Chichele Road, Oxted

CALA Homes Ltd.

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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Rev0	Edward Brown	06.10.2023	Initial issue
Rev1	Edward Brown	25.10.2023	Updated site plan

This statement has been commissioned by CALA Homes Ltd. to detail the proposed approach to energy and CO_2 reduction to be employed in development of the site at Chichele Road, Oxted. It should be noted that the details presented, including the proposed specifications, are subject to change as the detailed design of the dwellings progresses, whilst ensuring that the overall commitments will be achieved.

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1. Introduction

Preface

1.1. This Energy and Sustainability Statement has been prepared on behalf of CALA Homes Ltd. in support of the application for development of the site at Chichele Road, Oxted

Development Description

1.2. Chichele Road, Oxted is located on the Northern edge of Oxted, just south of the M25.

1.3. An application was submitted for the erection of up to 125 residential dwellings, not exceeding three storeys, with associated car parking, including EV charging points, and soft landscaping and public open space. The site would be accessed from Chichele Road.

1.4. The current development plan is for 116 units, with one-two bed apartments and two to five bed mid, semi and detached houses. The proposed site layout is shown in Figure 1.

Purpose and Scope of the Statement

1.5. The statement has been prepared to address relevant national and local policy relating to sustainable design and construction of dwellings, including relevant policies within the policy CSP 14 of the Tandridge District Core Strategy, adopted 2008..

1.6. This statement will also demonstrate that, following a fabric first approach to demand reduction, the proposed development will deliver a level of energy performance beyond the current Building Regulation standards whilst addressing a range of additional sustainable design considerations.

Figure 1. Proposed Site Layout

2. Planning Policy

Local Planning Policy

2.1. This statement will address policy CSP 14 of the Tandridge District Core Strategy, adopted 2008.

Policy CSP14 - Sustainable Construction

The Council will encourage all residential development (either new build or conversion) to meet Code level 3 as set out in the published Code for Sustainable Homes. Commercial* development with a floor area of 500m2 or greater will be encouraged to meet the BREEAM "Very Good" standard.

All new residential development (either new build or conversion) and commercial* development with a floor area of 500m2 or greater will be required to reach a minimum percentage saving in CO2 emissions through the incorporation of on-site renewable energy (as set out in the table below). The requirement varies according to the type of development and in the case of dwellings, the size of development.

Development Type	Percentage savings in Carbon Dioxide emissions through the provision of renewable energy technologies
Dwellings (1-9 units)	10%
Dwellings (10 + units)	20%**
Commercial* ($500m^2$+)	10%

Development over 5000m2 will be expected to incorporate combined heat and power or similar technology.

Small scale renewable energy projects will be permitted except where there are overriding environmental, heritage, landscape, amenity or other constraints.

* Commercial includes all forms of non-residential development, for example social and leisure related development.

**Only where a developer can satisfy the Council why the higher target of 20% cannot be achieved will the lower target of 10% be applied.

National Planning Policy Framework

2.2. In September 2023, the Government published the updated National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.

2.3. The planning process has been identified as a system to support the transition to a low carbon future in response to climate change by assisting in the reduction of greenhouse gas emissions and supporting renewable and low carbon energy.

2.4. Paragraph 154 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

154. New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

Current National Policy Standards

2.5. The NPPF requires that "local planning authorities should ...when setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards."

2.6. A policy announcement presented by HM Treasury as part of the July 2015 productivity plan "Fixing the Foundations" advised that the Government considered that energy efficiency standards introduced through recent changes to Building Regulations 'need time to become established' and will therefore persist until further notice.

2.7. This statement therefore sets out details relating to building energy performance standards and proposes an approach through which these will be achieved in a manner which improves the long-term sustainability of the dwellings.

Proposed Strategy

2.8. This statement is intended to establish the proposed approach to sustainable construction and energy reduction to be delivered at the development.

2.9. This strategy will demonstrate that the proposed dwellings will meet and exceed the requirements of Part L of the Building Regulations 2021 and the relevant policies outlined within the Tandridge District Core Strategy. This calculation will be carried out according to the Government's Standard Assessment Procedure (SAP) Methodology, using a representative sample of the house types proposed for the site and applying the intended specification.

