APPENDIX D

Union Street Development
Union Street
Aldershot
GU11 1EG

Potential Areas for Site Wide Improvements

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Prepared for:
Rushmoor Development Partnership

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1.0 Version History

Version	Revision	Date
First Issue	-	25.05.2021
Amendments to content and layout	1	28.05.2021
Heating solution adjustment	2	01.06.2021
Costs and text adjustements made	3	03.06.2021
Amendments to Costs	4	04.06.2021
Savings added for running costs	FINAL	07.06.2021

2.0 Contents

3.0 Summary

This Statement has been prepared to demonstrate what further measures may be introduced into the current development plans / specifications for the project at Union Street, Aldershot. The additional measures investigated seek to outline how the proposed building might be enhanced in relation to energy and sustainability through further reducing the buildings carbon emissions and improving its energy performance. The additional measures have been modelled in SAP and SBEM under the current Part L 2013 regulations. The London Plan carbon tool for SAP 10 has been used also to investigate potential performance under the proposed fuel tariff changes outlined under SAP 2020.

The current building design and specifications proposed already meet the key regulatory and local planning policy targets established by Rushmoor Local Plan 2014-2032 (Adopted February 2019). This current design and specification achieves a **48.51%** improvement over current Part L 2013 regulations (Appendix A). The additional measures investigated seek to build upon this energy efficient design to ascertain what further improvements might be made.

By improving the fabric of the building in the following ways:

- Roof U Value from 0.12 W/m^{2}K to 0.10 W/m^{2}K
- Window U Value (commercial) from 1.4 W/m^{2}K to 1.27 W/m^{2}K
- Window U Value (domestic) from 1.4 W/m^{2}K to 1.00 W/m^{2}K

And by improving the building services, renewable provision & lighting in the following

- Lighting efficiency improvement within commercial and communal spaces
- Enhanced MVHR efficiency
- More efficient PV panels from 36 KW peak to 50 KW peak
- Low Temperature Underfloor Heating

Incorporating these measures within the design and specification of the building the building performance improves of the building over the current building performance by **15.25%** and over Part L 2013 by **56.30%** (Appendix B).

$$\frac{(Current\ Design - Improved\ Design)}{Current\ Design}\ X\ 100 = \%\ Improvement$$

$$\frac{(139{,}167.38 - 117{,}948.09)}{139{,}167.38}\ X\ 100 = \mathbf{15.25\%}$$

Estimated Costs

- Circa an additional £105,000 to improve the Main Roofs U Value from 0.12 to 0.10 W/m^{2}k.
- Circa an additional £121,000 to improve the U value of residential windows from 1.4 to 1.00 W/m^{2}k.
- Circa an additional £93,000 to improve the u value of commercial windows from 1.4 to 1.27 W/m^{2}k. (note commercial doors would need to remain a u value of 1.8 W/m^{2}k)
- Circa an additional £23,000 to improve PV from 36kw to 50kw. (subject to confirmation on space, approximately 9m^2 more space needed based upon higher efficiency panels)
- Circa an additional £366,000 to improve MVHR units to Passivhaus units.
- TBC regarding lighting efficiency improvements.
- Circa £56k to omit radiators & add Under Floor Heating to Residential & Student Units.

- All proposed improvements come to an overall total cost of £764,000.

