Energy Statement

Rooftop Extension, 163 Iverson Road

Prepared for Reichmann Properties Ltd
28th May 2021

envision

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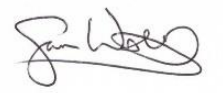
Sam Wallis BSc (Hons) M Arch Sc OCDEA	
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EXECUTIVE SUMMARY

1. This Energy Statement has been prepared by Envision on behalf Reichmann Properties Ltd (The Applicant) and is submitted in support of a full planning application for the construction of a roof-top extension to create four new dwellings at 163 Iverson Road, in West Hampstead within the London Borough of Camden.

2. The primary purpose of this document is to explain how the scheme can meet with the London Borough of Camden energy policies, along with those found within the London Plan (2021).

3. Envision has undertaken a review of the relevant policies and worked with the design team to determine and agree the relevance and approach that should be taken to fulfil each policy.

4. This four new dwellings are proposed to form part of a rooftop extension to the existing building at 163 Iverson Road, which contains 33 dwellings and was granted consent in 2012 by Camden Council (Planning Reference - 2012/0099/P). The applicant intends to demonstrate how the energy performance of this rooftop extension will meet with planning policy, and in doing so significantly exceed that of the originally consented scheme.

Summary of Energy Strategy

5. This statement illustrates how the scheme complies with the nationally recognised *Energy Hierarchy* and follows passive and efficiency improvements before the application of any Low or Zero Carbon (LZC) sources.

6. The development is expected to reduce CO_2 emissions by **43.82%** beyond the Part L 2013 complaint baseline, calculated using SAP 10 emission factors.

7. Envision has produced Part L1A compliant SAP calculations in order to determine the energy and CO_2 emissions for the proposed development. These have been calculated using SAP 10 figures, with detailed calculations provided in Appendix II.

8. To reduce the energy consumption of the development and to assist in achieving a Building Regulation Part L 2013 compliant development, the following design measures are recommended and will need to be incorporated into the detailed design:

   - Reduction in solar gain using lower g-values;
   - Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
   - Reduced air permeability, lower than standard Buildings Regulations;
   - Mechanical Ventilation Heat Recovery (MVHR) providing fresh air to the units;
   - High-efficient Air-Source Heat Pumps providing efficient space and water heating;
   - HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values; and

- High efficiency LED lighting throughout.

9. The figures used as the basis for this assessment are discussed further in Section 4 of this report.

10. In line with the requirements of the October 2018 update to the 'GLA Guidance on Preparing Energy Assessments', the predicted CO_2 emissions and energy demand presented in this report have been calculated using SAP 10 figures. These are presented in Appendix II.

Table A.1 – Final Site-Wide CO_2 reductions

Rooftop Extension	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	4.71	14.10
After energy demand reduction	4.27	14.10
After heat network / CHP	n/a	n/a
After renewable energy	2.64	14.10
	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Savings from energy demand reduction	0.44	9.25%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	1.63	34.57%
Cumulative on-site savings	2.06	**43.82%**

1 INTRODUCTION

1.1 The primary purpose of this statement is to explain how best practice sustainable design and construction measures would be incorporated in the proposed development to ensure alignment with local and regional planning policy.

1.2 Section 4 (Energy Statement) sets the parameters of detailed design, but remains at a strategic level. The calculations in this document are an indication of system size and carbon emissions based on guidance documents, approved software and practical experience. They are not design calculations but establish the viability and feasibility of various technologies for the proposed development.

1.3 This statement is structured as follows:

- Section 2 provides a description of the site and the development proposals;
- Section 3 provides a description of the main energy and sustainability policies relevant to the application;
- Section 4 provides an energy assessment, structured against the requirements of the policies examined in Section 3; and
- Section 5 provides a concluding summary.

1.4 In support of the Energy Statement, the following appendices have also been included:

- Appendix I – renewable technology analysis, summarising a review of the key available technologies for the site.
- Appendix II – Envision SAP 10 calculations, which convert current Part L 2013 emissions factors into SAP 10 in accordance with GLA guidance.
- Appendix III – SAP TER & DER worksheets.

2 CONTEXT AND PROPOSALS

Site Location & Proposed Development

2.1 The development site is located at 163 Iverson Road, which contains an existing residential building with 33 dwellings. The site is highly accessible with West Hampstead tube, Thameslink Rail Station and town centre in the immediate vicinity. To the north of the site is the railway embankment, which includes a number of mature trees. This land is identified as a 'Site of Nature Conservation Importance' (SNCI) in the Council's adopted Local Development Framework (LDF) Core Strategy. Beyond the railway embankment is the West Hampstead Thameslink Rail Station.

2.2 The development proposals will involve the construction of a rooftop extension to the existing building to contain four high quality residential dwellings.