2.10. In line with policy CSP 14 of the Tandridge District Core Strategy, a 20% reduction in CO_2 emissions aver Part L 2021 will be achieved through low carbon or renewable technologies

2.11. In addition, consideration will be given to building design, passive solar design and energy efficiency site-layouts where possible.

2.12. The following sections of this statement set out the sustainable design considerations which will be applied to the dwellings in order to deliver low energy, comfortable and affordable housing.

3. Climate Change Resilience

3.1. Dwellings constructed today may be operating in a substantially different climate over the coming decades, and therefore should be designed to ensure that they are resilient to future climate change impacts such as increases in temperature, rainfall, wind and sea level. Climate resilience is important to homeowners against a backdrop of increasingly extraordinary weather events.

3.2. Passive design measures will be considered and incorporated to enhance resilience to climate change impacts throughout the lifetime of the development.

Rising Temperatures and Overheating

3.3. With the risk of potentially higher summer temperatures and longer hot spells in the future, it is important to consider the thermal comfort of the dwelling. Passive design measures are proposed in order to mitigate future overheating.

Approved Document O

3.4. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.

3.5. This document requires a more in-depth assessment of the risk of overheating, taking into account site location, dwelling orientation, glazing proportions and openable window areas for natural ventilation.

3.6. This assessment will be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

Cooling hierarchy

3.1. In common with sustainable heating strategies, it is possible to apply a sustainable 'cooling hierarchy' which sets out the priorities to ensure overheating risk is minimised:

- Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.
- Minimise internal heat generation through energy efficient design:
- Manage the heat within the building through exposed internal thermal mass and high ceilings
- Provide passive ventilation
- Mechanical ventilation systems
- Provide active cooling systems

Addressing overheating risk

3.2. The development is proposed to use traditional masonry construction for the apartments and timber frame construction for the houses. This has a relatively low thermal mass, compared to masonry construction.

3.3. A construction with low thermal mass can have a higher overheating risk as the material is less effective at absorbing excess heat during the day and therefore heat can build up within the building faster than with high thermal mass materials. Conversely at night lower thermal mass materials can be of benefit as they cool faster with effective ventilation than higher thermal mass materials. Therefore, careful consideration will be given to address the overheating risk on site.

3.4. Within the development layout, orientation and massing has been considered to maximise useful passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.

3.5. Most houses will be able to benefit from cross-ventilation to effectively purge warm air from the properties during periods of hot weather. Window opening areas will be considered and guided by the Part O assessment, with increased opening areas being designed in as required. Efficient mechanical extract ventilation will also be considered in the background to assist in effectively extracting warm air from different rooms where required if window openings cannot be relied upon.

3.6. A combination of simplified and dynamic thermal modelling will be undertaken to model the overheating risk in line with CIBSE TM59. A sample representative house types and apartment units will be analysed to capture representative conditions across the site in accordance with the appropriate weather file. This will enable the development of appropriate strategies to address and mitigate overheating risk.

3.7. SUDs systems and planting have been incorporated within the design of the development to provide shading, evaporative cooling, and reduce surface water run-off.

4. Energy & CO_2 Reduction Strategy – Fabric First

Overview

4.1. As one of the key areas of ongoing impact of any development, the energy demand of the dwellings to be constructed is a key consideration in the overall sustainability strategy.

4.2. As set out within the policy review section of this statement, it is considered that Building Regulations form the minimum requirement for new dwellings in terms of energy performance.

4.3. As shown in Table 1, the CO_2 standards contained within Part L were increased in 2010 and 2013, reducing the TER by approximately 25% and a further 6% (9% for non-residential) respectively.

4.4. Part L 2021 has been mandatory from June 2023, which constitutes a much larger step change of a 31% reduction in emissions.