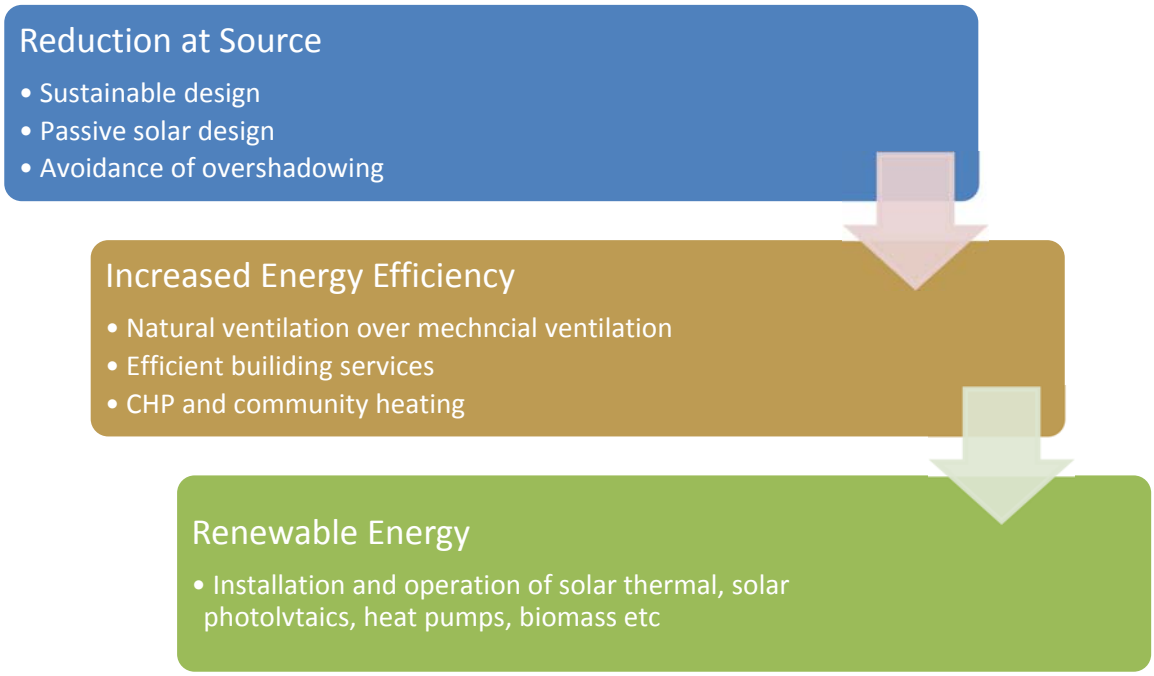
The specification adjustments proposed will save 17,828 KWh / year in domestic heating and hot water which represents a 6.2% saving. This equates to a £713.10 total saving across all domestic flats (using a gas tariff of 0.04p KWh).

A further option was modelled which looked at the building performance (domestic ONLY) using the improved measures outlined above in combination with a communal heat pump solution (350% efficient). However, it is acknowledged that this change in heating solution would bring with it project delays through planning resubmission and fundamental design adjustments which would need to be made. This is in addition to the competition for roof space that the ASHP plant would place up on the space available for PV provision. This combination of measures achieved a performance over Part L 2013 regulations of **63.37%** (Appendix C).

The best solution seems to be the CHP solution with enhanced fabric, MVHR, underfloor heating and increased PV efficiency. This yields a performance that is beyond the next proposed regulation standards change and is hot on the heels of the 75% reduction proposed for the Future Homes Standard in 2025 and does not require a planning resubmission along side any roof space competition which can be maximised one further deign has been completed for PV provision. It also helps to future proof the scheme through the installation of low temperature underfloor heating. It is also possible to review the provision of hydrogen in place of gas in due course through the building services set up proposed. This can be undertaken along with associated costs provided in due course.

4.0 Fabric Performance

The current building design and specification includes a very focused 'fabric first' approach to the project. This approach to design is focused on minimising heat loss and maximising both passive solar gain as well as recirculating latent heat from the building to reduce the demand for the heating system to be used.



The improved project fabric specification is detailed below compared against current permitted Part L average U Value thresholds as well as future thresholds that have been proposed under recent consultations.

Fabric Element	Current Part L Average U Value threshold	Project Proposal	% improvement over Part L 2013
Floor U Value (W/m^2K)	0.25	0.12	52%
Wall U Value (W/m^2K)	0.30	0.15	50%
Roof U Value (W/m^2K)	0.20	0.1	50%
Window U Value (W/m^2K)	2.00	1.00	50%
Door U Value (W/m^2K)	2.00	1.4	30%
Air Permeability 50 Pa	10.00 $m^3/(h.m^2)$	3.00 $m^3/(h.m^2)$	70%

Table: Improved project fabric specification compared against current Part L average U Value thresholds

The above table confirms that the proposed specification is highly efficient and overperforms against current average Part L U Value thresholds by over 50%.

