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project 1 Triton Square
date 21 April 2017
from Stephen Kearney, David Pearce
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file note **Energy and Sustainability Consultation Response_RevC**

Introduction

To date Arup Associates has responded to the following chronology of queries:

- 22/12/2016 – LBC queries to the energy and sustainability strategy.
- 10/01/2017 – Arup Associates responded with a file note titled: "Triton Square_Energy and Sustainability Consultation Response_RevA".

This file note has been drawn together in order to clarify recent comments made by Greater London Authority in the "Energy Memo: Stage I Consolation" document, dated 06/04/2017.

Energy Efficiency Response:

Comment 5: *"In order to confirm the CO2 emissions savings for the new-build elements, the applicant should explain what are the savings stated in Table 2 (pg. 25) as "after energy demand reduction benefits from refurbishment". These savings are not in line with the BRUKL submitted and cause inconsistency with the overall savings for the new-build commercial elements."*

In response to point 5 (on page 2) the carbon emission savings "after energy demand reduction benefits from refurbishment" accounts for the additional savings made to the existing refurbished building above Part L2B. These additional carbon savings over Part L2B were incorporated into the new extension under the "After energy reduction" row.

However, in subsequent correspondance with Camden Council this approach has been updated to reflect LBC comments and feedback on the energy strategy. To verify / clarify the carbon step change savings to the commerical aspect of the project we have updated and attached to this file note tables (A1 to A9) which identify;

- All Tables: The regulated and unregulated emissions
- A1 – A3: The previous energy hierachy results as submitted in the Energy Statement
- A4 – A6: Previously issued results to Camden Council (01/02/2017) with increase in air permeability to existing floors, this is supplemental information issued to LBC post-planning application.
- A7 – A9: New results due to increased air permeability to existing floors with additional carbon savings made to the existing refurbished building above Part L2B removed from new floors:

Comment 6: *"The DER worksheets submitted show a y-value of circa 0.07 – 0.08 and a g-value of 0.72, which is higher than the SAP default g-value. The applicant should firstly confirm the construction type for the scheme as ACDs are only currently compatible with traditional methods of construction, such as masonry. The applicant should also explain the processes in place in order to ensure that achieving this challenging performance level will be possible. Moreover, the applicant should explain why such a high g-value glazing is being proposed, rather than something that could further reduce the overheating risk."*

We are using Approved Construction Details, with traditional building methods (façade laid masonry and brick), so we are confident the assumptions made at planning still stand.

We are in detailed design development process, about 75% through Stage 3 design, reviewing draft supplier thermal analysis of elements, so we are confident the assumptions, which still apply for the construction, still matching the original Y values. When we continue to Stage 4 design we will continue to monitor the working details from the supplier and contractor.

The glass types originally discussed at planning have relaxed to standard clear double glazing and so we have reverted in the SAP calculations currently being run as a Stage 3 check to the default g value. There is a less than 1% difference in heating over the winter season, as winter heat gains have very slightly reduced (with a lower g value), but we can confirm this has no material effect on the energy statement calculations.

Comment 8: *"Clarification should be provided on the BRUKL worksheets submitted under Appendix A. It is understood that the first BRUKL (area: 31,103.9sq.m) is for the refurbished element and the second one (area: 10,478.1sq.m) is for the new-build. Whereas the new-build carbon emissions provided within the report are in line with the BRUKL figures, this is not the case for the refurbished elements. Clarification is required."*

For clarity table 1, 2 and 3 below have been populated;

- Table 1: Results Issued in Energy Strategy
- Table 2: Previously issued results to Camden Council (01/02/2017) with increase in air permeability to existing floors, this is supplemental information issued to LBC post-planning application.
- Table 3: New results due to increased air permeability to existing floors with additional carbon savings made to the existing refurbished building above Part L2B removed from new floors

Please also find attached in the appendix, two BRUKL files with individual headings. The air permeability rate has been changed to 5 m3/(h.m²) @ 50Pa for the existing building. This has resulted in a change to the BER and TER results for the refurbishment aspect of the building.

Comparing the change in air permeability from 3 to 5 m3/(h.m²) @ 50Pa of the existing floor plates the cooling and heating loads have increased. This has resulted in the previous carbon saving of 14% being reduced to 13.4% for the existing building. Table 1, 2 and 3 below illustrate the updated energy hierarchy tables and also the original submitted tables for direct comparison.