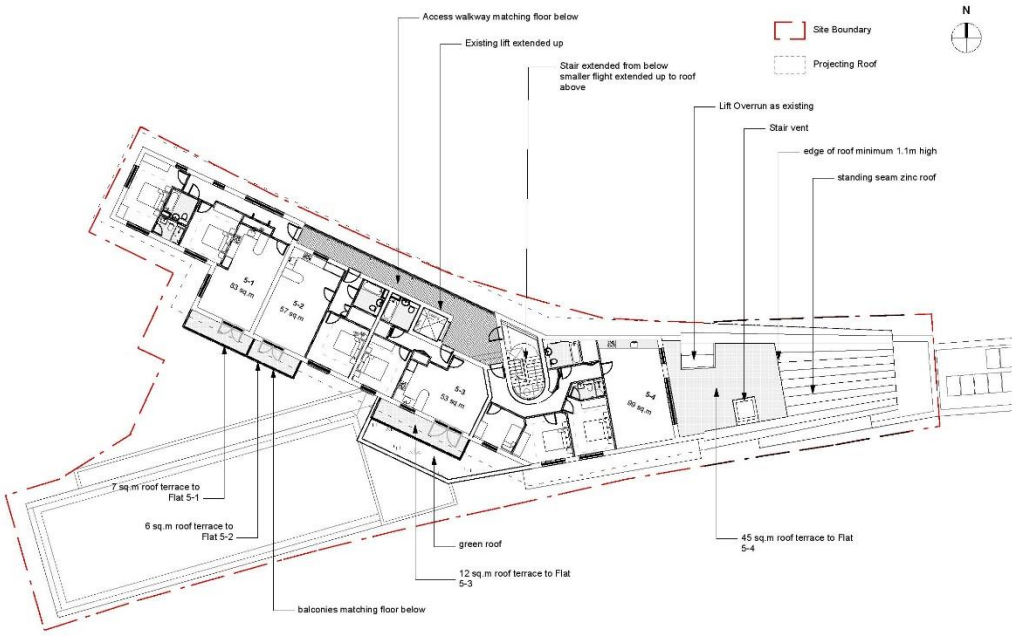

Fig 2.1 – Proposed Development

Existing Building

11. This four new dwellings are proposed to form part of a rooftop extension to the existing building which, was granted consent in 2012 by Camden Council (Planning Reference - 2012/0099/P). The original Energy Statement for this development was prepared by Richard Hodkinson Consultancy and demonstrated how the original building could achieve a 25% reduction in CO_2 emissions beyond Part L **2010** via:

- High-efficiency gas-fired boilers;
- U-values below the minimum requirements of Part L 2010;
- Mechanical Ventilation Heat Recovery;

- A 22.4 kWp PV array.

2.1 The applicant intends to demonstrate how the energy performance of this rooftop extension will significantly exceed that of the originally consented scheme, aligning and in fact, exceeding current energy policy.

3 SUSTAINABILITY & ENERGY POLICY CONTEXT

3.1 Many definitions of sustainable development exist, although the common objective for all is the integration of economic, social and environmental issues to ensure a better quality of life for people today, without compromising the needs of future generations. A key mechanism for delivering the principles of sustainable development lies within the UK planning system, which is implemented through national guidance and local planning policies. A review of all the relevant policy documents was undertaken in order to gain an understanding of the guiding policies for sustainability.

National Planning Policy Framework

3.2 The revised National Planning Policy Framework (NPPF) was published on 24th July 2018 and updated in February 2019. It sets the framework for all planning policy in England and how these are expected to be applied. The NPPF establishes a presumption in favour of sustainable development, and the need to support economic growth through the planning system.

- Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives: An economic role – to help build a strong, responsive and competitive economy, by ensuring that sufficient land if the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
- A social role – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- An environmental role – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

3.3 Planning plays a key role in helping shape places to achieve radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. The NPPF does not include detailed measures on sustainable design codes and standards to apply, although expects that when setting any local requirement for a building's sustainability, local planning authorities should do so in a way consistent with the national technical standards.

London Plan

3.4 The London Plan (2021) sets out the Mayor's vision for London. In accordance with the NPPF, it promotes economic development, and endorses the principles of sustainable development. It is the main vehicle for strategic decision-making on London's development, including development decisions. The Plan contains a number of policies directly related to a development's sustainable design and energy reduction, including:

- Policy G1 Green Infrastructure;
- Policy G5 Urban Greening;
- Policy G 6 Biodiversity and Access to Nature;
- Policy SI 1 Improving Air Quality;
- Policy SI 2 Minimising greenhouse gas emissions;
- Policy SI 3 Energy Infrastructure;
- Policy SI 4 Managing heat risk;
- Policy SI 7 Reducing Waste and supporting the circular economy;
- Policy SI 12 Flood Risk Management;
- Policy SI 13 Sustainable Drainage; and
- Policy T 5 Cycling.

3.5 Of particular importance to the CO_2 and Energy reductions required for a development is *Policy SI-2: Minimising carbon dioxide emissions.*

3.6 Policy 5.2 requires that development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy;
- Be clean: supply energy efficiently;
- Be green: use renewable energy.

3.7 The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations.

London Borough of Camden Planning Policy

3.8 The most relevant policies which need to be considered when assessing the scheme's compliance to sustainability policy are those provided within local development documents.

3.9 The London Borough of Camden's adopted Local Plan (2016-2031) provides the planning framework for the Borough until 2031 and includes a suite of planning policies and strategic site allocations and supersedes the previous Core Strategy and Development Policies planning documents (adopted in 2010).

Camden Local Plan (2016 – 2031)

3.10 Policies relevant to the energy of new development contained within the Camden Local Plan include:

1. **Policy CC1 – Climate Change Mitigation**

   The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. We will:

   (a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;

   (b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;

   (c) ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;

   (d) support and encourage sensitive energy efficiency improvements to existing buildings;

   (e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and

   (f) expect all developments to optimise resource efficiency.

3.11 Specifically, Policy CC1 requires new residential development to demonstrate a 19% CO_2 reduction below Part L 2013 Building Regulations (in addition to any requirements for renewable energy) in line with the Energy Hierarchy.

2. **Policy CC2 (a) – Adapting to Climate Change**

   All development should adopt appropriate climate change adaptation measures such as:

   (a) the protection of existing green spaces and promoting new appropriate green infrastructure;

   (b) not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;

   (c) incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and

(d) measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

3. Policy CC2 (b) – Sustainable Design & Construction Measures

All development should adopt appropriate climate change adaptation measures such as:

(a) ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;

(b) encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;

(c) encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment.

Camden Planning Guidance – Energy Efficiency & Adaptation

3.12 The council prepared the Camden Planning Guidance (CPG) on Energy and resources to support the policies in the Camden Local Plan 2017. The guidance is consistent with the Local Plan and forms a Supplementary Planning Document (SPD) which is an additional "material consideration" in planning decisions.

3.13 The guidance provides information on key energy and resource issues within the borough and supports Local Plan Policies CC1 Climate change mitigation and CC2 Adapting to climate change.