The table below further confirms the performance of the proposed fabric improvements against future proposed fabric standards under Part L proposed changes up to 2025

Element	Proposed 'zero carbon homes' standard	2021 Part L Standard	Indicative FHS specification (2025)	Project Proposal
Floor U Value (W/m2K)	0.13	0.13	0.11	0.12
External Wall U Value (W/m2K)	0.18	0.18	0.15	0.15
Roof U Value (W/m2K)	0.13	0.11	0.11	0.1
Window U Value (W/m2K)	1.40	1.20	0.80	1.00
Door U Value (W/m2K)	1.00	1.00	1.00	1.4
Air Permeability m3/(h.m2)	5.00	5.00	5.00	3.00
Heating Appliance	Gas Boiler	Gas Boiler	Low-Carbon Heating	CHP Boiler
Heat Emitter Type	Radiators	Low Temp Heating	Low Temp Heating	Low Temp Heating
Ventilation Type	Natural	Natural	Natural	MVHR
PV	30% GIFA	30% GIFA	None	50 KW peak

Table: Improved project fabric specification compared against fabric standards proposed to come in towards 2025

The proposed fabric improvements for the building design and specification place to scheme on par with the standards that are being proposed under the SAP 2021 and Future Homes Standard 2025 consultations.

These standards will ensure a solid fabric first approach that is ahead of current regulations and in line with those that are proposed to come into force in the coming 5 years.

The current approach to put fabric first and reduce emissions from our buildings would be reflected well within this approach.

5.0 Photovoltaics

The current building design and specification includes PV, however, there is room for more efficient panels to be used across the building to improve the performance of the building.

The current scheme includes provision for the installation of 36kWp PV. This is based on 144 x 250 watt panels. The additional PV array would be generated through an improved panel wattage so that the array would be closer to 50kWp PV.

6.0 MVHR

MVHR is specified within the current building design, however, under the improved approach the MVHR modelled used is closer to a PassivHaus model which leads to further improvements in energy capture and heat recovery.

7.0 Heat Pumps

Electricity from an ever decarbonising grid is becoming cleaner and this is recognised in the fuel factor change that is proposed to come into effect within the next change in regulations, making the use of electricity fuelled heating systems a more attractive option in the coming years. This is alongside the fact that gas boilers are proposed to be banned from new properties from 2025 onwards.

However, the use of heat pump technologies on this scheme is restricted mainly by the way in which the heat pump plant will be competing for space on the roof of the building with the required PV array. Heat pump usage would also require the scheme to undergo a revision through planning which will delay the project start and completion timeframes. The use of electricity would also present an increased cost to the end user given the higher tariffs in place at present.

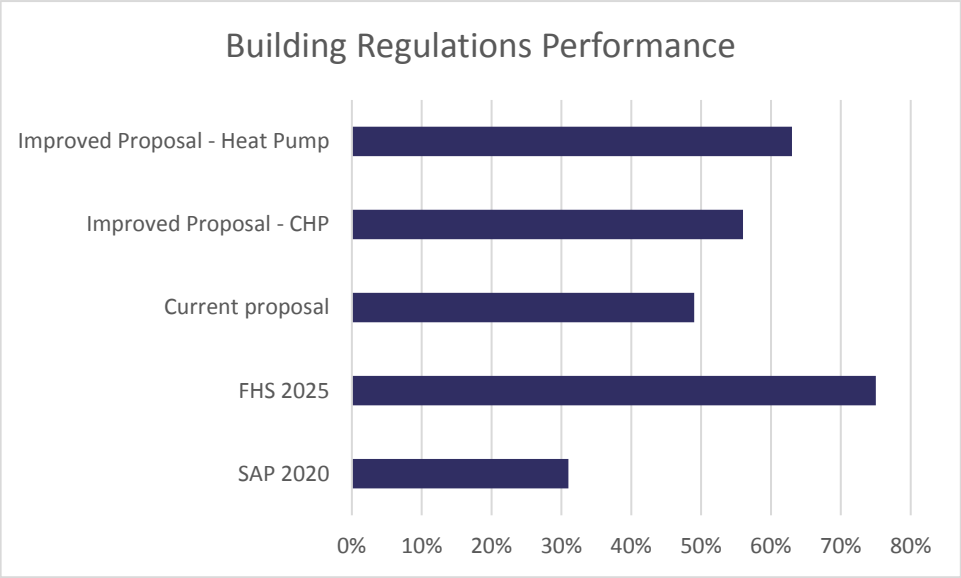
The performance of the heat pump solution with improved fabric and PV does not yield the same improvement under the current Part L 2013 regulations under which this development.

