Energy Assessment- 2021 Building Regulations

For the proposed development at:

Blocks A and B, Tiverton Road, Haringey, London

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1. SUMMARY

It is our opinion that sufficient design works have been carried out at this early stage to demonstrate that the proposal is successfully addressing the requirements of policy 5.2 of the London Plan and the local energy policies of the Haringey Local Pane Policy SP4 all developments are required to be zero carbon, meaning 100% reduction in regulated carbon emissions compared to Part L 2021 Building regulations. achieving a minimum of 18% reduction in Be Lean and 78% reduction in Co2 over 2021 building regulations.

The energy hierarchy has been adopted to follow a Be Lean, Be Clean, Be Green methodology. The preferred energy strategy is to reduce energy demand and consequently the amount of conditioning and renewable energy contribution needed. This starts with a fabric first approach to improve thermal elements and controlled fittings. The feasibility of centralised heat pump systems and decentralised energy networks has been considered within the Be Clean case.

The Mayor has declared a climate emergency and has set a target for London to be net zero by 2030. This puts London at the forefront of global cities and UK action on climate change. The Mayor's London Plan ensures that the planning system is playing its part in achieving the net zero target.

On 15 June 2022, national building regulations were updated to enhance energy performance standards for new buildings through Part L 2021. A new Part O 2021 was also introduced, updating requirements to tackle overheating.

The Mayor's Energy Assessment Guidance1 has been updated to explain how London Plan policy should be applied now that these regulations have taken effect. This note summarises the key updates. An updated spreadsheet to report carbon emissions has also been published, which planning applicants should submit as part of the energy strategy2 when these are required.

Part L 2021 is a stepping-stone towards the Future Homes Standard and Future Buildings Standard which the Government is expected to consult on in 2023 and introduce in 2025. London's approach will be updated further once these standards are agreed.

The Mayor's net zero carbon target for major developments

The updated guidance confirms that all major developments in London must continue to meet the London Plan net zero carbon target by following the energy hierarchy (Policy SI 2), the heating hierarchy (Policy SI 3) and by maximising on-site carbon reductions. Planning applicants will be expected to demonstrate that at each stage of the energy hierarchy they have maximised opportunities for carbon reduction to achieve as close to zero as possible. An on-site carbon reduction of at least 35 per cent beyond Part L 2021 of building regulations should be achieved. Once it has been demonstrated that carbon reductions have been maximised, any remaining emissions to zero should be offset by a contribution to

the relevant borough's carbon offset fund. Applicants should also continue to meet the energy efficiency targets (Policy SI 2) and undertake dynamic modelling as part their energy strategy to reduce the risk of overheating (Policy SI 4).

- Achieving on-site carbon reductions: the on-site carbon reductions that can normally be achieved over Part L 2021 will vary for different development types:

- Residential developments are expected to be able to achieve on-site savings beyond the minimum 35 per cent improvement, so we have introduced an additional percentage improvement benchmark of 50 per cent plus which these developments should be aiming to achieve. Meeting the energy efficiency target may now be more challenging initially, but it is essential that planning applicants reduce energy demand as far as possible to avoid high energy bills for occupants.

- Initially, non-residential developments may find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 to meet both the energy efficiency target and the minimum 35 per cent improvement. This is because the new Part L baseline now includes low carbon heating for non-residential developments but not for residential developments. However, planning applicants will still be expected to follow the energy hierarchy to maximise carbon savings before offsetting is considered.

- Developments connecting to gas-based district heat networks (DHNs) may also find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 until the decarbonisation strategies for these networks begin to take effect. Developments in Heat Network Priority Areas (HNPAs) are expected to connect to a network where possible to support London's decarbonisation provided the network has a decarbonisation strategy. Further detail on DHN connections is provided in the guidance.

Over time it is expected that performance against Part L 2021 will improve to enable these developments to achieve closer alignment with the energy efficiency targets and the minimum 35 per cent on-site improvement due to technological improvements and as costs come down. We will monitor this progress and may update the benchmarks to reflect these improvements as appropriate. In the intervening period applicants should continue to aim to maximise on-site carbon reductions as far as possible.

The development complies with the part l 2021 building regulations, achieving the minimum requirement for the Target emissions rate and the Target Fabric Energy Efficiencies.