3.14 This document is referred to within this Energy Statement, where relevant.

4 ENERGY STATEMENT

4.11 In pursuing compliance with the Energy Policy in the London Borough of Camden, Envision has followed guidance from the Borough's Local Plan, namely Policy CC1 (Climate Change Mitigation) – which has a requirement that all new dwellings (non-major) should achieve a 19% reduction in carbon dioxide (CO_2) emissions in accordance with the following energy hierarchy:

2. Step 1 – Reducing Energy Requirements;
3. Step 2 – Supplying the energy that is required more efficiently; and
4. Step 3 – Meeting remaining energy requirements through renewable and low carbon energy.

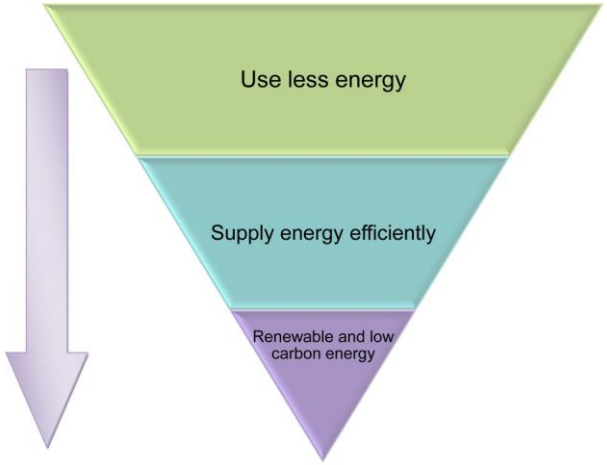

Fig 4.1 - 'Energy Hierarchy'

4.12 In line with the requirements of the October 2018 update to the 'GLA Guidance on preparing Energy Assessments', the predicted CO_2 emissions and energy demand presented in this report have been calculated using **SAP 10 figures**. The GLA 'Carbon Emission Reporting Spreadsheet', to be provided with referable planning applications is set up for development proposing communal heating systems. As this development proposes an individual heating system (not compatible with the GLA Carbon Emission Reporting Spreadsheet) the consumption figures have been manually converted with SAP 10 emission factors and provided in Appendix II.

4.13 Compliance with Part L1a of Building Regulations is provided via the SAP worksheets in Appendix III.

Methodology

4.14 In accordance with NCM guidance, the appropriate methodology for calculating the energy performance of the domestic portion is "The Government's Standard Assessment Procedure for Energy Rating of Dwellings". This procedure was undertaken using Stroma FSAP 2012 version 1.0.4.19 which is a Department of Communities and Local Government (DCLG) approved methodology and software for undertaking SAP assessments. For the purposes of this assessment the rooftop extension was modelled through FSAP.

Establishing the Target Emission Rate (TER)

4.15 The total emissions savings calculated in this report are expressed against a Building Regulation 2013 Target Emission Rate. This is the Baseline against which the measures implemented must show an improvement.

4.16 The Target Emission Rates for the development have been established using DCLG approved methodology and software.

4.17 The calculated carbon emissions and total energy demand for the Target Emission Rate are illustrated below. The calculated figure demonstrates a Part L1A Building Regulations 2013 compliant model – arrived at using SAP 10 carbon factors.

Table 4.1 – Target CO_2 emissions for Development

Unit	Total Floor Area for Unit Type (m^2)	SAP 10 TER	Total Target CO_2 ($kg.CO_2.yr$)	Target Regulated Energy (kWh.yr)
H.1	84.09	15.55	1,307.78	6,180.05
H.2	57.7	15.46	891.96	4,207.94
H.3	53.5	16.28	870.76	4,110.14
H.4	99.4	16.45	1,635.38	7,733.58
		Total =	**4,705.88**	**22,231.71**

4.18 The figure of **4,705.88 $kg.CO_2.yr$** the targets that must be reached and improved upon by the proposals in this Energy Assessment in order to comply with Building Regulations Part L1a 2013 and Camden Policy CC1. This will be achieved through the implementation of fabric efficiency, energy-reduction and carbon-saving measures as outlined in the ensuing sections, calculated using SAP 10 emission factors.