It is also recognised that the provision of low temperature underfloor heating is of value to future proofing the scheme for further changes that the building will undergo during its life.

8.0 Performance against Part L

The graph below outlines the performance of the current strategy as well as the proposed improved strategies over and above that of different up and coming building regulation standard enhancements.

- FHS 2025 – Future Homes Standard due to come into force 2025 (75% better than current building regulation performance)
- SAP 202 – Due to come into force 2021 (31% better than current building regulation performance)



The improved specification including the CHP improves more than the SAP 2020 standard and is close on the heels of the FHS improvements that will be required in 5 years time.

Appendix A

Current building and specification design proposals

Design SAP Data Input Table			
Element		Details	Comments
Floor U-Values	New Build Exposed Floor to Car Park	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Insulation in Soffit Insulation
	New Build Exposed Floor to Commercial Units	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Insulation in Soffit Insulation – U-Value to be Halved in Line with SAP Conventions
Wall U-Values	New Build External Walls	0.15 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Steel Frame/Concrete Walls with Non- Combustible Insulation
	Party Wall to Existing Building	0.00 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Insulation to Inner Leaf. Any Cavities Need to be Fully Filled to Obtain U-Value
	Party Wall Between Flats	0.00 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Fully Filled Cavities Between Flats. Any Cavities Need to be Fully Filled to Obtain U-Value
	Party Wall to Heated Corridor	0.00 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Fully Filled Cavities Between Flat and Heated Corridor. Any Cavities Need to be Fully Filled to Obtain U-Value
Roof U-Values	New Build Roof – Flat Roof	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Insulation Above Concrete
Opening U-Values	Windows	1.40 W/m²K	Double Glazed, Low-E Coated. G Value: 0.60
	Door - Solid	1.40 W/m²K	Solid Composite, Fireproof Door
Y- Value	Thermal Bridging	Various	Accredited Construction Details Used
Ventilation	Air Tightness	3.00	-
	Mechanical Ventilation	Mechanical Ventilation with Heat Recovery (MVHR)	Zehnder ComfoAir MVHR Units in Kitchen and Wet Rooms Only
Heating and Hot Water	Primary Heating System	CHP Boiler	Combined Heat & Power (CHP) Boiler – Assumed Heating Efficiency 55.8%, Electrical Efficiency 34.3%
	Controls	Programmer	Flat Rate Charging System with Programmer with Room Thermostats and TRVs in Every Dwelling
	Emitters	Radiators	Radiators Installed Throughout
	Water Heating	From Gas Boiler	Hot Water Supplied Directly from Combi Boiler
	Secondary Heating	N/A	No Secondary Heating Specified
Renewable Technologies		Photovoltaic Panels (PV)	Proposed 36kWp PV to be Installed Site Wide, PV Allocated to Each Dwelling Via Floor Area. Panels Installed in a Southerly Orientation at a Pitch of 30°. Total Area 230.4m² (144 x 250Watt Rated Panels)
Low Energy Lighting		LED Fittings	Minimum Efficiency 45 Lumens per Circuit Watt