The development shows a reduction of 18% through energy efficiency measures- Be Lean stage, with a further reduction of 60% through on-site renewables, therefore achieving a total of 78% reduction in CO_2 emissions and a reduction of 3 % over the Target Fabric Energy.

2. INTRODUCTION

This Energy Assessment relates to a planning application for a new development comprising of 17 New Dwellings at Tiverton Road, Haringey, London

The requirement for new developments to obtain a proportion of their energy needs from on-site renewable energy sources is now a well-established feature of planning policy.

This Energy Assessment sets out the applicable policies on energy and CO_2 emissions, and the methodology for and the results from an energy demand assessment.
It includes an overview of possible renewable energy technologies and identifies the technology most suitable for this development and reasons why other technologies have been excluded.

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings. The annual remaining carbon emissions figure is multiplied by the assumed life time of the developments services (e.g. 30 years to give the cumulative shortfall. The cumulative shortfall is multiplied by the carbon dioxide offset price to determine the required cash in lieu contribution.

The Mayor's Housing Standards Viability Assessment assumed a carbon offset price of £95.00 per tonne of carbon dioxide offset price for a period of 30 years. Boroughs may use this price or set their own by undertaking a local specific viability assessment. Where the borough applies a carbon offset price of £95.00 per tonne, it is not considered necessary to carry out a further viability assessment of the policy approach. The GLA will regularly review the recommended carbon offset price.

3. PLANNING REQUIREMENTS

This report has been prepared in accompaniment to a planning application for new development to create 17 New Dwellings at Blocks A and B, Tiverton Road, Haringey, London

Detailed energy statements should be submitted as part of major applications. This should demonstrate the predicted energy and associated carbon dioxide emission savings achieved through the incorporated of energy efficiency measures, decentralised energy and low/zero carbon technologies. This should be demonstrated in line with policy 5.2 of the London Plan, which requires a 35% reduction in CO_2 emissions above 2021 Building Regulations.

In line with Haringey Local Pane Policy SP4 all developments are required to be zero carbon, meaning 100% reduction in regulated carbon emissions compared to Part L 2021 Building regulations. achieving a minimum of 18% reduction in Be Lean and a minimum of 20% reduction in emissions from on – site renewable energy generation under Be Green

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings. The annual remaining carbon emissions figure is multiplied by the assumed lifetime of the development's services (e.g. 30 years to give the cumulative shortfall. The cumulative shortfall is multiplied by the carbon dioxide offset price to determine the required cash in lieu contribution.

4. CALCULATION METHODOLOGY

This Energy Assessment takes a standard hierarchical approach as follows:

4.1 Base Line

Calculation of baseline energy demand, demonstrates the projected annual heating, cooling and electricity demand of the development. The assessment shows the carbon dioxide emissions resulting from the predicted energy use (target emission rate).

4.2 Lean – Energy demand reduction

Exceeding building regulations requirements (Part L 2021) through reduction measures alone, over the baseline calculations. (10% reduction required)

4.3 Clean – Heating infrastructure

Further reductions from Be Lean are demonstrated by using community / district heating networks.

4.4 Green

Further reduction for Be Clean are achieved by using low carbon and/ or renewable technologies to be incorporated in the development, demonstrating how much carbon dioxide emissions from expected energy use will be reduced through on-site renewable energy generation, a minimum of 30% reduction over the baseline to be achieved.

4.5 Carbon off Set

A carbon offset payment is required to the local authority based on the CO_2 shortfall. The Mayor's Housing Standards Viability Assessment assumed a carbon offset price of £95.00 per tonne of carbon dioxide offset price for a period of 30 years. Boroughs may use this price or set their own by undertaking a local specific viability assessment. Where the borough applies a carbon offset price of £95.00 per tonne, it is not considered necessary to carry out a further viability assessment of the policy approach. The GLA will regularly review the recommended carbon offset price.