Table 1. CO_2 Emissions improvements from successive Part L editions

Building Regulations	CO_2 emissions improvements over preceding regulations
L1A 2006	-
L1A 2010	25%
L1A 2013	6%
L1 2021	31%

Energy Reduction Strategy – Fabric First

4.5. The proposed construction specification and sustainable design principles to be applied to the development will ensure that each dwelling meets the CO_2 reductions mandated by Part L of the Building Regulations.

4.6. It is proposed that the energy demand reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy.

Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

4.7. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:

- Building orientation – maximise passive solar gain and daylight
- Building placement – control overshading and wind sheltering
- Landscaping – control daylight, glare and mitigate heat island effects
- Building design – minimise energy demand through fabric specification

Be Clean – supply energy efficiently

4.8. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

Be Green – use low carbon / renewable energy

4.9. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources – e.g., biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small-scale heat networks
- Development-scale heat networks

4.10. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as 'fabric first' and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.

4.11. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub[1] and the Energy Savings Trust[2] having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

4.12. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 2.

Table 2. Benefits of the Fabric First approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy/CO_2/fuel bill savings applied to all dwellings	✓	×
Savings built-in for life of dwelling	✓	×
Highly cost-effective	✓	×
Increases thermal comfort	✓	×
Potential to promote energy conservation	✓	✓
Minimal ongoing maintenance / replacement costs	✓	×
Significant disruption to retrofit post occupation	✓	×

Building Regulations Standards – Fabric Energy Efficiency

4.13. In addition to the CO_2 reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE) and expressed in kWh/m^2/year.

4.14. This standard enables the decoupling of energy use from CO_2 emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO_2 emissions through low carbon or renewable energy technologies.

4.15. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L. These reference values are described as 'statutory guidance' as opposed to mandatory requirements, allowing full flexibility in design approach and balances between different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. The proposed approach and indicative construction specifications are set out in the following sections of this Strategy.

[1] Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013

[2] Energy Savings Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

Proposed Fabric Specification

4.16. In order to ensure that the energy demand of the development is reduced, the dwellings should be designed to minimise heat loss through the fabric wherever possible. Table 3 details the proposed fabric specification of the major building elements, with the first column in this table setting out the Part L limiting fabric parameters in order to demonstrate the improvements to be delivered.

Table 3. Indicative construction specification – main elements

	Part L Limiting Fabric Parameters	Design Specification
External wall – u-value	0.26 W/m²K	0.21 W/m²K
Party wall – u-value	0.20 W/m²K	0.00 W/m²K
Roof – u-value	0.16 W/m²K	0.10 W/m²K
Ground floor – u-value	0.18 W/m²K	≤ 0.16 W/m²K
Windows – u-value	1.6 W/m²K	1.3 W/m²K
Doors – u-value	1.6 W/m²K	1.2 W/m²K
Air Permeability	8.0 m³/h.m² at 50 Pa	≤ 4.00 m³/h.m² at 50 Pa
Thermal Bridging	Y = 0.150 (default)	Y = ≤ 0.040 (average)

Thermal bridging

4.17. The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging will not achieve the desired energy and CO_2 reduction targets.

4.18. The specification should seek to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings, and as such thermal modelling will be undertaken to assess the performance of all main building junctions.

Air leakage

4.19. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The proposal adopts an airtightness standard of 4.00m³/h.m² at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

Provisions for Energy-Efficient Operation of the Dwelling

4.20. The occupant of the dwelling should be provided with all necessary literature and guidance relating to the energy efficient operation of fixed building services. Currently it is assumed that all dwellings will be provided with highly efficient Air Source Heat Pumps (ASHPs), fully insulated primary pipework, and multi-zone zone controls to avoid unnecessary heating of spaces when not required.

5. Baseline CO_2 Emissions

5.1. The development is to be designed and constructed to meet the requirements of Part L of the Building Regulations 2021, therefore compliance with this standard forms the first stage in the sustainable construction approach.

5.2. Part L compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms CO_2 per metre squared of total useful floor area, per annum – as the benchmark. The calculated performance of the dwelling as designed - the Dwelling Emission Rate (DER) – is required to be lower than this benchmark level.