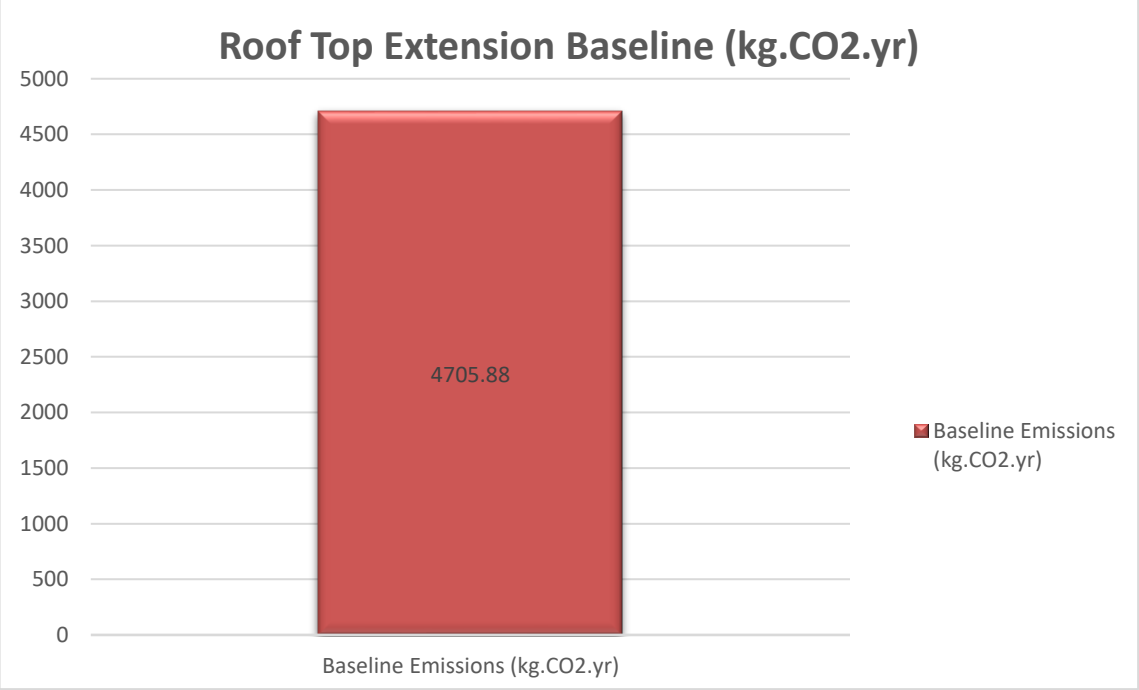

Fig 4.2 – Target CO_2 emissions for Development

Applying the London Plan Energy Hierarchy: Stage 1 – Be Lean

4.19 The Greater London Authority seeks a 'fabric first' approach to reducing the carbon footprint of London's built environment. This is achieved through buildings using less energy by improving u-values, air-tightness and lighting efficiency amongst others. This is the first step to consider in reducing a building's carbon emissions before the efficient delivery of power, heat or renewables are considered by a design-team.

Fabric Efficiency

4.20 U-Values, are used to measure how effective elements of a building's fabric are as insulators. That is, how effective they are at preventing heat from transmitting between the inside and the outside of a building. The lower the U-value of an element of a building's fabric, the more slowly heat is able to transmit through it, and so the better it performs as an insulator. Very broadly, the better (i.e. lower) the U-value of a buildings fabric, the less energy is required to maintain comfortable conditions inside the building., The following U-Values are proposed for the development:

Table 4.2 – Proposed U-Values

Elements	New Thermal Elements: U-Values – W/m² K	Part L1a Limiting Fabric Parameters – W/m²K	Comment
External Wall	0.15	0.35	n/a
Ground Floor	n/a	n/a	n/a
Roof (Flat & Pitched)	0.11	0.25	n/a
External Glazing	1.1	2.2	Assumed as double-glazed, with a g-value of 0.55
External Solid Doors	1.6	3.5	n/a
Party Walls	0	n/a	Assumed as fully-filled cavity with effective edge sealing an insulation in line with layers in abutting elements.

4.21 The proposed u-values have been set to ensure that the new top floor flats meet with the Dwelling Fabric Energy Efficiency (DFEE) target and to demonstrate a betterment than the u-values achieved in the existing building.

Air Permeability

4.22 The designed Air Permeability Rate (APR) has been set at 3 $m^3/h.m^2$ @ 50Pa for the development.

Lighting

4.23 The SAP calculation software used for assessing the development does not allow for the specification of lighting elements. However, it is assumed that the light fittings will be specified as LED, low-energy with local manual switching and if appropriate, occupancy sensing.

Ventilation

4.24 The ventilation strategy has been designed to meet with occupant and client requirements across the varied activity zones in the development, whilst maintaining the energy efficiency needed to lower carbon emissions. A balanced whole-house mechanical ventilation system with heat recovery is proposed for every dwelling as follows;

2. 1-Bed Flats: *Nuaire MRXBOX95-WM1* (or similar);

3. 2 & 3 Bed Flats: *Nuaire MRXBOX95-WM2* (or similar).

Space & Water Heating

4.25 In line with the 'GLA guidance on preparing Energy Assessments', the heating system assumed at 'Be-Lean' stage is an individual gas-fired heating system, with the efficiency in line with the notional building boiler efficiency (91%).

4.26 Each dwelling will be provided with a 200-litre internal hot water cylinder, with a standing heat loss of 1.63 kWh/24 hours. The SAP assessment assumes the pipework will be fully insulated and the water heating will be timed separately.

Be Lean Stage –CO_2 Reductions

4.27 The following tables and graphs represent the Be-Lean improvements for the development over the Target Emission Rate (TER) baseline emissions;

Table 4.3 – Be-Lean Emissions

Unit	Total Floor Area for Unit Type (m^2)	SAP 10 DER	Total CO_2 ($kg.CO_2.yr$)	Regulated Energy (kWh.yr)
H.1	84.09	14.02	1,178.89	5,547.31
H.2	57.7	13.75	793.33	3,727.10
H.3	53.5	14.82	792.76	3,728.44
H.4	99.4	15.15	1,505.84	7,089.16
		Total =	**4,270.82**	**20,092.01**
		Difference over Baseline	435.07	2139.70
		% Difference	**9.25%**	**9.62%**

4.28 As detailed above, the measures as taken at 'Be-Lean' stage would result in a **9.25%** reduction in site-wide regulated CO_2 emissions over the Part L 2013 Target Emission Rate, calculated using SAP 10 emission factors.