5. CONSIDERATION OF Renewable and low carbon technologies

Consideration of Heat and power:
Combined Heat and Power (CHP) and Combined Cooling Heat and Power (CCHP) or Tri-generation Systems are recognised as a very desirable way of reducing energy wastage and resulting carbon dioxide emissions.
While generally operating on fossil fuel, mainly natural gas, their advantage is that the waste heat normally associated with electricity generation is put to good use providing space heating and hot water. This means that the overall fuel efficiency can be increased significantly — typically to above 80% compared to 30-40% for grid electricity. The main effect is to approximately halve the carbon dioxide emissions associated with electricity use on the development for all the electricity produced by the CHP plant. However, space and water heating for the development is provided by mains gas and so a CHP unit would only reduce emissions associated with lighting, fans, pumps and domestic appliances. As such, the reduction in CO_2 would not be that great.
Generally CHP and CCHP are most suited to community heating systems particularly where there is a constant demand for heat throughout the year and therefore they are not considered to be viable on developments of less than approximately 50 units.

As the electricity grid decarbonised the carbon saving from the gas engine CHP will decrease and with growing concerns of the impact of the technology on air quality – for this reason CHP is not considered suitable for this development.

5.1 OVERVIEW OF RENEWABLE ENERGY

Energy from renewable sources has been defined in Article 2 of EU Directive 2010/13/EU '*on the energy performance of buildings*' and includes wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. For the purposes of this energy Assessment and the use of renewable energy on a domestic scale these can be summarised as follows:

- Bio-fuels — combustion of solid or liquid bio-fuels to produce heat or electricity.
- Decentralised energy.
- Heat pumps — extraction of heat from the earth, atmosphere or water bodies.
- Hydroelectricity — use of water cycle driven flows to generate electricity.
- Photovoltaic — direct generation of electricity from sunlight.
- Solar thermal — direct heating of water for space heating or domestic hot water.
- Wind turbines — use of solar driven air movement to generate electricity.

The technologies and their potential application to this site are discussed in more detail in the following sections. However, one further pertinent point must be made. The reason for adopting renewable energy technologies is to reduce greenhouse gas emissions, mainly carbon dioxide, and none of the technologies are wholly "zero carbon". This is because, when

the whole life cycle is taken into account some energy has to be put into every systems to manufacture and maintain the equipment (which has a finite life) or to operate the equipment, and generally at present this energy is derived from non-renewable sources. Examples include the energy needed to refine and process the silicon used to manufacture photovoltaic panels, the diesel fuel used to transport wood pellets and to power the wood processing machinery for the production of wood fuel pellets.
Finally, due to the dynamic and innovative nature of the renewable energy technology industry even apparently similar products can differ in vital practical details which means that detailed design of installations must be undertaken by experts, often working closely with the product manufacturers, as virtually no two products are identical or interchangeable.
The following sections contain a summary of each possibly applicable technology, and a comparison of the advantages and disadvantages of technologies relevant to this development.

5.2 DECENTRALISED ENERGY

In addition to addressing the well understood and widely accepted planning policy requirement to install systems that will deliver a proportion of the development's energy needs from renewable sources, a further consideration is the availability of decentralised energy. If it is feasible, new developments should incorporate community energy generating schemes so that future developments can be connected or where there are existing networks, the feasibility of connecting the subject development should be investigated. However in this case there are no such networks available locally.

5.3 BIO-FUELS

Key planning and design issues regarding the use of bio-fuels include the building space and organisation to accommodate and operate the plant. The equipment would plant space and access and maintenance. Facilities are required for fuel storage and must be provided along with loading access for the fuel to be safely and efficiently delivered and stored. Finally, systems utilising bio fuels, particularly biomass, are rarely available at the small scale that would be appropriate for use in a building where the heat loads are so low. For these reasons the use of bio-fuels is not considered suitable for this development.

5.4 HEAT PUMPS

Heat pumps collect low temperature heat from renewable sources and "concentrate" it to a usable temperature. Fossil fuel based (grid) electricity is generally required to operate the pumps and the renewable component of the output is therefore by convention taken as the difference between the output energy and the input energy. A typical heat pump can deliver 3 kWh of heat energy for every 1 kWh and has been chosen for this development.

5.5 HYDROELECTRICITY

There is no suitable source of water in the locality which could be utilised as an energy source.