5.3. Calculations have been undertaken to a range of sample house types and apartments to build a representative site model. The Part L compliant baseline carbon emissions are reported in Table 4.

Table 4. Site wide baseline CO_2 emissions

	CO_2 emissions ($kgCO_2$/year)
Site wide emissions baseline	127,258

6. Low Carbon and Renewable Energy Systems

6.1. A range of technologies have been assessed for potential incorporation into the scheme in accordance with Regulation 25A of the Building Regulations with the intention of Part L 2021 compliance and policy CSP 14 of the Tandridge District Core Strategy

Combined Heat and Power (CHP) and District Energy Networks

6.2. A CHP unit is capable of generating heat and electricity from a single fuel source. The electricity generated by the CHP unit is used to displace electricity that would otherwise be supplied from the national grid, with the heat generated as a by-product utilised for space and water heating.

6.3. The economic and technical viability of a CHP system is largely reliant on a consistent demand for heat throughout the day to ensure that it operates for over 5000 hours per year. Heat demand from mainly residential schemes is not conducive to efficient system operation, with a defined heating season and intermittent daily profile, with peaks in the morning and the evening. For this reason, the use of a CHP system is considered unfeasible for this development.

6.4. There are currently no heat networks which extend near the proposed development. High network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments mean that a new heat network to serve the area is not considered viable or an environmentally preferred option. Due to these reasons, the provision for future connection to a district heating system is also not proposed.

Wind Power

6.5. Locating wind turbines adjacent to areas with buildings presents a number of potential obstacles to deployment. These include the area of land onsite required for effective operation, installation and maintenance access, environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by adjacent obstacles, including the significant amount of woodland on and around the development.

6.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 4.7m/s [3]. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective[4]. For these reasons wind power is not considered feasible.

Building Scale Systems

6.7. The remaining renewable or low carbon energy systems considered potentially feasible are at a building scale. These are as follows;

- Individual biomass heating
- Solar thermal
- Solar photo-voltaic (PV)
- Air Source Heat Pumps (ASHPs)
- Ground Source Heat Pump (GSHPs)

6.8. The advantages and disadvantages of these technologies are evaluated in Tables 5-9.

[3] NOABL Wind Map (http://www.rensmart.com/Weather/BERR)

[4] CIBSE TM38:2006. Renewable energy sources for buildings.

Table 5. Individual Biomass Heating feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Potential to significantly reduce CO_2 emissions as the majority of space and water heating will be supplied by a renewable fuel • Decreased dependence on fossil fuel supply	• A local fuel supply is required to avoid increased transport emissions • Fuel delivery, management and security of supply are critical • Space is required to store fuel, a thermal store and plant • A maintenance regime would be required even though modern systems are relatively low maintenance • Building users or a management company must be able to ensure fuel is supplied to the boiler as required. Local environmental impacts potentially include increased NO_x and particulate emissions
Estimated costs and benefits	
• Cost £2,000 upwards for a wood-pellet boiler, not including cost of fuel • Not eligible for RHI payments as new-build properties	
Conclusions	
Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management.	

Table 6. Solar Thermal systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Mature and reliable technology offsetting the fuel required for heating water (typically gas) • Solar thermal systems require relatively low maintenance • Typically, ~50% of hot water demand in dwellings can be met annually	• Installation is restricted to favourable orientations on an individual building basis • The benefit of installation is limited to the water heating demand of the building • Safe access must be considered for maintenance and service checks • Buildings need to be able to accommodate a large solar hot water cylinder • Distribution losses can be high if long runs of hot water pipes are required • Visual impact may be a concern in special landscape designations (e.g. AONB)
Estimated costs and benefits	
• Cost £2,000 - 5,000 for standard installation • Not eligible for RHI payments as new-build properties • Ongoing offset of heating fuel, minimal maintenance requirements	
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations.	