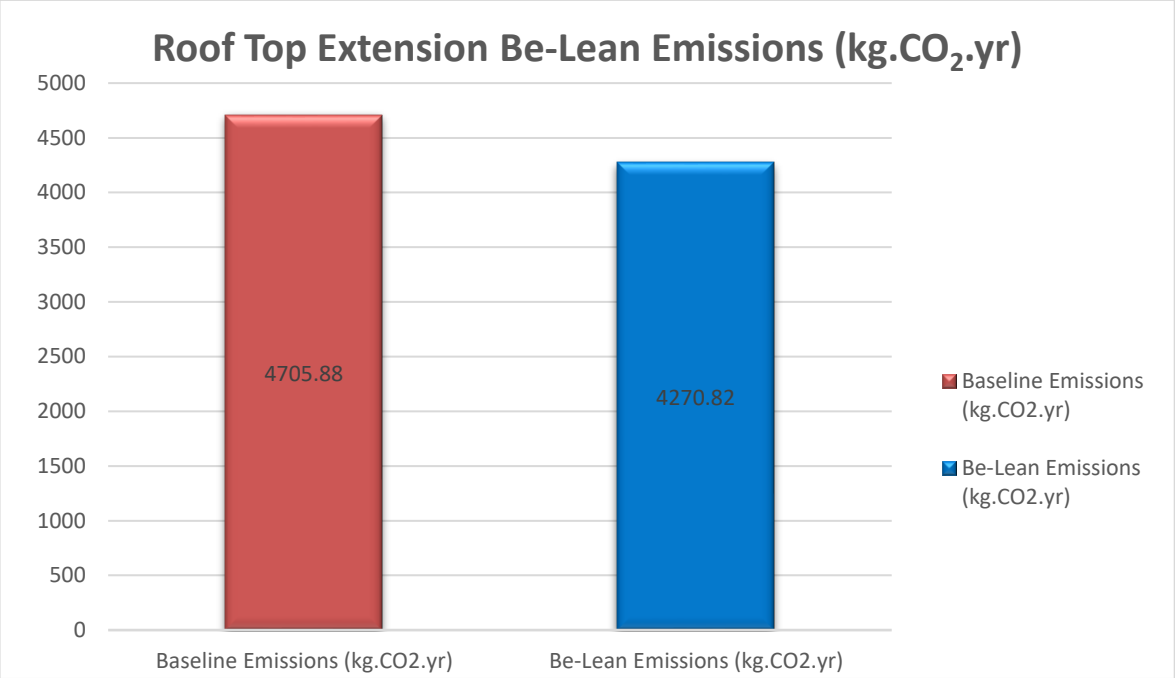

Fig 4.3 – Be-Lean Stage Reductions

Cooling & Overheating

4.29 Policy SI 4 of the London Plan (2021) seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

4.30 Applicants should apply the cooling hierarchy as detailed in Policy SI 4. It is proposed that the development would incorporate the following measures:

Table 4.4 – Cooling Methods

Cooling Method	Measures Employed
Minimising internal heat generation through energy efficient design	No-on site heat distribution network is proposed and therefore internal heat gains will be limited.
Reducing the amount of heat entering the building in summer	Internal blinds will be provided to all bedrooms and living areas to encourage occupants to limit solar gains. This, combined with a g-value in the glazing of 0.55 will reduce solar gain.
Use of thermal mass and high ceilings to manage the heat within the building	Floor to ceiling heights are maintained at a minimum 2,600mm. This relative increase in exposed surface will help to lower indoor air temperatures.
Passive ventilation	Although Mechanical Ventilation Heat Recovery (MVHR) is proposed, all dwellings will be provided with openable windows to allow for natural / purge ventilation and the majority allow for cross-flow ventilation.
Mechanical ventilation	MVHR units are proposed for each dwelling. These will facilitate a summer by-pass mode to make use of 'free cooling' when the outside air temperature is below that in the building during summer months.

Applying the London Plan Energy Hierarchy: Stage 2 – Be Clean

4.31 The 'Be-Clean' stage requires that any energy supplied to major developments should be as efficient as possible by selecting energy systems in accordance with the following hierarchy:

1. Connect to local existing or planned heat networks
2. Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
3. Use low-emission combined heat and power (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
4. Use ultra-low NOx gas boilers (CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of London Plan Policy SI 1 Improving air quality)

Connection to existing heating or cooling networks

4.32 By referencing the London Heat Map, it is clear that there are no existing or proposed networks in the vicinity of the site, with the nearest being in Kilburn 1.4 kilometres south of the site.

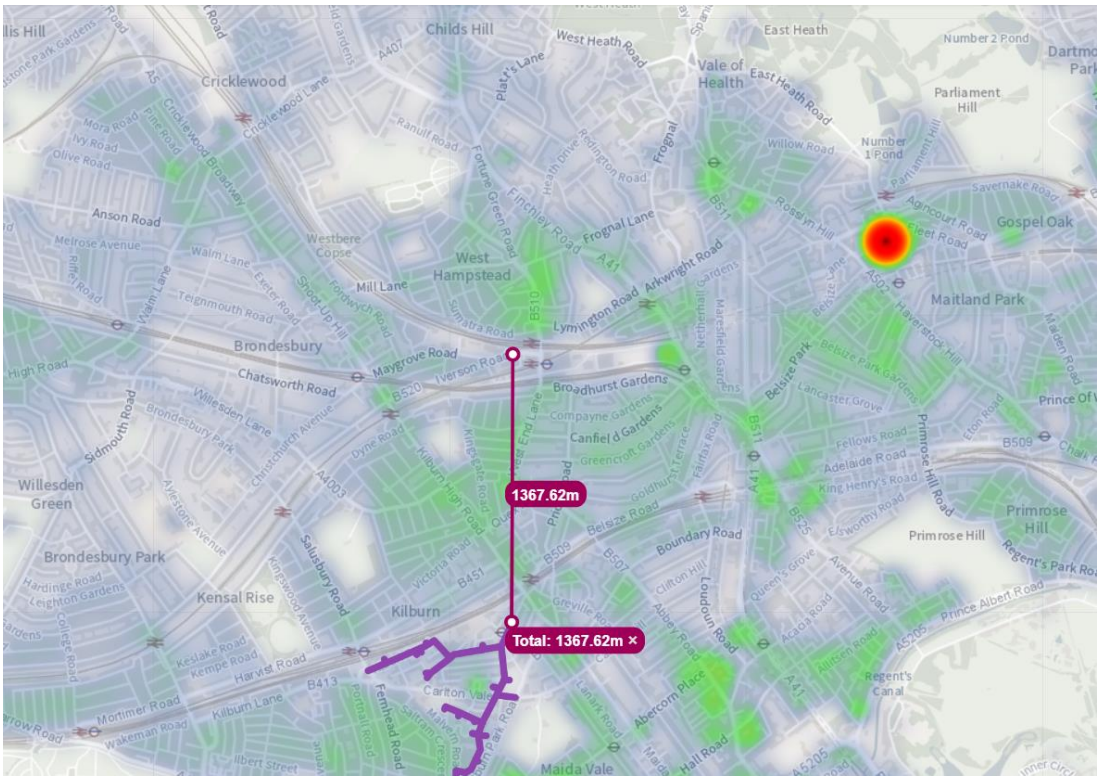

Fig 4.4 Local Heat Map

Use Zero-Emission or Local Secondary Heat Sources

4.33 As detailed in the ensuing 'Be-Green' section, the development will make use of individual air-source heat pumps to provide low-carbon heating and hot water. These systems will not be communal given the minor nature of the development.