5.6 PHOTOVOLTAIC

Photovoltaic (PV) systems use areas of semiconductor material that produce electricity when exposed to light. They are connected to the building electricity supply via an inverter which converts the output to a form which is compatible with the mains electricity voltage and frequency. This also allows excess electricity to be exported at times when the actual demand from the dwellings is less than that being produced by the PV system. This ensures that all the electricity produced is used and achieves a reduction in carbon dioxide emissions. For all purposes relating to planning, the exported electricity is by convention treated as if it were used on site.

The output of photovoltaic systems is generally specified as kW peak, or kWp with each 1kWp of system expected to produce an average 850 kWh of electricity per year, although this may be reduced depending on location, orientation and over shading, because the availability of sunlight, to produce electricity, will generally not align with demand, it is normal for the system to be connected to the electricity grid and excess production exported. The introduction of the feed-in-tariff has improved the economics of solar PV systems.

There are no direct environmental consequences from the installation of PV panels but the installation can have a visual impact that may require consideration, this has been chosen for the development

5.7 SOLAR THERMAL PANELS

Solar thermal panels harness solar energy to heat domestic hot water. They are usually used in conjunction with the main heating system as they can only provide a portion of the demand for hot water, depending on the time of year. Overall, it is estimated that a suitably sized system can provide up to 60% of the annual energy demand for providing hot water. These require the installation of a water cylinder in each dwelling. This is not currently planned for as it is proposed to use a combi boiler due to the small size of the dwellings. It is for this reason that solar thermal is not considered entirely suitable for the development.

5.8 WIND TURBINES

Micro wind turbines produce electricity and can be grid-connected in the same way as photovoltaic panels. Although wind turbines are one of the most cost effective renewable energy technologies, for smaller turbines the capital cost is relatively high compared to the amount of power generated. Adjacent trees and buildings create turbulence and the location affects wind speed and to be effective an average wind speed of no less than 5m/s is required. From the Energy Saving Trust's wind prediction tool, the predicted average wind speed at the development site is 2.4 m/s, significantly less than 5 m/s. In addition noise and vibration from roof mounted turbines can prove unacceptable and wind turbines are less likely to meet with the approval of local residents and planners.
For these reasons wind turbines are not considered suitable for this development.

6. Baseline TER

The total CO_2 emissions has been calculated taking full account of energy demands for space heating and hot water, and electricity for pumps, fans, lights.. The baseline was determined by using the typical orientation and the use of building elements (walls, windows etc.) with U-values and other reference values and in most cases consistent with achieving compliance with Approved Document Part LA: 2021.

6.1 Baseline calculations

Applied Details: Domestic

Element	U – Value Element	Element	U – Value Element
Walls – external	0.15	Roof	0.09
Windows (g value 0.30)	1.20	Exposed Floor	0.12
Floor	0.13	Wall to stairs	0.15 / 0.25
Door to flats (internal)	1.40	Glazed Doors (g value 0.30)	1.20
Wall to UPS	0.20		

Services

- **Psi values – calculated to default and calculations Psi values**
- **Air pressure test 5.00**
- **Intermittent extract fans**
- **100% Low energy lighting**
- **Ventilation – Intermittent extract fans**
- **Mains gas combi boiler SAP table , Boiler interlock**
- **Controls – Programmer, TRVS, Room Stat**
- **Internal water use 105 ltr per person per day**
- **Emitters – Radiators**

7. Be Lean calculations: Energy demand reduction

Exceeding building regulations requirements (Part L 2021) through reduction measures alone, over the baseline calculations.

Applied Details: Domestic

Element	U – Value Element	Element	U – Value Element
Walls – external	0.15	Roof	0.09
Windows (g value 0.30)	1.20	Exposed Floor	0.12
Floor	0.13	Wall to stairs	0.15 / 0.25
Door to flats (internal)	1.40	Glazed Doors (g value 0.30)	1.20
Wall to UPS	0.20		

Services

- Psi values – calculated to default calculated PSI values and default values
- Air pressure test 3.00
- 100% Low energy lighting (84lm/w)
- Ventilation – Nuaire MRXBOXAB – ECO5
- Space and water heating mains gas combi boiler- efficiency 89.5%
- Controls – Programmer, TRVs, Rooms Stat
- Delayed start thermostat
- Internal water use 105 ltr per person per day
- Shower 8 litres per minute
- Emitters – Radiators

Junctions	Psi value (W/mk)
Lintels E2	0.038
Sill E3	0.022
Jams E4	0.035
Floor E5	0.078
Intermittent Floor E6	0.069
Internal Floor E7 (between flats)	0.078
Exposed Floor E20	0.232
CornersE16	0.033
Inverted Corners E17	-0.069
Party Corners E18	0.025

8. Be Clean – Heating infrastructure

Further reductions from Be Lean are demonstrated by using community / district heating networks.