Table 7. Solar photovoltaic systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• The technology offsets the high carbon content of grid supplied electricity used for lighting, pumps and fans, appliances and equipment • Mature and well proven technology that is relatively easily integrated into building fabric • Adaptable to future system expansion • Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid • PV systems generally require very little maintenance • Occupiers could benefit from Smart Export Guarantee payments	• Poor design and installation can lead to lower than expected yields (e.g. from shaded locations) • Installation is restricted to favourable orientations • Safe access must be considered for maintenance and service checks • Visual impact may be a concern in special landscape designations (e.g. AONB) or conservation areas • Reflected light may be a concern in some locations
Estimated costs and benefits	
• Cost £1,500 upwards (1kWp+) and scalable • Ongoing offset of electricity fuel costs, minimal maintenance requirements	
Conclusions	
PV panels are considered technically feasible for all buildings with suitable roof orientations. The relatively low cost, high carbon saving potential and limited additional impacts mean that PV is considered a feasible option for this development.	

Table 8. Air Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Heat pumps are a relatively mature technology providing heat using the reverse vapor compression refrigeration cycle • Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250% • Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings • Air source heat pumps are powered by electricity. The current carbon factor of electricity as stated in SAP2021 is 0.136 kgCO_2/kWh, lower than other potential fuel sources.	• It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Users must be educated in how heat pump systems should be operated for optimal efficiency. • Air source heat pump plant should be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology • Noise in operation may be an issue particularly when operating at high output
Estimated costs and benefits	
• Cost £5,000 - £7,000 for standard installation • Not eligible for RHI payments as new-build properties	
Conclusions	
Air source heat pumps are technically feasible for the buildings in this scheme.	

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Table 9. Ground Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle • Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320% • Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings • Ground source heat pumps are powered by electricity. The current carbon factor of electricity as stated in SAP2021 is 0.136 $kgCO_2/kWh$, lower than other potential fuel sources.	• Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps • A hot water cylinder would also be required for both space and water heating • It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved • Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system
Estimated costs and benefits	
• Cost circa £10,000+ • Running cost linked to COP of heat pump, circa 3.0 equates to 66% reduction vs electricity or around 5-6p/kWh (higher than mains gas) • Additional costs to upgrade electricity infrastructure currently unknown	
Conclusions	
Ground source heat pumps are considered technically feasible for buildings in this scheme. However, the cost and difficulty associated with vertical boreholes at this site means that they are not considered a preferred low carbon technology at this stage.	

Summary

6.9. Following this feasibility assessment, it is considered that there are a range of technically feasible low carbon or renewable energy systems, however a number of these may be discounted on the grounds of increased running costs for residents or other adverse effects:

- Biomass heating systems would require significant storage space for fuel as well as regular deliveries at different times to all dwellings. Local NO_x and particulate pollution is also an increasing concern, and therefore they are not appropriate for this development.

- Solar PV systems are relatively low cost, have a high carbon saving potential and limited additional impacts mean that PV is considered a feasible option for this development.

- Air source heat pumps are highly efficient, low carbon heating source that, through the decarbonisation of the grid, result in a net zero ready heating and hot water system.

- Ground source heat pump systems may be technically feasible; however, the ground conditions are unknown, and the capital cost is likely to be prohibitive.

6.10. Following this feasibility assessment, it is considered that air source heat pumps are the most appropriate for the houses for this development with hot water heat pumps installed to apartments. PV will also be considered for some plots.

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7. Indicative Dwelling Performance

7.1. Through following the strategy described, the dwellings will significantly reduce energy demand and consequent CO_2 emissions beyond a Part L compliant level of performance through the dwelling fabric and solar PV.

7.2. Indicative SAP calculations have been undertaken on a sample of the proposed dwelling types to provide an overview of the typical as-designed energy performance, in comparison with Building Regulations standards. The results of these calculations are shown in Tables 10 and 11.