As the benefits in relation to the performance increase over Part L2B cannot be incorperated into the new extension Triton will now have an improvement of 20.4% over the target emissions of Part L2A 2013, with the combined development acheiveing 24.3% improvement over the building regulations.

Triton will therefore need to pay a carbon off-set charge of £59,590, this has been calculated based on £60 / Tonne CO2 x 30 years.

Note: St Annes residential carbon offset to comply with Camden zero carbon policy is still required.

Energy Hierarchy Results:
Results Issued in Energy Strategy:

	New Build commercial		New Build residential		Commercial Refurbishment		Overall area weighted reductions	
	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage
Baseline	227	N/A	32.2	N/A	821	N/A	260	N/A
Be Lean	197	13.4%	28.9	10.4%	706	14%	227	12.7%
Be Clean	141 from refurbishment	24.6%	28.9	0%	706	0%	170	21.9%
Be Green	125	7.1%	15.5	41.6%	706	0%	139	11.9%
TOTAL	102	45.1%	16.7	51.9%	115	14%	121	46.5%
Shortfall	0	-10%	15.4	48.1%	N/A	N/A	0	-12%
Offset	0	N/A	£27,710		N/A	N/A	0	N/A

Table 1

Previously issued results to Camden Council (01/02/2017) with increase in air permeability to existing floors:

	New Build commercial		New Build residential		Commercial Refurbishment		Overall area weighted reductions	
	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage
Baseline	227	N/A	32.24	N/A	858	N/A	260	N/A
Be Lean	197	13.4%	28.9	10.4%	743	13.4%	227	12.7%
Be Clean	144	23.3%	28.9	0%	743	0%	173	20.7%
Be Green	128	7.1%	15.5	41.6%	743	0%	144	11.4%
TOTAL	99	43.7%	16.7	51.9%	115	13.4%	116	44.7%
Shortfall	0	-9%	15.4	48.1%	N/A	N/A	0	-9.7%
Offset	0	N/A	£27,710		N/A	N/A	0	N/A

Table 2

New results due to increased air permeability to existing floors with additional carbon savings made to the existing refurbished building above Part L2B removed from new floors:

	New Build commercial		New Build residential		Commercial Refurbishment		Overall area weighted reductions	
	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage
Baseline	227	N/A	32.24	N/A	858	N/A	260	N/A
Be Lean	197	13.4%	28.9	10.4%	691	19.6%	227	12.7%
Be Clean	197	0.0%	28.9	0%	691	0%	226	0.3%
Be Green	181	7.1%	15.5	41.6%	691	0%	196	11.4%
TOTAL	46	20.4%	16.7	51.9%	168	19.6%	63	24.3%
Shortfall	0	14.6%	15.4	48.1%	N/A	N/A	0	10.7%
Offset	£59,590	N/A	£27,710		N/A	N/A	£87,300	N/A

Table 3

District Heating Response:

Comment 10: *"The applicant should, however, provide a commitment to ensuring that the development is designed to allow future connection to a district heating network should one become available."*

1 Triton Square shall incorporate connections for a future heat network and future connection strategy. A connection route from the road to the plant room will be maintained for future connection and will be identified / detailed in the RIBA Stage 3 drawing issue.

Comment 11: *"The applicant is proposing to install a centralised heating/cooling system providing a site wide network. The site heat network should be supplied from a single energy centre. Further information on the floor area and location of the energy centre should be provided."*

For clarification the scheme does not propose a site-wide network. 1 Triton Square office building & St. Anne's Residential building are autonomous with independent systems.