London Heat Map

Purple are proposed heat networks

Orange are existing heat networks



As can be seen from the map there is a proposed heat network it is within 500m of a proposed transmission route. From an initial review.

9.0 : Be Green

Photovoltaic Panel systems convert energy from the sun into electricity through semi-conductor cells mounted in collector panels. The panels are connected to an inverter to turn the DC output into AC for use in the building to which they are attached and to be fed back into the grid when not required.

Space and Water Heating

Heat pump Details

Reference	Block	Location	Manufacturer	Model	Max Current (A)	Refrigerant	Output (kW)
HP-A-01	A	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8
HP-A-02	A	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8
HP-A-03	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-04	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-05	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-06	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-07	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-08	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-09	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-A-10	A	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-B-01	B	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8
HP-B-02	B	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-B-03	B	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8
HP-B-04	B	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-B-05	B	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8
HP-B-06	B	Roof	Mitsubishi Electric	PUZ-WZ50VAA	13	R290	5
HP-B-07	B	Roof	Mitsubishi Electric	PUZ-WZ80VAA	25	R290	8

Water Cylinder Details

Reference	Block	Floor	Location	Manufacturer	Model	Storage Capacity (L)	Pre Plumbed	Heat Loss (kWh/Day)
CYL-A-01	A	Ground	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09
CYL-A-02	A	Ground	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09
CYL-A-03	A	First	Utility	Mitsubishi Electric	EHPT21X-UKHEWL	210	Yes	1.53
CYL-A-04	A	First	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-A-05	A	Second	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-A-06	A	Second	Utility	Mitsubishi Electric	EHPT21X-UKHEWL	210	Yes	1.53
CYL-A-07	A	Second	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-A-08	A	Third	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-A-09	A	Third	Utility	Mitsubishi Electric	EHPT21X-UKHEWL	210	Yes	1.53
CYL-A-10	A	Third	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-B-01	B	Ground	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09
CYL-B-02	B	Ground	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-B-03	B	First	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09
CYL-B-04	B	Second	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-B-05	B	Second	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09
CYL-B-06	B	Third	Utility	Mitsubishi Electric	EHPT25X-UKHEWL	250	Yes	1.8
CYL-B-07	B	Third	Utility	Mitsubishi Electric	EHPT30X-UKHEWL	300	Yes	2.09

9.10 : Roof plan showing the Photovoltaic Panels

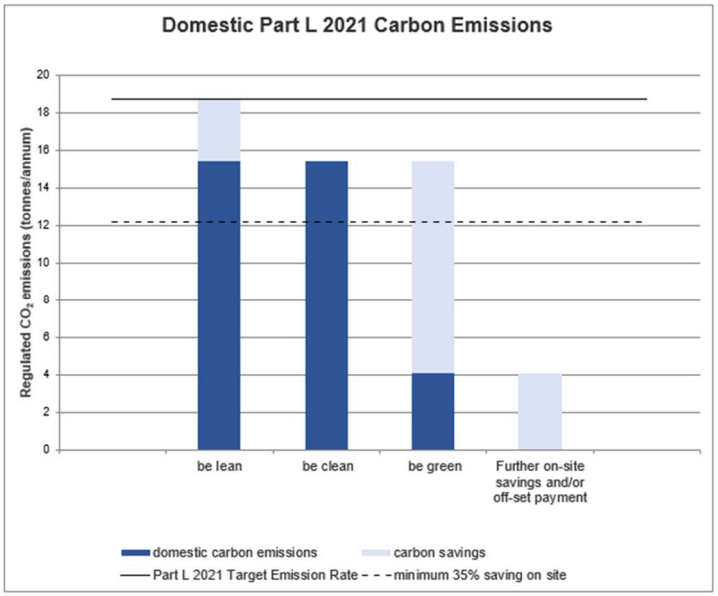
Photovoltaic Panel Flats apportioned 19.10 KW peak split between the blocks utilizing the roof space.

