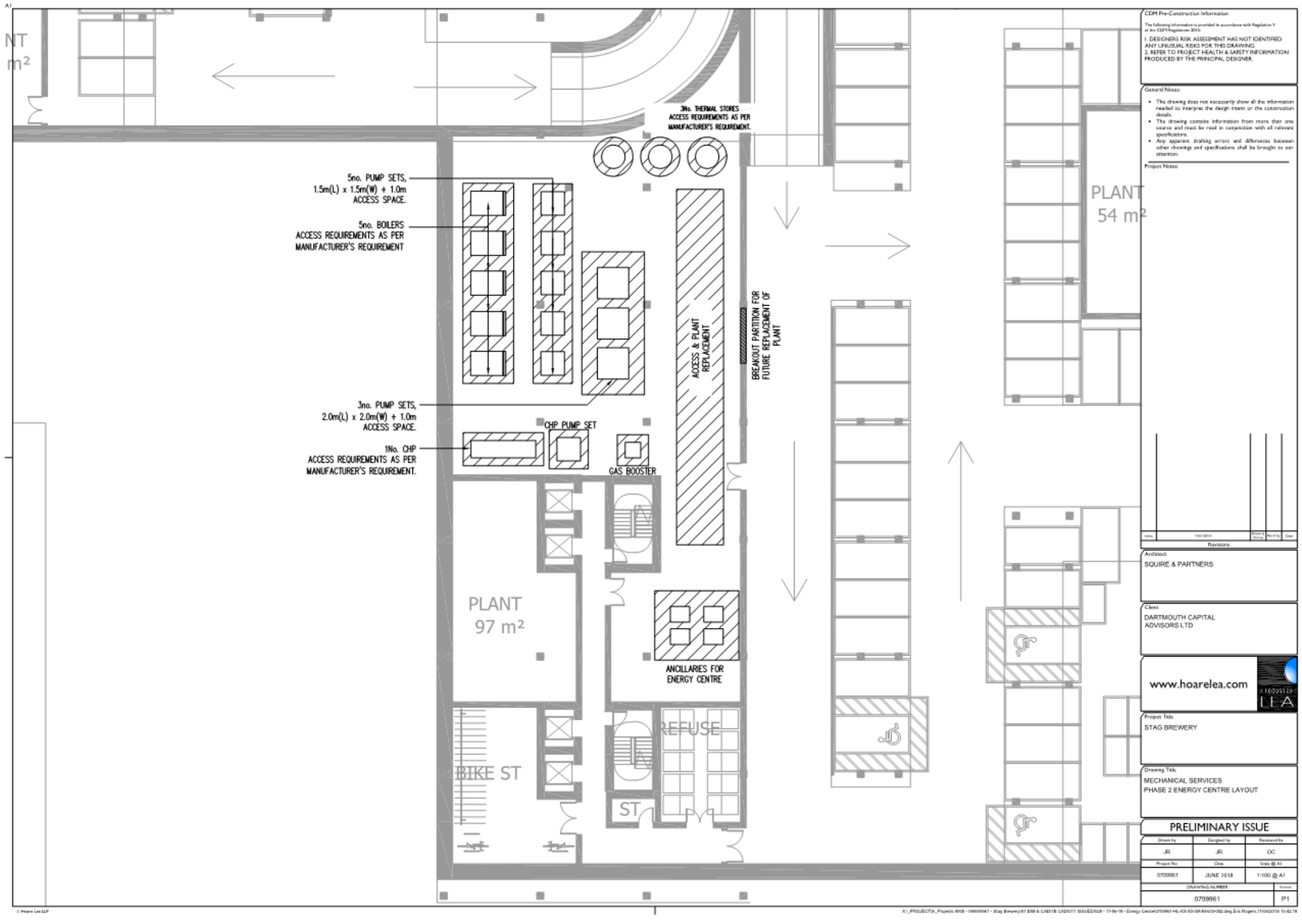
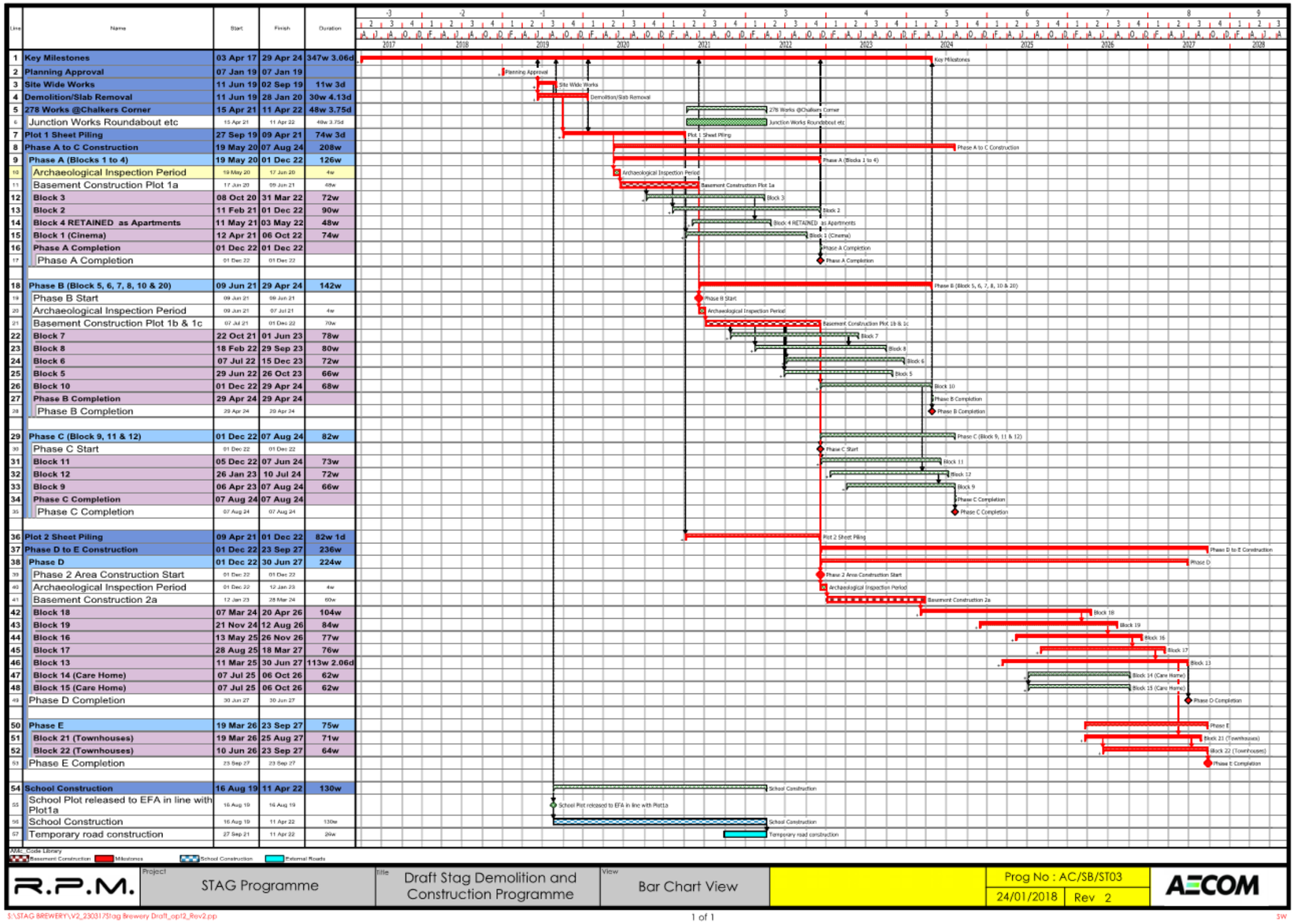


Figure E2: Development Area 2 basement energy centre indicative layout

Appendix F: Framework construction management plan draft programme.



Line	Name	Start	Finish	Duration
1	Key Milestones	03 Apr 17	29 Apr 24	347w 3.06d
2	Planning Approval	07 Jan 19	07 Jan 19	
3	Site Wide Works	11 Jun 19	02 Sep 19	11w 3d
4	Demolition/Slab Removal	11 Jun 19	28 Jan 20	30w 4.13d
5	278 Works @Chalkers Corner	15 Apr 21	11 Apr 22	48w 3.75d
6	Junction Works Roundabout etc	15 Apr 21	11 Apr 22	48w 3.75d
7	Plot 1 Sheet Piling	27 Sep 19	09 Apr 21	74w 3d
8	Phase A to C Construction	19 May 20	07 Aug 24	208w
9	Phase A (Blocks 1 to 4)	19 May 20	01 Dec 22	126w
10	Archaeological Inspection Period	19 May 20	17 Jun 20	4w
11	Basement Construction Plot 1a	17 Jun 20	09 Jun 21	68w
12	Block 3	08 Oct 20	31 Mar 22	72w
13	Block 2	11 Feb 21	01 Dec 22	90w
14	Block 4 RETAINED as Apartments	11 May 21	03 May 22	48w
15	Block 1 (Cinema)	12 Apr 21	06 Oct 22	74w
16	Phase A Completion	01 Dec 22	01 Dec 22	
17	Phase A Completion	01 Dec 22	01 Dec 22	
18	Phase B (Block 5, 6, 7, 8, 10 & 20)	09 Jun 21	29 Apr 24	142w
19	Phase B Start	09 Jun 21	09 Jun 21	
20	Archaeological Inspection Period	09 Jun 21	07 Jul 21	4w
21	Basement Construction Plot 1b & 1c	07 Jul 21	01 Dec 22	70w
22	Block 7	22 Oct 21	01 Jun 23	78w
23	Block 8	18 Feb 22	29 Sep 23	80w
24	Block 6	07 Jul 22	15 Dec 23	72w
25	Block 5	29 Jun 22	26 Oct 23	66w
26	Block 10	01 Dec 22	29 Apr 24	68w
27	Phase B Completion	29 Apr 24	29 Apr 24	
28	Phase B Completion	29 Apr 24	29 Apr 24	
29	Phase C (Block 9, 11 & 12)	01 Dec 22	07 Aug 24	82w
30	Phase C Start	01 Dec 22	01 Dec 22	
31	Block 11	05 Dec 22	07 Jun 24	73w
32	Block 12	26 Jan 23	10 Jul 24	72w
33	Block 9	06 Apr 23	07 Aug 24	66w
34	Phase C Completion	07 Aug 24	07 Aug 24	
35	Phase C Completion	07 Aug 24	07 Aug 24	
36	Plot 2 Sheet Piling	09 Apr 21	01 Dec 22	82w 1d
37	Phase D to E Construction	01 Dec 22	23 Sep 27	236w
38	Phase D	01 Dec 22	30 Jun 27	224w
39	Phase 2 Area Construction Start	01 Dec 22	01 Dec 22	
40	Archaeological Inspection Period	01 Dec 22	12 Jan 23	4w
41	Basement Construction 2a	12 Jan 23	28 Mar 24	60w
42	Block 18	07 Mar 24	20 Apr 26	104w
43	Block 19	21 Nov 24	12 Aug 26	84w
44	Block 16	13 May 25	26 Nov 26	77w
45	Block 17	28 Aug 25	18 Mar 27	76w
46	Block 13	11 Mar 25	30 Jun 27	113w 2.06d
47	Block 14 (Care Home)	07 Jul 25	06 Oct 26	62w
48	Block 15 (Care Home)	07 Jul 25	06 Oct 26	62w
49	Phase D Completion	30 Jun 27	30 Jun 27	
50	Phase E	19 Mar 26	23 Sep 27	75w
51	Block 21 (Townhouses)	19 Mar 26	25 Aug 27	71w
52	Block 22 (Townhouses)	10 Jun 26	23 Sep 27	64w
53	Phase E Completion	23 Sep 27	23 Sep 27	
54	School Construction	16 Aug 19	11 Apr 22	130w
55	School Plot released to EFA in line with Plot1a	16 Aug 19	16 Aug 19	
56	School Construction	16 Aug 19	11 Apr 22	130w
57	Temporary road construction	27 Sep 21	11 Apr 22	29w

Appendix G: Overheating Risk Assessment Results.

DSY1.
Table 22: Overheating risk results on a room by room basis – DSY1.

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Master BD	1.44%	0.55%	Risk criteria met
2	03_B06 6.3.2 2BD (S) BD 01	1.47%	0.52%	Risk criteria met
3	03_B06 6.3.2 2BD (S) Master BD	1.42%	0.55%	Risk criteria met
4	03_B06 6.3.3 4BD (S) BD 01	1.33%	0.55%	Risk criteria met
5	03_B06 6.3.3 4BD (S) BD 02	1.03%	0.58%	Risk criteria met
6	03_B06 6.3.3 4BD (S) BD 03	1.20%	0.52%	Risk criteria met
7	03_B06 6.3.3 4BD (S) Master BD	1.36%	0.55%	Risk criteria met
8	03_B06 6.3.4 3BD (S) BD 01	1.36%	0.58%	Risk criteria met
9	03_B06 6.3.4 3BD (S) BD 02	1.50%	0.58%	Risk criteria met
10	03_B06 6.3.4 3BD (S) Master BD	1.23%	0.58%	Risk criteria met
11	03_B08 8.TY.1 3BD (S) BD01	0.68%	0.55%	Risk criteria met
12	03_B08 8.TY.1 3BD (S) BD02	0.71%	0.55%	Risk criteria met
13	03_B08 8.TY.1 3BD (S) Living Dini	1.41%		Risk criteria met
14	03_B08 8.TY.1 3BD (S) Master BD	0.63%	0.64%	Risk criteria met
15	03_B08 8.TY.10 3BD (L) BD01	0.65%	0.49%	Risk criteria met
16	03_B08 8.TY.10 3BD (L) BD02	0.57%	0.52%	Risk criteria met
17	03_B08 8.TY.11 2BD (L) BD01	0.98%	0.67%	Risk criteria met
18	03_B08 8.TY.11 2BD (L) Master B	0.49%	0.52%	Risk criteria met
19	03_B08 8.TY.12 3BD (S) BD01	0.57%	0.52%	Risk criteria met
20	03_B08 8.TY.12 3BD (S) BD02	0.63%	0.55%	Risk criteria met
21	03_B08 8.TY.12 3BD (S) Master B	0.57%	0.52%	Risk criteria met
22	03_B08 8.TY.2 3BD (S) BD01	0.79%	0.55%	Risk criteria met
23	03_B08 8.TY.2 3BD (S) BD02	0.82%	0.55%	Risk criteria met
24	03_B08 8.TY.2 3BD (S) Living Dini	1.26%		Risk criteria met
25	03_B08 8.TY.2 3BD (S) Master BD	0.76%	0.61%	Risk criteria met
26	03_B08 8.TY.3 2BD (L) BD01	0.65%	0.52%	Risk criteria met
27	03_B08 8.TY.3 2BD (L) Master BD	0.71%	0.61%	Risk criteria met
28	03_B08 8.TY.4 2BD (L) BD01	0.63%	0.55%	Risk criteria met
29	03_B08 8.TY.4 2BD (L) Master BD	0.57%	0.46%	Risk criteria met
30	03_B08 8.TY.5 1BD (L) Master BD	0.68%	0.55%	Risk criteria met
31	03_B08 8.TY.6 2BD (L) Master BD	0.63%	0.61%	Risk criteria met
32	03_B08 8.TY.7 3BD (s) BD01	0.60%	0.55%	Risk criteria met
33	03_B08 8.TY.7 3BD (s) BD02	0.63%	0.55%	Risk criteria met
34	03_B08 8.TY.8 2BD (M) BD01	0.71%	0.55%	Risk criteria met
35	03_B08 8.TY.8 2BD (M) Master BI	0.60%	0.55%	Risk criteria met
36	03_B08 8.TY.9 2BD (L) BD01	1.06%	0.52%	Risk criteria met
37	03_B08 8.TY.9 2BD (L) Master BD	0.60%	0.55%	Risk criteria met