Applying the London Plan Energy Hierarchy: Stage 3 – Be Green

4.34 An analysis of low carbon/renewable technologies was undertaken to determine which would be suitable for application in a development of this size and nature. This analysis has been appended to this document in Appendix I.

4.35 During the design-development period for this scheme, multiple low carbon/renewable systems were examined for both their feasibility and ability to lower carbon emissions insofar as possible. As per the analysis contained in Appendix I, the renewable systems deemed to be the most viable for the development are individual Air-Source Heat Pumps (ASHPs) providing efficient space and water heating to each dwelling.

Renewable Energy / Low Carbon Technology 1 – Air-Source Heat Pumps for Space & Water Heating

4.36 The low-carbon/renewable energy proposed for the development is an air-source heat pump (ASHP). ASHPs with the following specifications have been assumed:

- The ASHP will have a minimum SCOP of 2.9 for heating[1];
- DHW storage will be as per the details laid out in the 'Be-Lean' section under Paragraph 4.17;
- HVAC system controls installed will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values as well as local time and temperature control.

4.37 Final system selection will be at detail-design by the appointed mechanical engineer.

Provision of PV

4.38 As detailed in Appendix I, PV arrays would typically represent a suitable solution for the development, however roof-space will be allocated to re-install PV that meet the renewable energy requirements of the existing 33 dwellings at 163 Iverson Road.

4.39 The existing building has a 22.4kWp PV array installed on the uppermost roof, which will be removed to make way for the rooftop extension. This array will be subsequently re-installed on the roof of the extension to ensure the existing 33 dwellings continue to benefit from the carbon offset of the installation.

4.40 As demonstrated in the 'Be-Green' results below, the proposed development far exceeds the 19% reduction requirements of Policy CC1 and already proposes a renewable energy installation in the

[1] Mitsubishi Ecodan QUHZ Monobloc Air Source Heat Pump or similar assumed

form of heat pumps, therefore the non-installation of PV is deemed to be immaterial given the above reasons.

Be-Green CO_2 Reductions

4.41 The following tables and graphs represent the Be-Green improvements for the development over the Target Emission Rate (TER) baseline emissions:

Table 4.5– Be-Green Improvement over TER

Unit	Total Floor Area for Unit Type (m^2)	SAP 10 DER	Total CO_2 ($kg.CO_2.yr$)	Regulated Energy (kWh.yr)
H.1	84.09	8.32	699.44	3,001.87
H.2	57.7	9.52	549.34	2,357.68
H.3	53.5	10.08	539.50	2,315.47
H.4	99.4	8.61	855.53	3,671.82
		Total =	**2,643.81**	**11,346.84**
		Difference over Be-Lean	1627.00	8745.17
		% Difference	**38.10%**	**43.53%**
		Difference over Baseline	2062.07	10884.87
		% Difference	**43.82%**	**48.96%**

4.42 As detailed above, the measures as taken at this stage would result in a **43.82%** reduction in the sitewide regulated CO2 emissions over the Building Regulations Part L 2013 Target Emission Rate, calculated using SAP 10 emission factors, exceeding the 19% required by Camden Policy CC1.