Results 10 – Carbon Reduction

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	3.3	18%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	11.4	61%
Cumulative on site savings	**14.7**	**78%**
Annual savings from off-set payment	4.1	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**122**	-
Cash in-lieu contribution (£)	**11,631**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development



10.1 Fabric reduction

Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	improvement %
39.29	38.14	3

11: GLA Spreadsheet SAP 10

RESIDENTIAL CO_2 ANALYSIS (PART L1)

				Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area	Number of units	Total area represented by model	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2) (Row 4)		(m^2)	($kgCO_2$ / m^2) (Row 273)	($kgCO_2$ p.a.) (Row 269)	($kgCO_2$ / m^2) (Row 273 or 384)	($kgCO_2$ / m^2) (Row 273 or 384)	($kgCO_2$ / m^2) (Row 273 or 384)	(kWh/m^2)	(kWh/m^2)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)
A1	120.34	1	120.34	12.80	-192.23	13.11	13.11	3.42	43.81	47.47	1,540	-192	1,578	1,385	155	1,578	1,385	0	412	974
A2	90.8	1	90.8	15.40	-145.47	14.20	14.20	3.52	49.04	47.67	1,398	-145	1,289	1,144	254	1,289	1,144	0	320	824
A3	58	1	58	15.05	-92.96	14.16	14.16	2.94	37.27	35.51	873	-93	821	728	145	821	728	0	171	558
A4	71.36	1	71.36	12.03	-114.35	11.09	11.09	2.36	28.06	26.33	858	-114	791	677	181	791	677	0	168	509
A5	72.8	1	72.8	12.88	-116.66	12.87	12.87	2.84	33.01	34.95	938	-117	937	820	117	937	820	0	207	614
A6	58	1	58	12.70	-92.96	12.12	12.12	2.29	26.83	25.72	737	-93	703	610	127	703	610	0	133	477
A7	71.36	1	71.36	12.03	-114.35	11.09	11.09	2.36	28.06	26.33	858	-114	791	677	181	791	677	0	168	509
A8	72.8	1	72.8	15.58	-116.66	14.28	14.28	3.40	45.20	41.09	1,134	-117	1,040	923	211	1,040	923	0	248	675
A9	58	1	58	15.43	-92.96	13.83	13.83	2.78	38.97	34.09	895	-93	802	709	186	802	709	0	161	548
A10	71.36	1	71.36	15.70	-114.35	13.54	13.54	2.98	44.63	37.69	1,120	-114	966	852	268	966	852	0	213	639
		1																		
B1	120.34	1	120.34	12.58	-192.23	13.02	13.02	3.35	42.90	47.16	1,514	-192	1,567	1,375	139	1,567	1,375	0	403	971
B2	73	1	73	15.55	-116.98	13.89	13.89	3.08	43.93	40.76	1,135	-117	1,014	897	238	1,014	897	0	225	672
B3	86.16	1	86.16	14.17	-138.04	13.33	13.33	3.20	41.88	41.33	1,221	-138	1,149	1,010	210	1,149	1,010	0	276	735
B4	72	1	72	12.54	-116.98	12.66	12.66	2.67	31.32	32.81	903	-117	912	795	108	912	795	0	192	602
B5	97.5	1	97.5	11.08	-156.19	10.28	10.28	2.48	30.72	29.84	1,080	-156	1,002	846	234	1,002	846	0	242	604
B6	72	1	72	15.96	-116.98	14.67	14.67	3.33	46.71	42.84	1,149	-117	1,056	939	210	1,056	939	0	240	700
B7	97.5	1	97.5	14.25	-156.19	12.59	12.59	3.12	45.07	39.78	1,389	-156	1,228	1,071	318	1,228	1,071	0	304	767

12: Carbon off set payment

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.
It has been calculated that the remaining regulated Carbon Emissions are to offset through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

A carbon off set payment has been calculated as 122 tonnes of carbon at £95.00 = £11,631