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Living dining	2.56%		Risk criteria met
2	03_B06 6.3.2 2BD (S) Living Room	2.97%		Risk criteria met
3	03_B06 6.3.3 4BD (S) Living dining	2.31%		Risk criteria met
4	03_B06 6.3.4 3BD (S) Living dining	2.92%		Risk criteria met
5	03_B08 8.TY.10 3BD (L) Living dir	0.75%		Risk criteria met
6	03_B08 8.TY.10 3BD (L) Master B	0.46%	0.58%	Risk criteria met
7	03_B08 8.TY.11 2BD (L) Living dir	0.90%		Risk criteria met
8	03_B08 8.TY.12 3BD (S) Living dir	0.85%		Risk criteria met
9	03_B08 8.TY.3 2BD (L) Living Dini	0.96%		Risk criteria met
10	03_B08 8.TY.4 2BD (L) Living dinir	0.90%		Risk criteria met
11	03_B08 8.TY.5 1BD (L) Living Dini	1.11%		Risk criteria met
12	03_B08 8.TY.6 2BD (L) BD01	0.63%	0.52%	Risk criteria met
13	03_B08 8.TY.6 2BD (L) Living dinir	1.46%		Risk criteria met
14	03_B08 8.TY.7 3BD (s) Living dinir	1.21%		Risk criteria met
15	03_B08 8.TY.7 3BD (s) Master BD	0.52%	0.85%	Risk criteria met
16	03_B08 8.TY.8 2BD (M) Living Dir	2.77%		Risk criteria met
17	03_B08 8.TY.9 2BD (L) Living Dini	1.16%		Risk criteria met
18	04_B09 9.4.1 4BD BD01	1.80%	0.49%	Risk criteria met
19	04_B09 9.4.1 4BD BD02	1.25%	0.61%	Risk criteria met
20	04_B09 9.4.1 4BD BD03	1.28%	0.55%	Risk criteria met
21	04_B09 9.4.1 4BD Living Dining	2.31%		Risk criteria met
22	04_B09 9.4.1 4BD Master BD	1.28%	0.52%	Risk criteria met
23	04_B10 10.4.1 2BD (M) BD01	1.31%	0.55%	Risk criteria met
24	04_B10 10.4.1 2BD (M) Living din	1.51%		Risk criteria met
25	04_B10 10.4.1 2BD (M) Master BI	1.36%	0.61%	Risk criteria met
26	04_B10 10.4.3 4B BD01	1.42%	0.61%	Risk criteria met
27	04_B10 10.4.3 4B BD02	1.36%	0.52%	Risk criteria met
28	04_B10 10.4.3 4B BD03	1.42%	0.55%	Risk criteria met
29	04_B10 10.4.3 4B Master BD	1.20%	0.55%	Risk criteria met
30	04_B10 10.4.3 4BD Living Dining	2.11%		Risk criteria met

DSY2.

Table 23: Overheating risk results on a room by room basis – DSY2.

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Master BD	2.15%	0.79%	Risk criteria met
2	03_B06 6.3.2 2BD (S) BD 01	2.31%	0.76%	Risk criteria met
3	03_B06 6.3.2 2BD (S) Master BD	2.21%	0.88%	Risk criteria met
4	03_B06 6.3.3 4BD (S) BD 01	2.15%	0.85%	Risk criteria met
5	03_B06 6.3.3 4BD (S) BD 02	1.72%	0.94%	Risk criteria met
6	03_B06 6.3.3 4BD (S) BD 03	1.82%	0.79%	Risk criteria met
7	03_B06 6.3.3 4BD (S) Master BD	2.21%	0.79%	Risk criteria met
8	03_B06 6.3.4 3BD (S) BD 01	2.23%	0.94%	Risk criteria met
9	03_B06 6.3.4 3BD (S) BD 02	2.15%	0.79%	Risk criteria met
10	03_B06 6.3.4 3BD (S) Master BD	1.91%	0.88%	Risk criteria met
11	03_B08 8.TY.1 3BD (S) BD01	1.53%	0.91%	Risk criteria met
12	03_B08 8.TY.1 3BD (S) BD02	1.58%	0.88%	Risk criteria met
13	03_B08 8.TY.1 3BD (S) Living Dining	2.92%		Risk criteria met
14	03_B08 8.TY.1 3BD (S) Master BD	1.47%	1.07%	Risk criteria not met
15	03_B08 8.TY.10 3BD (L) BD01	1.39%	0.79%	Risk criteria met
16	03_B08 8.TY.10 3BD (L) BD02	1.47%	0.88%	Risk criteria met
17	03_B08 8.TY.11 2BD (L) BD01	1.72%	0.97%	Risk criteria met
18	03_B08 8.TY.11 2BD (L) Master BD	1.28%	0.94%	Risk criteria met
19	03_B08 8.TY.12 3BD (S) BD01	1.47%	0.91%	Risk criteria met
20	03_B08 8.TY.12 3BD (S) BD02	1.47%	0.91%	Risk criteria met
21	03_B08 8.TY.12 3BD (S) Master BD	1.47%	0.88%	Risk criteria met
22	03_B08 8.TY.2 3BD (S) BD01	1.63%	0.91%	Risk criteria met
23	03_B08 8.TY.2 3BD (S) BD02	1.63%	0.94%	Risk criteria met
24	03_B08 8.TY.2 3BD (S) Living Dining	3.02%		Risk criteria not met
25	03_B08 8.TY.2 3BD (S) Master BD	1.72%	1.04%	Risk criteria not met
26	03_B08 8.TY.3 2BD (L) BD01	1.53%	0.94%	Risk criteria met
27	03_B08 8.TY.3 2BD (L) Master BD	1.63%	1.04%	Risk criteria not met
28	03_B08 8.TY.4 2BD (L) BD01	1.47%	0.88%	Risk criteria met
29	03_B08 8.TY.4 2BD (L) Master BD	1.44%	0.85%	Risk criteria met
30	03_B08 8.TY.5 1BD (L) Master BD	1.53%	0.88%	Risk criteria met
31	03_B08 8.TY.6 2BD (L) Master BD	1.53%	1.10%	Risk criteria not met
32	03_B08 8.TY.7 3BD (s) BD01	1.55%	0.97%	Risk criteria met
33	03_B08 8.TY.7 3BD (s) BD02	1.55%	0.94%	Risk criteria met
34	03_B08 8.TY.8 2BD (M) BD01	1.61%	0.97%	Risk criteria met
35	03_B08 8.TY.8 2BD (M) Master BD	1.47%	1.00%	Risk criteria not met
36	03_B08 8.TY.9 2BD (L) BD01	1.85%	0.94%	Risk criteria met
37	03_B08 8.TY.9 2BD (L) Master BD	1.53%	0.91%	Risk criteria met

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Living dining	3.82%		Risk criteria not met
2	03_B06 6.3.2 2BD (S) Living Room	4.22%		Risk criteria not met
3	03_B06 6.3.3 4BD (S) Living dining	3.72%		Risk criteria not met
4	03_B06 6.3.4 3BD (S) Living dining	4.12%		Risk criteria not met
5	03_B08 8.TY.10 3BD (L) Living dining	1.76%		Risk criteria met
6	03_B08 8.TY.10 3BD (L) Master BD	1.23%	1.07%	Risk criteria not met
7	03_B08 8.TY.11 2BD (L) Living dining	2.21%		Risk criteria met
8	03_B08 8.TY.12 3BD (S) Living dining	2.51%		Risk criteria met
9	03_B08 8.TY.3 2BD (L) Living Dining	2.66%		Risk criteria met
10	03_B08 8.TY.4 2BD (L) Living dining	2.51%		Risk criteria met
11	03_B08 8.TY.5 1BD (L) Living Dining	2.56%		Risk criteria met
12	03_B08 8.TY.6 2BD (L) BD01	1.53%	0.91%	Risk criteria met
13	03_B08 8.TY.6 2BD (L) Living dining	3.22%		Risk criteria not met
14	03_B08 8.TY.7 3BD (s) Living dining	2.92%		Risk criteria met
15	03_B08 8.TY.7 3BD (s) Master BD	1.53%	1.58%	Risk criteria not met
16	03_B08 8.TY.8 2BD (M) Living Dining	4.07%		Risk criteria not met
17	03_B08 8.TY.9 2BD (L) Living Dining	2.66%		Risk criteria met
18	04_B09 9.4.1 4BD BD01	2.37%	0.76%	Risk criteria met
19	04_B09 9.4.1 4BD BD02	2.02%	0.88%	Risk criteria met
20	04_B09 9.4.1 4BD BD03	2.04%	0.79%	Risk criteria met
21	04_B09 9.4.1 4BD Living Dining	3.67%		Risk criteria not met
22	04_B09 9.4.1 4BD Master BD	2.02%	0.76%	Risk criteria met
23	04_B10 10.4.1 2BD (M) BD01	2.02%	0.79%	Risk criteria met
24	04_B10 10.4.1 2BD (M) Living dining	3.02%		Risk criteria not met
25	04_B10 10.4.1 2BD (M) Master BD	2.02%	0.79%	Risk criteria met
26	04_B10 10.4.3 4B BD01	2.18%	0.85%	Risk criteria met
27	04_B10 10.4.3 4B BD02	2.12%	0.76%	Risk criteria met
28	04_B10 10.4.3 4B BD03	2.15%	0.79%	Risk criteria met
29	04_B10 10.4.3 4B Master BD	1.99%	0.82%	Risk criteria met
30	04_B10 10.4.3 4BD Living Dining	3.57%		Risk criteria not met

DSY3.

Table 24: Overheating risk results on a room by room basis – DSY3.

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Master BD	3.10%	1.25%	Risk criteria not met
2	03_B06 6.3.2 2BD (S) BD 01	3.32%	1.16%	Risk criteria not met
3	03_B06 6.3.2 2BD (S) Master BD	3.21%	1.22%	Risk criteria not met
4	03_B06 6.3.3 4BD (S) BD 01	3.16%	1.22%	Risk criteria not met
5	03_B06 6.3.3 4BD (S) BD 02	2.67%	1.40%	Risk criteria not met
6	03_B06 6.3.3 4BD (S) BD 03	2.83%	1.25%	Risk criteria not met
7	03_B06 6.3.3 4BD (S) Master BD	3.24%	1.19%	Risk criteria not met
8	03_B06 6.3.4 3BD (S) BD 01	3.21%	1.34%	Risk criteria not met
9	03_B06 6.3.4 3BD (S) BD 02	3.30%	1.22%	Risk criteria not met
10	03_B06 6.3.4 3BD (S) Master BD	3.00%	1.37%	Risk criteria not met
11	03_B08 8.TY.1 3BD (S) BD01	2.26%	1.46%	Risk criteria not met
12	03_B08 8.TY.1 3BD (S) BD02	2.31%	1.43%	Risk criteria not met
13	03_B08 8.TY.1 3BD (S) Living Dining	4.17%		Risk criteria not met
14	03_B08 8.TY.1 3BD (S) Master BD	2.10%	1.67%	Risk criteria not met
15	03_B08 8.TY.10 3BD (L) BD01	2.10%	1.19%	Risk criteria not met
16	03_B08 8.TY.10 3BD (L) BD02	2.21%	1.43%	Risk criteria not met
17	03_B08 8.TY.11 2BD (L) BD01	2.72%	1.49%	Risk criteria not met
18	03_B08 8.TY.11 2BD (L) Master BD	1.74%	1.52%	Risk criteria not met
19	03_B08 8.TY.12 3BD (S) BD01	2.10%	1.46%	Risk criteria not met
20	03_B08 8.TY.12 3BD (S) BD02	2.10%	1.52%	Risk criteria not met
21	03_B08 8.TY.12 3BD (S) Master BD	2.04%	1.43%	Risk criteria not met
22	03_B08 8.TY.2 3BD (S) BD01	2.48%	1.31%	Risk criteria not met
23	03_B08 8.TY.2 3BD (S) BD02	2.51%	1.37%	Risk criteria not met
24	03_B08 8.TY.2 3BD (S) Living Dining	4.27%		Risk criteria not met
25	03_B08 8.TY.2 3BD (S) Master BD	2.56%	1.49%	Risk criteria not met
26	03_B08 8.TY.3 2BD (L) BD01	2.15%	1.34%	Risk criteria not met
27	03_B08 8.TY.3 2BD (L) Master BD	2.31%	1.55%	Risk criteria not met
28	03_B08 8.TY.4 2BD (L) BD01	2.23%	1.34%	Risk criteria not met
29	03_B08 8.TY.4 2BD (L) Master BD	2.02%	1.40%	Risk criteria not met
30	03_B08 8.TY.5 1BD (L) Master BD	2.23%	1.31%	Risk criteria not met
31	03_B08 8.TY.6 2BD (L) Master BD	2.26%	1.67%	Risk criteria not met
32	03_B08 8.TY.7 3BD (s) BD01	2.42%	1.43%	Risk criteria not met
33	03_B08 8.TY.7 3BD (s) BD02	2.45%	1.37%	Risk criteria not met
34	03_B08 8.TY.8 2BD (M) BD01	2.56%	1.37%	Risk criteria not met
35	03_B08 8.TY.8 2BD (M) Master BD	2.34%	1.46%	Risk criteria not met
36	03_B08 8.TY.9 2BD (L) BD01	2.86%	1.37%	Risk criteria not met
37	03_B08 8.TY.9 2BD (L) Master BD	2.29%	1.46%	Risk criteria not met