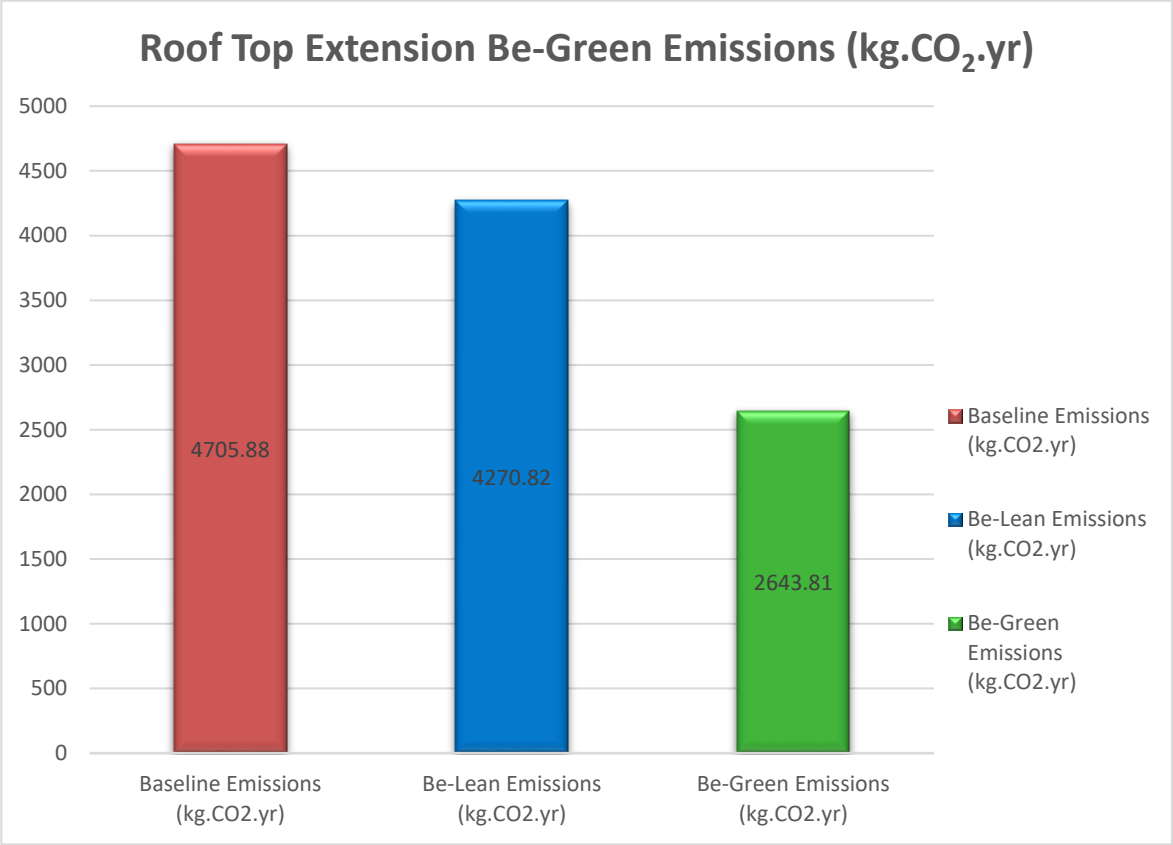

Fig 4.5 – Be-Green Reductions

Final Residential CO_2 Reduction Charts & Carbon Offset Payment

4.43 In accordance with the *'GLA guidance on preparing energy assessments'*, the final carbon emissions and predicted savings are presented below for the entire development. final table represents the site wide regulated carbon dioxide emissions and savings.

Table 4.6 – Final Residential CO_2 reductions

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	4.71	14.10
After energy demand reduction	4.27	14.10
After heat network / CHP	n/a	n/a
After renewable energy	2.64	14.10
	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Savings from energy demand reduction	0.44	9.25%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	1.63	34.57%
Cumulative on-site savings	2.06	**43.82%**

5 CONCLUSION

5.1 This Energy Statement has been prepared by Envision on behalf Reichmann Properties Ltd (The Applicant) and is submitted in support of a full planning application for the construction of a roof-top extension to create four new dwellings at 163 Iverson Road, in West Hampstead within the London Borough of Camden.

5.2 The primary purpose of this document is to explain how the scheme can meet with the London Borough of Camden energy policies, along with those found within the London Plan (2021).

5.3 To minimise energy consumption by the development and to assist in achieving a Building Regulation Part L1A 2013 compliant development, the following design measures are proposed:

- Reduction in solar gain using lower g-values;
- Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
- Reduced air permeability, lower than standard Buildings Regulations;
- Mechanical Ventilation Heat Recovery (MVHR) providing fresh air to the units;
- High-efficient Air-Source Heat Pumps providing efficient space and water heating;
- HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values; and
- High efficiency LED lighting throughout.

5.4 The strategy follows the three-step 'Energy Hierarchy' and meets all policies as outlined in Section 3 of the report. The developments overall reduction in carbon emissions over the Part L 2013 (using SAP 10 emission figures) baseline is **43.82%,** therefore complying with the London Borough of Camden's policy on CO_2 reductions in minor developments.

5.5 Further optimising of the heat pump installation will be assessed at the detail-design phase. For this Energy Report, the solutions have been optimised to suit the predicted energy consumption and carbon emissions as per Envision's calculations.

5.6 This four new dwellings are proposed to form part of a rooftop extension to the existing building at 163 Iverson Road, which contains 33 dwellings and was granted consent in 2012 by Camden Council (Planning Reference - 2012/0099/P). The applicant has additionally demonstrated how the energy performance of this rooftop extension will significantly exceed that of the originally consented scheme.

APPENDIX I – RENEWABLE TECHNOLOGY ANALYSIS

Renewable Technology	Rating (out of 5)	Comment
Photovoltaics	*	PV arrays are a suitable solution for the development, however roofspace will be allocated to re-install PV that meet the renewable energy requirements of the existing 33 dwellings at 163 Iverson Road.
Solar Thermal	**	The proposed DHW system (efficient heat pumps) will already provide hot water – the use of a solar thermal system would be an over-design.
Wind Turbine	*	The restricted nature of the site, coupled with the noise, aesthetic (planning) and building vibrations arising from their installation means this system is unviable.
Ground Source Heat Pump	*	Not feasible due to existing building.
Air Source Heat Pump	****	ASHPs are viable for the development and are capable of providing a significant portion of the building's energy from effectively a renewable source, as for each kW of electricity in excess of 3kW of heating will be extracted. These can be mounted on top of the rooftop extension. This makes ASHPs one of the preferred renewable technology for the development.
Biomass Communal Boiler	**	The significant plant and in particular, storage space required for a biomass boiler is unsuitable for a development of this size.

APPENDIX II – SAP 10 CALCULATION

Table 1. CARBON (CO2) FACTORS		
Fuel type	Fuel Carbon Factor (kgCO2/kWh)	
	SAP 2012	SAP 10
Natural Gas	0.216	0.210
Grid Electricity	0.519	0.233

STEP 1 - BASELINE (TER) CALCULATIONS				REGULATED ENERGY CONSUMPTION PER UNIT (kWh.p.a)								SAP 2012 CO2 PERFORMANCE (Regulated CO2 Emissions)							SAP 10 CO2 PERFORMANCE (Regulated CO2 Emissions)						
Unit	Area (m²)	SAP 10 TER	SAP 2012 TER	Space Heating	Fuel Type	Domestic Hot Water	Fuel Type	Lighting	Auxiliary	Cooling	Renewable Energy	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total
H.1	84.09	15.55	17.44	3270.91	Natural Gas	2475.56	Natural Gas	358.58	75	n/a	0	706.51656	534.72096	186.10302	38.925	n/a	0	1466.2655	686.8911	519.8676	83.54914	17.475	n/a	0	1307.7828
H.2	57.7	15.46	17.65	1621.43	Natural Gas	2226.02	Natural Gas	285.49	75	n/a	0	350.22888	480.82032	148.16931	38.925	n/a	0	1018.1435	340.5003	467.4642	66.51917	17.475	n/a	1	891.95867
H.3	53.5	16.28	18.47	1607.55	Natural Gas	2170.66	Natural Gas	256.93	75	n/a	0	347.2308	468.86256	133.34667	38.925	n/a	0	988.36503	337.5855	455.8386	59.86469	17.475	n/a	2	870.76379
H.4	99.4	16.45	18.31	4696.49	Natural Gas	2544.6	Natural Gas	417.49	75	n/a	0	1014.4418	549.6336	216.67731	38.925	n/a	0	1819.6778	986.2629	534.366	97.27517	17.475	n/a	3	1635.3791