Table 10. Indicative dwelling performance after fabric measures and ASHPs/Hot water heat pumps – CO_2 emissions

House type	Part L compliant emissions ($kgCO_2$/year)	As-designed emissions ($kgCO_2$/year)	Improvement %
Willow Det (As), House	1,632	447	72.64
Fennel Det (As), House	1,179	297	74.77
Clover Det (As), House	1,059	292	72.46
Rowan Det (As), House	1,466	356	75.72
Bayberry Semi (As), House	913	244	73.29
Clover End (As), House	980	268	72.64
2Bed Flats FF (As), Flat	835	367	56.00
2Bed Flats GF (As), Flat	985	460	53.33
2Bed Flats SF (As), Flat	912	414	54.60
Bayberry Mid (As), House	828	229	72.30

Fabric Energy Efficiency

7.3. Table 11 demonstrates that the dwellings will exceed the uplifted Fabric Energy Efficiency targets within Part L 2021 through the proposed specification.

Table 11. Fabric Energy Efficiency of sample dwellings

	Target Fabric Energy Efficiency ($kWh/m^2/year$)	Design Fabric Energy Efficiency ($kWh/m^2/year$)	Improvement %
Willow Det (As), House	40.87	39.69	2.89
Fennel Det (As), House	42.27	40.42	4.38
Clover Det (As), House	38.89	36.33	6.58
Rowan Det (As), House	43.56	43.32	0.55
Bayberry Semi (As), House	36.00	33.30	7.50
Clover End (As), House	34.80	32.20	7.47
2Bed Flats FF (As), Flat	31.30	29.40	6.07
2Bed Flats GF (As), Flat	41.30	38.40	7.02
2Bed Flats SF (As), Flat	35.90	33.80	5.85
Bayberry Mid (As), House	31.00	28.40	8.39
Willow Det (As), House	40.87	39.69	2.89

7.4. The indicative site-wide Part L compliant and the as-designed CO_2 emissions are shown in Table 12.

7.5. This calculated performance indicates that the dwellings will significantly exceed the requirements of Part L through the proposed specification.

Table 12. Estimated CO2 emissions – after indicative Fabric Efficiency measures.

	CO_2 emissions ($kgCO_2$/yr)	
Part L compliant	127,258	
After fabric measures	38,477	
	$kgCO_2$/yr	%
Total savings	88,781	69.76

8. Resource Efficiency

8.1. This section sets out details of additional resource efficiency and sustainable design principles to be applied at the development.

Materials

8.2. The impacts of construction materials range from the depletion of natural resources to the greenhouse gas emissions and water use associated with their manufacture and installation.

8.3. Within the development choices will be made in order to reduce the consumption of primary resources and using materials with fewer negative impacts on the environment, including but not limited to the following;

- Use fewer resources and less energy through designing buildings more efficiently.
- Specify and select materials and products that strike a responsible balance between social, economic and environmental factors.
- Incorporate recycled content, use resource-efficient products and give due consideration to end-of-life uses.
- Influence, specify and source increasing amounts of materials which can be reused and consider future deconstruction and recovery.

Embodied Carbon and Timber Construction.

8.4. It is proposed that timber frame construction be used for the houses across the development to reduce the embodied carbon compared with a traditional build development.

8.5. The average embodied carbon of sustainably sourced timber products is -1.03 kgCO2e/kg when taking into account carbon sequestration[5]. Thereby not only resulting in a reduction in carbon emissions associated with the development, but offsetting some of the emissions and storing carbon within the fabric of the building which might otherwise remain in the atmosphere.

8.6. Comparatively the embodied carbon associated with a standard traditional construction involves the use of concrete blockwork. The chemical reaction which takes place in the setting of concrete itself releases large quantities of carbon dioxide.

8.7. Further benefits of timber frame construction include a lighter structure, which can allow for reduced quantities of concrete required for foundations, further reducing the embodied carbon of the development, and a lower thermal mass requiring less energy to heat the structure to a comfortable indoor temperature.

Waste

8.8. Sending waste to landfill has various environmental impacts, such as the release of local pollution, ecological degradation and methane emissions, in addition to exacerbating resource depletion. Waste in housing comes from two main streams; construction waste and domestic waste during occupation.

Household Waste

8.9. In this respect regard has been given to the policy advice contained in the NPPF together with the Council's current strategy in terms of waste and recycling to ensure that the new dwellings are provided with adequate storage facilities for both waste and recyclable materials.