Table 1: Energy Efficient Measures of SAP Calculations

Design SBEM Student Accommodation Data Input Table				
Element		Details	Comments	
Floor U-Values	New Build Exposed Floor to Car Park	0.15 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Insulation in Soffit Insulation	
	New Build Exposed Floor	0.20 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Insulation in Soffit Insulation	
Wall U-Values	New Build External Walls	0.15 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Steel Frame/Concrete Walls with Non- Combustible Insulation	
	Wall to Bin Stores	0.25 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Steel Frame/Concrete Walls with Non- Combustible Insulation	
	Internal Partitions	0.33 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Fully Filled Cavities	
Roof U-Values	New Build Roof – Flat Roof	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Insulation Above Concrete	
Opening U-Values	Windows	1.40 W/m²K	Double Glazed, Low-E Coated. G Value: 0.60	
	Door - Solid	2.20 W/m²K	Solid Composite, Fireproof Door	
Alpha Value	Thermal Bridging	10.40%	Accredited Construction Details Used (Alpha Value is the % of the Buildings Heat Transfer Coefficient which is due to Thermal Bridging)	
Ventilation	Air Tightness	3.00	-	
	Mechanical Ventilation	Mechanical Ventilation	Extract Fans in the Following Rooms Air Flow Rates Based on Part F Minimum Standards	
			Bathrooms	Maximum S.F.P - 0.5 W/l/s - Fan Remote from Zone
			Communal Areas	Maximum S.F.P - 1.0 W/l/s - Fan Remote from Zone with Grease Filter
Heating and Hot Water	Primary Heating System	CHP Boiler	Combined Heat & Power (CHP) Boiler – Assumed Heating Efficiency 55.8%, Electrical Efficiency 34.3%	
	Controls	Programmer	Central Time Control, Local Time Control, Local Temperature Controls	
	Emitters	Radiators	Radiators Installed Throughout	
	Water Heating	From Gas Boiler	1000L Part L Compliant Tank - 3.91kWh/day Loss Factor	
Renewable Technologies		Photovoltaic Panels (PV)	Proposed 36kWp PV to be Installed Site Wide, PV Allocated to Student Accommodation Via Floor Area. Panels Installed in a Southerly Orientation at a Pitch of 30°. Total Area 230.4m² (144 x 250Watt Rated Panels) – Installed Capacity to Commercial Area 12.82kWp	
Low Energy Lighting		LED Fittings	Minimum Efficiency 75 Lumens per Circuit Watt	
Metering		Heating	No Separate Metering Provisions to Heating System	
		Lighting	No Separate Metering Provisions to Heating System	

Table 2: Energy Efficient Measures of SAP Calculations

Design SBEM Retail Units Data Input Table			
Element		Details	Comments
Floor U-Values	New Build Ground Floor	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Below Screed
	New Build Exposed Floor to Car Park	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction PIR Insulation in Soffit Insulation
Wall U-Values	New Build External Walls	0.15 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Steel Frame/Concrete Walls with Non- Combustible Insulation
Roof U-Values	New Build Roof – Flat Roof	0.12 W/m²K	Target U-Value - Construction Details to be Confirmed - Assumed Construction Insulation Above Concrete
Opening U-Values	Windows	1.40 W/m²K	Double Glazed, Low-E Coated. G Value: 0.60
	Door - Solid	2.20 W/m²K	Solid Composite, Fireproof Door

Table 3: Energy Efficient Measures of SAP Calculations

Current building design and specification performance

Dwelling	Floor Area m^2	Target Emission Rate $kgCO_2/m^2/yr$	Dwelling/ Building Emission Rate $kgCO_2/m^2/yr$	Percentage Improvement	Total Emissions $kgCO_2$/year
Plot G-02 (Exposed Floor to Car Park)	88.47	16.47	5.99	63.63%	529.94
Plot G-05 (Exposed Floor to Retail Unit)	71.58	17.99	6.60	63.31%	472.43
Plot F-08 (Exposed Floor to Retail Unit)	74.87	17.75	6.54	63.15%	489.65
Plot F-10 (Exposed Floor to Retail Unit)	73.20	16.57	6.28	62.10%	459.70
Plot F-14 (Exposed Floor to Retail Unit)	63.32	19.08	7.14	62.58%	452.10
Plot F-19 (Exposed Floor to Retail Unit)	54.00	16.81	6.45	61.63%	348.30
Plot F-25 (Exposed Floor to Retail Unit)	59.87	16.23	6.25	61.49%	374.19
Plot F-16 (Mid Floor)	50.16	15.91	6.17	61.22%	309.49
Plot F-22 (Mid Floor)	71.58	14.69	5.72	61.06%	409.44
Plot S-43 (Mid Floor)	75.01	15.74	5.94	62.26%	445.56
Plot S-44 (Mid Floor)	92.27	14.17	5.47	61.40%	504.72
Plot T-57 (Mid Floor)	57.69	13.81	5.58	59.59%	321.91
Plot T-59 (Mid Floor)	50.16	16.10	6.22	61.37%	312.00
Plot T-70 (Mid Floor)	56.94	15.65	5.95	61.98%	338.79
Plot S-37 (Top Floor)	63.32	20.32	7.11	65.01%	450.21
Plot Fr-74 (Top Floor)	70.02	18.93	6.70	64.61%	469.13
Plot Fr-80 (Top Floor)	75.08	16.59	6.11	63.17%	458.74
Plot Fth-92 (Top Floor)	71.35	20.04	7.08	64.67%	505.16
Plot Fth-96 (Top Floor)	75.50	17.70	6.52	63.16%	492.26
Plot Fth-98 (Top Floor)	79.01	16.71	6.04	63.85%	477.22
Student Accommodation	3,582.40	31.10	14.30	54.02%	51,228.32
Retail Unit CX-05	58.52	43.10	42.10	2.32%	2,463.69
Retail Unit CX-07	89.33	49.40	42.20	14.57%	3,769.73
Retail Unit CX-10	62.35	40.90	36.90	9.78%	2,300.72
Retail Unit CX-13	131.33	35.70	34.00	4.76%	4,465.22
Retail Unit CX-14	212.62	45.50	36.80	19.12%	7,824.42
				Total	**80,673.01**

Table 4: Summary of Emissions (Regulated) of the Be Green Assessment

By multiplying out the sampled emissions and energy demands for the sampled SAP& SBEM Calculations to the remaining residential and retail units the emissions for the site are estimated to be **139,167.38 $KgCO_2$** per annum whilst the Energy Demand for the site is estimated to be **980,012.44 kWh per annum.**

When comparing the emissions of the site with a Combined Heat & Power boiler and PV this has reduced the emissions for the development against the residual baseline Target Emission Rate by **48.51%**. This equates to a saving carbon dioxide of **131,111.91 $KgCO_2$** per annum.

Appendix B

Improved building design and specification performance - CHP

Dwelling	Floor Area m^2	Target Emission Rate $kgCO_2/m^2/yr$	Dwelling/ Building Emission Rate $kgCO_2/m^2/yr$	Percentage Improvement	Total Emissions $kgCO_2/year$
Plot G-02 (Exposed Floor to Car Park)	88.47	16.47	4.57	72.23%	404.57
Plot G-05 (Exposed Floor to Retail Unit)	71.58	17.99	5.17	71.25%	370.26
Plot F-08 (Exposed Floor to Retail Unit)	74.87	17.75	5.09	71.35%	380.77
Plot F-10 (Exposed Floor to Retail Unit)	73.20	16.57	4.84	70.80%	354.14
Plot F-14 (Exposed Floor to Retail Unit)	63.32	19.08	5.68	70.21%	359.93
Plot F-19 (Exposed Floor to Retail Unit)	54.00	16.81	5.08	69.78%	274.36
Plot F-25 (Exposed Floor to Retail Unit)	59.87	16.23	4.90	69.84%	293.08
Plot F-16 (Mid Floor)	50.16	15.91	4.87	69.42%	244.08
Plot F-22 (Mid Floor)	71.58	14.69	4.31	70.67%	308.45
Plot S-43 (Mid Floor)	75.01	15.74	4.44	71.80%	332.93
Plot S-44 (Mid Floor)	92.27	14.17	4.06	71.32%	374.92
Plot T-57 (Mid Floor)	57.69	13.81	4.30	68.88%	247.93
Plot T-59 (Mid Floor)	50.16	16.10	4.91	69.49%	246.42
Plot T-70 (Mid Floor)	56.94	15.65	4.63	70.39%	263.88
Plot S-37 (Top Floor)	63.32	20.32	5.57	72.56%	353.01
Plot Fr-74 (Top Floor)	70.02	18.93	5.28	72.11%	369.70
Plot Fr-80 (Top Floor)	75.08	16.59	4.68	71.81%	351.10
Plot Fth-92 (Top Floor)	71.35	20.04	5.56	72.25%	396.76
Plot Fth-96 (Top Floor)	75.50	17.70	4.91	72.29%	370.35
Plot Fth-98 (Top Floor)	79.01	16.71	4.56	72.73%	359.97
Student Accommodation	3,582.40	31.10	12.60	59.49%	45,138.24
Retail Unit CX-05	58.52	43.10	36.70	14.85%	2,147.68
Retail Unit CX-07	89.33	49.40	37.00	25.10%	3,305.21
Retail Unit CX-10	62.35	40.90	31.90	22.00%	1,988.97
Retail Unit CX-13	131.33	35.70	29.80	16.53%	3,913.63
Retail Unit CX-14	212.62	45.50	32.40	28.79%	6,888.89
				Total	**70,039.21**