STEP 2 - BE-LEAN DER CALCULATIONS				REGULATED ENERGY CONSUMPTION PER UNIT (kWh.p.a)								SAP 2012 CO2 PERFORMANCE (Regulated CO2 Emissions)							SAP 10 CO2 PERFORMANCE (Regulated CO2 Emissions)						
Unit	Area (m²)	SAP 10 DER	SAP 2012 DER	Space Heating	Fuel Type	Domestic Hot Water	Fuel Type	Lighting	Auxiliary	Cooling	Renewable Energy	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total
H.1	84.09	14.02	16.44	2503.85	Natural Gas	2436.84	Natural Gas	358.62	248	n/a	0	540.8316	526.35744	186.12378	128.712	n/a	0	1382.0248	525.8085	511.7364	83.55846	57.784	n/a	0	1178.8874
H.2	57.7	13.75	16.38	1071.82	Natural Gas	2192.87	Natural Gas	274.02	188.39	n/a	0	231.51312	473.65992	142.21638	97.77441	n/a	0	945.16383	225.0822	460.5027	63.84666	43.89487	n/a	1	793.32643
H.3	53.5	14.82	17.46	1168.63	Natural Gas	2134.19	Natural Gas	248.76	176.86	n/a	0	252.42408	460.98504	129.10644	91.79034	n/a	0	934.3059	245.4123	448.1799	57.96108	41.20838	n/a	2	792.76166
H.4	99.4	15.15	17.67	3845.01	Natural Gas	2499.84	Natural Gas	405.08	339.23	n/a	0	830.52216	539.96544	210.23652	176.06037	n/a	0	1756.7845	807.4521	524.9664	94.38364	79.04059	n/a	3	1505.8427

STEP 3 - BE-GREEN DER CALCULATIONS				REGULATED ENERGY CONSUMPTION PER UNIT (kWh.p.a)								SAP 2012 CO2 PERFORMANCE (Regulated CO2 Emissions)							SAP 10 CO2 PERFORMANCE (Regulated CO2 Emissions)						
Unit	Area (m²)	SAP 10 DER	SAP 2012 DER	Space Heating	Fuel Type	Domestic Hot Water	Fuel Type	Lighting	Auxiliary	Cooling	Renewable Energy	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total	Space Heating	Domestic Hot Water	Lighting	Auxiliary	Cooling	Renewable Energy	Total
H.1	84.09	8.32	18.53	908.35	Electricity	1516.9	Electricity	358.62	218	n/a	0	471.43365	787.2711	186.12378	113.142	n/a	0	1557.9705	211.64555	353.4377	83.55846	50.794	n/a	0	699.43571
H.2	57.7	9.52	21.21	577.25	Electricity	1348.02	Electricity	274.02	158.39	n/a	0	299.59275	699.62238	142.21638	82.20441	n/a	0	1223.6359	134.49925	314.08866	63.84666	36.90487	n/a	0	549.33944
H.3	53.5	10.08	22.46	605.24	Electricity	1314.61	Electricity	248.76	146.86	n/a	0	314.11956	682.28259	129.10644	76.22034	n/a	0	1201.7289	141.02092	306.30413	57.96108	34.21838	n/a	0	539.50451
H.4	99.4	8.61	19.17	1386.67	Electricity	1570.84	Electricity	405.08	309.23	n/a	0	719.68173	815.26596	210.23652	160.49037	n/a	0	1905.6746	323.09411	366.00572	94.38364	72.05059	n/a	0	855.53406

APPENDIX III – PART L OUTPUTS FOR EACH STAGE

Block Compliance WorkSheet: Be-Lean Results

User Details

Assessor Name: **Stroma Number:**

Software Name: Stroma FSAP **Software Version:** Version: 1.0.5.41

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
TF 5-1 2B W	16.44	17.44	47.4	50.3	84.09
TF 5-2 1B NS	16.38	17.65	39.1	39.1	57.7
TF 5-3 1B NS	17.46	18.47	42.4	41.7	53.5
TF 5-4 3B E	17.67	18.31	56.9	58.3	99.4

Calculation Summary

Total Floor Area	294.69
Average TER	17.96
Average DER	17.03
Average DFEE	48.07
Average TFEE	49.24
Compliance	Pass
% Improvement DER|TER	5.18
% Improvement DFEE|TFEE	2.38

Block Compliance WorkSheet: Be-Green Results

User Details

Assessor Name: **Stroma Number:**

Software Name: Stroma FSAP **Software Version:** Version: 1.0.5.41

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
TF 5-1 2B W	18.53	25.56	47.4	50.3	84.09
TF 5-2 1B NS	21.21	25.57	39.1	39.1	57.7
TF 5-3 1B NS	22.46	26.86	42.4	41.7	53.5
TF 5-4 3B E	19.17	26.96	56.9	58.3	99.4

Calculation Summary

Total Floor Area	294.69
Average TER	26.27
Average DER	19.98
Average DFEE	48.07
Average TFEE	49.24
Compliance	Pass
% Improvement DER|TER	23.94
% Improvement DFEE|TFEE	2.38