8.10. Tanbridge District Council currently operate a household collection service through which households are able to recycle materials including paper and cardboard, plastic bottles, tins, glasses and metal foils, along with a separate collection for garden waste. Future occupiers of the dwellings will be provided with an information pack detailing the Council's current collection arrangements for waste and recycling and advising of the nearest recycling centres to the Application site.

Construction Waste

8.11. The development will additionally be designed to effectively and appropriately monitor and manage construction site waste. Target benchmarks for resource efficiency will be set in accordance with best practice – e.g., 5m3 of waste per $100m^2$ / tonnes waste per m^2.

8.12. Wherever possible materials will be diverted from landfill through re-use on site, reclamation for re-use, returned to the supplier where a 'take-back' scheme is in place or recovered and recycled using an approved waste management contractor.

[5] London Energy Transformation Initiative (LETI), LETI Embodied Carbon Primer: Supplementary guidance to the Climate Emergency Design Guide, January 2020

9. Water Conservation

9.1. In line with current Building Regulations, water use will be managed effectively throughout the development through the incorporation of appropriate efficiency measures.

9.2. Water efficiency measures including the use of efficient dual flush WCs, low flow showers and taps and appropriately sized baths will be encouraged with the aim to limit the use of water during the operation of the development to limit water use.

9.3. Table 13 shows a total water consumption of 105.9 Litres/Person/Day for the potential specification, well below the maximum of 125 Litres/Person/Day required by Building Regulations.

Table 13. Typical Water Demand Calculation

Installation Type	Unit of measure	Capacity/ flow rate	Litres/Person/Day
WC (dual flush)	Full flush (l)	6	8.76
	Part flush (l)	4	11.84
Taps (excluding kitchen taps)	flow rate (l/min)	5	9.48
Bath	Capacity to overflow (l)	181	19.91
Shower	Flow rate (l/min)	6	26.22
Kitchen sink taps	Flow rate (l/min)	6	13.00
Calculated Use			110.9
Normalisation Factor			0.91
Total Internal Consumption (L)			100.9
External Use			5.0
Building Regulations 17.K			105.9

10. Conclusions

10.1. This Sustainability Statement has been prepared by AES Sustainability Consultants Ltd on behalf of CALA Homes Ltd., to detail the proposed approach to sustainable construction to be employed at Chichele Road, Oxted, located on the Northern edge of Oxted.

10.2. The primary purpose of this statement is to address policy CSP 14 of the Tandridge District Core Strategy, adopted 2008 which requires a CO_2 reduction of over 20% through renewables.

10.3. The statement sets out a fabric first approach to sustainable construction, demonstrating that improvements in insulation specification, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures will ensure that energy demand and consequent CO_2 emissions are minimised. Calculations demonstrate that the design specification will result in a significant reduction in carbon emissions over Building Regulations Part L 2021 standards.

10.4. A range of potentially appropriate low carbon or renewable technologies have been assessed for feasibility, concluding that ASHPs for houses and hot water heat pumps for the apartments constitutes both the preferred and most viable technology for this site. PV will also be considered for some plots.

10.5. Indicative SAP calculations have been undertaken on a sample of the proposed dwelling types to provide an overview of the typical as-designed energy performance. When combined with the improvements from fabric measures and ASHPs, the site will result in an overall reduction of 69.76% CO_2 emissions over the Part L 2021 baseline.

10.6. In line with the latest building regulations, glazing orientation and g values have been considered carefully to strike a balance between useful solar gain in winter and reducing the risk of overheating in summer. Passive measures such as green infrastructure and opportunities for cross ventilation have been maximised where possible in line with the cooling hierarchy. A detailed Part O assessment will be carried out at detailed design stage to ensure that all dwellings will be compliant with regulatory standards.

10.7. Both construction and household waste will be carefully managed within the development including reducing the consumption of primary resources and using materials with fewer negative impacts on the environment, incorporating recycled materials and participating in take back schemes where available.