Table 5: Summary of Emissions (Regulated) of the Be Green Assessment with Improved Fabric

By multiplying out the emissions to all the dwellings and the commercial areas of the site the total emissions have been calculated at **117,948.09kgCO₂/year.** It has also been calculated that the energy demand on site is **915,885.11kWh/year**. This accounts for a reduction emission from Part L of **56.30%** and a **15.25%** improvement on the Be Green Assessment.

Appendix C

Improved building design and specification performance – Heat Pump

Dwelling	Floor Area m^2	Target Emission Rate $kgCO_2/m^2/yr$	Dwelling/ Building Emission Rate $kgCO_2/m^2/yr$	Percentage Improvement	Total Emissions $kgCO_2/year$
Plot G-02 (Exposed Floor to Car Park)	88.47	24.06	8.43	64.97	745.59
Plot G-05 (Exposed Floor to Retail Unit)	71.58	26.32	8.89	66.24	636.03
Plot F-08 (Exposed Floor to Retail Unit)	74.87	25.98	9.36	63.97	700.90
Plot F-10 (Exposed Floor to Retail Unit)	73.20	24.13	8.90	63.12	651.37
Plot F-14 (Exposed Floor to Retail Unit)	63.32	27.95	10.47	62.54	662.88
Plot F-19 (Exposed Floor to Retail Unit)	54.00	24.33	9.29	61.82	501.60
Plot F-25 (Exposed Floor to Retail Unit)	59.87	23.46	8.92	61.99	533.89
Plot F-16 (Mid Floor)	50.16	22.82	8.75	61.64	439.10
Plot F-22 (Mid Floor)	71.58	21.2	7.88	62.83	564.11
Plot S-43 (Mid Floor)	75.01	22.86	8.15	64.37	611.00
Plot S-44 (Mid Floor)	92.27	20.54	7.49	63.53	691.20
Plot T-57 (Mid Floor)	57.69	19.69	7.76	60.59	447.66
Plot T-59 (Mid Floor)	50.16	23.13	8.84	61.76	443.61
Plot T-70 (Mid Floor)	56.94	29.87	10.26	65.63	649.97
Plot S-37 (Top Floor)	63.32	22.51	8.37	62.8	476.75
Plot Fr-74 (Top Floor)	70.02	27.68	9.57	65.43	670.10
Plot Fr-80 (Top Floor)	75.08	24.12	8.50	64.77	637.92
Plot Fth-92 (Top Floor)	71.35	29.5	10.22	65.36	729.14
Plot Fth-96 (Top Floor)	75.50	25.91	9.03	65.17	681.42
Plot Fth-98 (Top Floor)	79.01	24.38	8.37	65.66	661.43
				Total	**12,135.67**

Table 6: Summary of Emissions (Regulated) of the Be Green Assessment with Improved Fabric and Photovoltaics & Air Source Heat Pumps

By multiplying out the emissions to all the dwellings the total emissions have been calculated at **60,251.78kgCO₂/year.** It has also been calculated that the energy demand on site is **279,677.04Wh/year**. This accounts for a reduction emission from Part L of **63.37%**

Total Target Emission Rate: **164,471.92 KgCO₂/Year**
Total Design Emission Rate: **60,251.78 KgCO₂ /Year**

Total CO_2 Savings over Part L: **104,220.14 KgCO₂/Year**
Improvement over Part L: **63.37%**

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