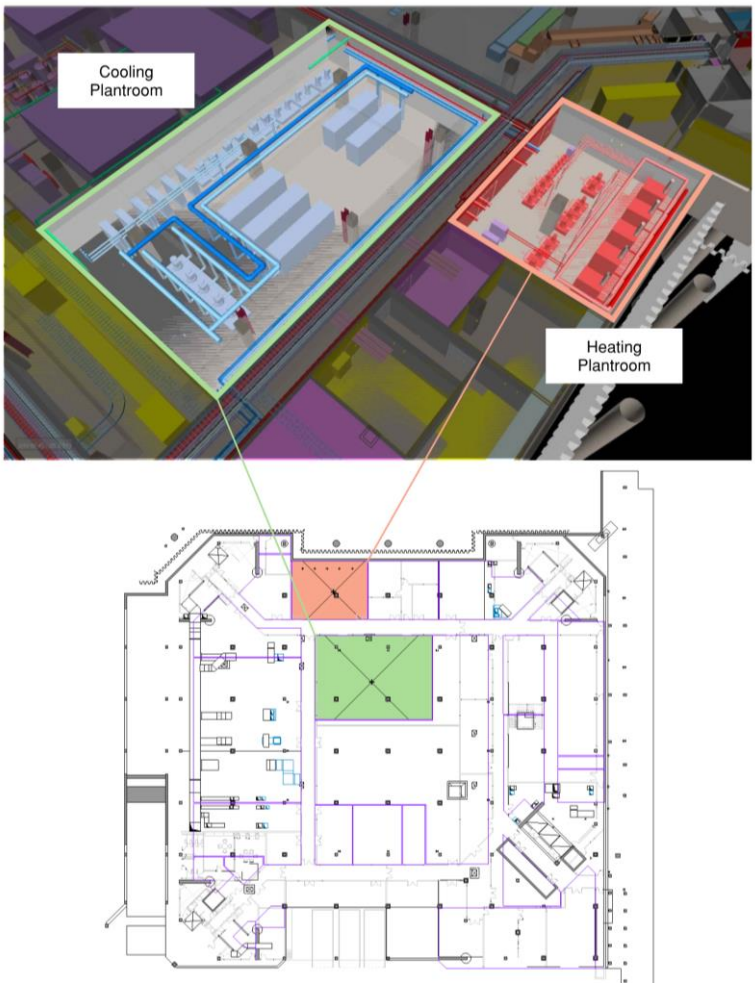
The heating plantroom for 1 Triton Square is located in the basement and contains high efficiency modular gas boilers coupled with a distribution system incorporating high efficiency variable speed pumps. This heating energy centre shall incorporate connections for a future heat network and space for a plate heat exchanger in the plant room.

In order to improve boiler efficiency and to pre-heat the domestic hot water supply recycled waste heat from the water cooled chiller system shall be used, reducing energy consumption.

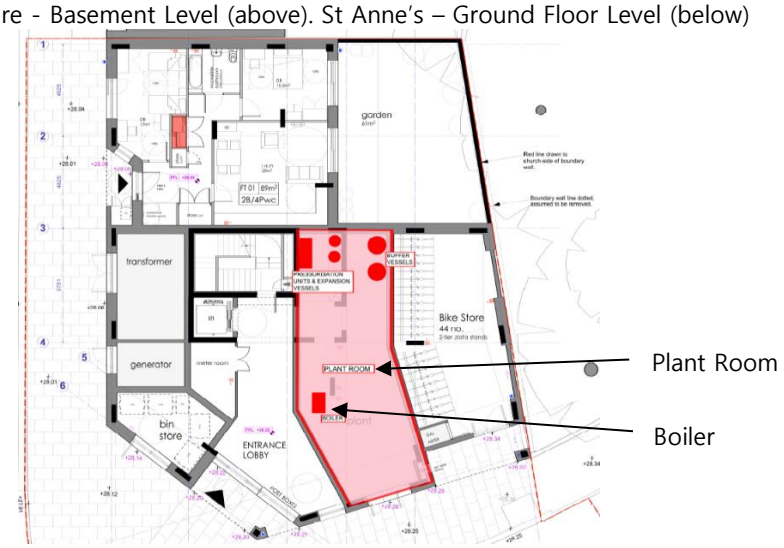
The heating plantroom is 134m².

The Chiller plantroom is located in the basement and contains high efficiency water cooled chillers connected to cooling towers located on the roof. The equipment selections for this system has been selected to closely match the load of the building to ensure that the chillers and cooling towers are operating at their optimum efficiency.

The cooling plantroom is 387m².



1 Triton Square - Basement Level (above). St Anne's – Ground Floor Level (below)



Renewable Energy Response:

Comment 13: *"The applicant has investigated the feasibility of a range of renewable energy technologies and is proposing to install 400sq.m of Photovoltaic (PV) panels. The applicant should confirm the CO2 emissions savings achieved through this third element of the energy hierarchy."*

The PV panels incorporated onto Triton will reduce carbon emissions by 16.09 Tonnes CO_2 / annum towards Triton with 6.5 Tonnes CO_2 / annum offsetting for St. Anne's. This is a reduction of 22.59 Tonnes CO_2 / annum from PV, with a total combined reduction of 63.22 Tonnes CO_2 / annum when compared against the TER.

Please refer to table 3 and tables A7 to A9 in the appendix for further details.