Live Adaptive Overheating Assessment Results				
Room No.	Room Name	TM52 Criterion 1	% Hours >26	Result
1	03_B06 6.3.1 1BD (S) Living dining	5.68%		Risk criteria not met
2	03_B06 6.3.2 2BD (S) Living Room	6.44%		Risk criteria not met
3	03_B06 6.3.3 4BD (S) Living dining	5.18%		Risk criteria not met
4	03_B06 6.3.4 3BD (S) Living dining	5.98%		Risk criteria not met
5	03_B08 8.TY.10 3BD (L) Living dining	2.16%		Risk criteria met
6	03_B08 8.TY.10 3BD (L) Master BD	1.66%	1.61%	Risk criteria not met
7	03_B08 8.TY.11 2BD (L) Living dining	3.02%		Risk criteria not met
8	03_B08 8.TY.12 3BD (S) Living dining	3.12%		Risk criteria not met
9	03_B08 8.TY.3 2BD (L) Living Dining	3.12%		Risk criteria not met
10	03_B08 8.TY.4 2BD (L) Living dining	3.32%		Risk criteria not met
11	03_B08 8.TY.5 1BD (L) Living Dining	3.42%		Risk criteria not met
12	03_B08 8.TY.6 2BD (L) BD01	2.42%	1.34%	Risk criteria not met
13	03_B08 8.TY.6 2BD (L) Living dining	4.52%		Risk criteria not met
14	03_B08 8.TY.7 3BD (s) Living dining	4.32%		Risk criteria not met
15	03_B08 8.TY.7 3BD (s) Master BD	2.40%	2.25%	Risk criteria not met
16	03_B08 8.TY.8 2BD (M) Living Dining	6.13%		Risk criteria not met
17	03_B08 8.TY.9 2BD (L) Living Dining	3.72%		Risk criteria not met
18	04_B09 9.4.1 4BD BD01	3.65%	1.19%	Risk criteria not met
19	04_B09 9.4.1 4BD BD02	2.83%	1.37%	Risk criteria not met
20	04_B09 9.4.1 4BD BD03	2.94%	1.22%	Risk criteria not met
21	04_B09 9.4.1 4BD Living Dining	5.53%		Risk criteria not met
22	04_B09 9.4.1 4BD Master BD	2.97%	1.19%	Risk criteria not met
23	04_B10 10.4.1 2BD (M) BD01	3.00%	1.19%	Risk criteria not met
24	04_B10 10.4.1 2BD (M) Living dining	4.47%		Risk criteria not met
25	04_B10 10.4.1 2BD (M) Master BD	3.00%	1.25%	Risk criteria not met
26	04_B10 10.4.3 4B BD01	3.16%	1.34%	Risk criteria not met
27	04_B10 10.4.3 4B BD02	3.02%	1.19%	Risk criteria not met
28	04_B10 10.4.3 4B BD03	3.10%	1.19%	Risk criteria not met
29	04_B10 10.4.3 4B Master BD	2.89%	1.28%	Risk criteria not met
30	04_B10 10.4.3 4BD Living Dining	5.33%		Risk criteria not met

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