Non-Domestic Carbon Savings:

"An on-site reduction of 102 tonnes of CO2 per year in regulated emissions compared to a 2013 Building Regulations compliant development is expected for the non-domestic buildings, equivalent to an overall saving of 45%. Clarification on Item 5 above should be provided before the savings associated with the commercial elements can be verified."

As noted above, due to the changes in carbon strategy for the development requested by Camden Council (01/02/2017) the new projected reduction of 46 tonnes of CO2 per year in regulated emissions compared to 2013 building regulations is expected with an overall saving of 20.4%.

Please see tables A1 to A9 which break down the total carbon reduction for Triton, St. Anne's and the combined development.

Please note that although the new table A7 now shows a lower percentage in carbon reduction compared to the energy strategy this is in relation to how the carbon savings are reported for new build only.

As 1 Triton Square is not able to offset the carbon reduction experienced in the existing building over Part L2B to the new floors we cannot illustrate the total carbon saving. However, this carbon saving is still present for the combined commercial building overall.

Appendix
Results Issued in Energy Strategy:

		Regulated	Unregulated		
1	**Triton (New Extension):**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**Total Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**% Carbon Reduction**
	Baseline	227	202	429	-
	Be Lean	197	202	399	13.4%
	After energy reduction	141	202	343	24.6%
	After renewable energy	125	202	327	7.1%
	Total Carbon Reduction:				45.1%

Table A1

		Regulated	Unregulated		
2	**St. Annes:**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**Total Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**% Carbon Reduction**
	Baseline	32.24	25.88	58.12	-
	Be Lean	28.9	25.88	54.78	10.4%
	After energy reduction	28.9	25.88	54.78	0.0%
	After renewable energy	15.5	25.88	41.38	41.6%
	Total Carbon Reduction:				51.9%

Table A2

		Regulated	Unregulated	
3	**Combined Development:**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**Carbon Dioxide Emissions (Tonnes CO2 per annum)**	**% Carbon Reduction**
	Baseline	260	228	-
	Be Lean	227	228	12.7%
	After energy reduction	170	228	21.9%
	After renewable energy	139	228	11.9%
	London Plan Target	169	-	35%
	Total Carbon Reduction:			46.5%

Table A3

Previously issued results to Camden Council (01/02/2017) with increase in air permeability to existing floors:

		Regulated	Unregulated		
1	**Triton (New Extension):**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Total Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	227	202	429	-
	Be Lean	197	202	399	13.4%
	After energy reduction	144	202	346	23.3%
	After renewable energy	128	202	330	7.1%
	Total Carbon Reduction:				43.7%

Table A4

		Regulated	Unregulated		
2	**St. Annes:**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Total Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	32.24	25.88	58.12	-
	Be Lean	28.9	25.88	54.78	10.4%
	After energy reduction	28.9	25.88	54.78	0.0%
	After renewable energy	15.5	25.88	41.38	41.6%
	Total Carbon Reduction:				51.9%

Table A5

		Regulated	Unregulated	
3	**Combined Development:**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	260	228	-
	Be Lean	227	228	12.7%
	After energy reduction	173	228	20.7%
	After renewable energy	144	228	11.4%
	London Plan Target	169	-	35%
	Total Carbon Reduction:			44.7%

Table A6

New results due to increased air permeability to existing floors with additional carbon savings made to the existing refurbished building above part l2b removed from new floors:

		Regulated	Unregulated		
1	**Triton (New Extension):**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Total Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	227	202	429	-
	Be Lean	197	202	399	13.4%
	Be Clean	197	202	399	0.0%
	After renewable energy	181	202	383	7.1%
	Total Carbon Reduction:				20.4%

Table A7

		Regulated	Unregulated		
2	**St. Annes:**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Total Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	32.24	25.88	58.12	-
	Be Lean	28.9	25.88	54.78	10.4%
	Be Clean	28.9	25.88	54.78	0.0%
	After renewable energy	15.5	25.88	41.38	41.6%
	Total Carbon Reduction:				51.9%

Table A8

		Regulated	Unregulated	
3	**Combined Development:**	Carbon Dioxide Emissions (Tonnes CO2 per annum)	Carbon Dioxide Emissions (Tonnes CO2 per annum)	% Carbon Reduction
	Baseline	260	228	-
	Be Lean	227	228	12.7%
	Be Clean	226	228	0.3%
	After renewable energy	196	228	11.4%
	London Plan Target	169	-	35%
	Total Carbon Reduction:			24.3%

Table A9

Appendix
BRUKL Files: