RM1, Ford Airfield, Ford, West Sussex

Vistry South East

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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01	Ruth Pike	13/12/2024	Update to Strategy
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This statement has been produced by AES Sustainability Consultants on behalf and commissioned by Vistry South East to detail the proposed approach to energy and CO_2 reduction to be employed in the development of RM1, Ford Airfield, Ford, West Sussex. 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. Written by AES Sustainability Consultants on behalf of Vistry South East, this Energy and Sustainability Statement has been prepared in support of a reserved matters planning application for RM1 for 339 no homes at Land at Ford Airfield, Ford West Sussex.

Development Description

1.2. The outline approved (ref. F/4/20/OUT) development site is located on the decommissioned Ford Airfield in Ford, West Sussex. The Site is approximately 0.7km South of Ford Railway Station and 0.4km West of the River Arun, bounded by Ford Lane on its Northern boundary, Ford Lane on its Eastern boundary, Horsemere Green Lane to the South and Yapton Road/Rollaston Part to the West.

1.3. The outline permission boundary extends to an area of approximately 86.83ha and will be delivered across multiple phases of development, each subject to separate reserved matters applications.

1.4. The outline permission allows for the delivery of up to 1,500 dwellings, a two form entry primary school, a community hub sports pitches and changing facilities as well as associated public open space, This report is however only concerned with the RM1 (North) Parcel.

1.5. *Approval of reserved matters (layout, scale, appearance and landscaping) following outline consent F/4/20/OUT for phase RM1 (North), for the erection of 341 no. residential dwellings plus associated roads, infrastructure, parking, landscaping, and associated works.*

Purpose and Scope of the Statement

1.6. The statement has been written to prove compliance with local planning policy relating to sustainable construction and to comply with Condition 26 of the outline planning permission (ref. F/4/20/OUT) which requires:

1.7. *"At least 10% of the energy supply of the development shall be secured from decentralised and renewable or low carbon energy sources. Details of how the above energy reductions will be achieved shall be submitted and secured as part of any reserved matters applications for each phase as defined by the Phasing Strategy under Condition 5."*

1.8. This statement will address relevant national and local policies relating to sustainable development, including Arun District Council Adopted Local Plan, Policy ECC SP2.

1.9. This statement will also demonstrate that the development will incorporate sustainable design considerations and ensure that a significant reduction in CO_2 emissions has been achieved over ADL 2021, meeting the requirements of the expected Future Homes Standard which later phases of this development will be required to adhere to.

Figure 1. Proposed Site Layout – Ford Airfield, RM1 Parcel.

2. Planning Policy

National Planning Policy Framework

2.1. In December 2024, 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.

2.2. 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.

2.3. Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

> 164. 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

2.4. 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.

2.5. 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.

2.6. 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.

Local Planning Policy

2.7. Local policy relating to the sustainable design and construction of buildings is contained within the Arun District Council Local Plan, adopted in July 2018. The following extracts from these documents are relevant to the energy strategy:

> The Arun District Council Local Plan (2018)
>
> Policy ECC SP2: Energy and Climate Change Mitigation
>
> *All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:*
>
> *a. Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;*
>
> *b. Use design and layout to promote energy efficiency; and*
>
> *c. Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.*
>
> *All major developments must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider 'allowable solutions' where it is clearly demonstrated that the provision of on site renewable or low carbon energy generation is unviable or not feasible.*
>
> *Where planning permission is required to retrofit energy efficiency measures into existing development, schemes will be permitted, subject to the Design and Built Heritage policies. In assessing the achievement of these standards the Council will consider:*
>
> *Site constraints;*
>
> *Technical viability;*
>
> *Financial viability; and*
>
> *Delivery of additional benefits.*

The Future Homes Standard and future Zero carbon policy

2.8. It should be noted that Part L 2021, introduced in June 2022, represents a 31% reduction in CO_2 emissions compared to Part L1 2013. Another step-change is expected in the Future Homes Standard which will represent a further 75-80% CO_2 reduction from 2025.

Proposed Strategy

2.9. It is proposed that the development is designed to incorporate all applicable guidance contained within ECC SP1 and ECC SP2 relating to carbon dioxide emissions reductions and the construction of highly efficient and sustainable buildings which seek to minimise energy demand and CO_2 emissions as well as considering sustainable construction methods.

2.10. It is proposed that the dwellings will be constructed following a Fabric First approach to meet, and exceed the current Building Regulations, with insulation standards, thermal bridging and air leakage all improved beyond the minimum compliance levels.

2.11. It is expected that some phases of the scheme will be constructed after 2025 so will likely need to meet the proposed updates to the Building Regulations in line with the Future Homes Standard. The notional fabric specification is aligned with ADL 2021 standards, and although the exact standard has not been confirmed, it is currently expected that ADL 2021 standards will align with the updates to Approved Document L expected in 2025.

2.12. In addition, consideration will be given to building design, passive solar design and energy efficiency site-layouts where possible, together with the installation of low carbon energy systems to further reduce carbon emissions arising from the development to ensure that carbon dioxide emissions are minimised through energy efficiency measures, renewable and low carbon energy, and where necessary Allowable Solutions; in accordance with Policy ECC SP2.

2.13. The proposals include the incorporation of highly efficient ground source heat pumps to provide space heating and hot water demand, moving away from on-site combustion of fossil fuels in alignment with the Future Homes Standard and to meet the expected 80% uplift in emissions over ADL 2013.

2.14. 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. Energy Consumption and CO_2 Emissions

3.1. 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.

3.2. 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.

3.3. 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.

3.4. Part L 2021 became 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

3.5. 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.

3.6. 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

3.7. 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

3.8. 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

3.9. 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

3.10. 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.

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

3.12. 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

3.13. 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.

3.14. 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.

3.15. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1. 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.

Proposed Fabric Specification

3.16. 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	0.24 W/m²K
Party wall – u-value	0.20 W/m²K	0.00 W/m²K
Roof – u-value	0.16 W/m²K	0.09-0.14 W/m²K
Ground floor – u-value	0.18 W/m²K	≤ 0.12 W/m²K
Windows – u-value	1.60 W/m²K	1.30 W/m²K
Rooflights - u-value	1.80 W/m²K	1.60 W/m²K
Doors – u-value	1.60 W/m²K	1.20 W/m²K
French Doors – u-value	1.60 W/m²K	1.40 W/m²K
Air Permeability	8.0 m³/h.m² at 50 Pa	4.0 m³/h.m² at 50 Pa

Thermal bridging

3.17. 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.

3.18. 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.

3.19. The Applicant has committed to constructing to enhanced construction details for each of the psi value junctions, which significantly exceed those standards outlined within Appendix R leading to improved energy efficiency and reduced energy demand.

Air leakage

3.20. 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 4.00 $m^3/h.m^2$ 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

3.21. 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 ground source heat pumps, fully insulated primary pipework, and multi-zone heating controls to avoid unnecessary heating of spaces when not required.

4. Baseline CO_2 Emissions and Energy Demand

4.1. 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.

4.2. 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.

4.3. Calculations have been undertaken for 21 dwelling types, a representative sample of house types proposed to assess the carbon emissions of the development. Based on these calculations, the representative site-wide Part L compliant CO_2 emissions are shown in Tables 4.

4.4. A further manual adjustment has then been undertaken to align the TER with 2013 regulatory standards to show alignment with the expected uplift in carbon emissions over of 75-80%, detailed in table 5. As we don't know exactly what the regulatory standards will look like just yet, this is a good barometer for alignment with the expected uplift required in ADL 2025.

Table 4. Part L 2021 compliant baseline CO_2 emissions for Phase RM1

	Part L Compliant CO_2 emissions ($kgCO_2$/year)
Site-wide emissions baseline	360,031

Table 5. Part L compliant baseline CO_2 emissions for Phase RM1 (manually adjusted to illustrate ADL 2013 standards)

	Part L Compliant CO_2 emissions ($kgCO_2$/year)
Site-wide emissions baseline	521,784

4.5. Based on these calculations, the representative site-wide Part L compliant energy baseline figures are shown in Table 6. No manual adjustment has been undertaken.

Table 6. Part L 2021 compliant baseline energy demand for the site

	Part L Compliant energy (kWh/year)
Site-wide Baseline Energy Demand	675,627

5. Low Carbon and Renewable Energy Systems

5.1. A range of technologies have been assessed for potential incorporation into the scheme in accordance with Regulation 25A of the Building Regulations and with the intent of meeting Part L 2021 and the relevant policies within the adopted Arun District Council Local Plan.

Combined Heat and Power (CHP) and District Energy Networks

5.2. 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 effectively a by-product utilised for space and water heating.

5.3. 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.

5.4. 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

5.5. 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.

5.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 4.9m/s (taken from NOABL Wind Map (http://www.rensmart.com/Weather/BERR). Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective. For these reasons wind power is not considered feasible.

Building Scale Systems

5.7. 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 Photovoltaic (PV)
- Air Source Heat Pumps (ASHPs)
- Ground Source Heat Pump (GSHPs)

5.8. The advantages and disadvantages of these technologies are evaluated in Tables 7-11.

Table 7. 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	
Conclusions	
Biomass heating is not considered technically feasible in this development scheme due to insufficient space and difficulty in securing adequate fuel supply. It is also not aligned with the Future Homes Standard drive away from on-site combustion.	

Table 8. 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 • Ongoing offset of heating fuel, minimal maintenance requirements	
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations.	

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Table 9. 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 • Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (mansafe systems etc) for roof access	• 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 10. Air 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 250% • Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings • Will benefit from ongoing decarbonisation of the electricity grid	• Air source heat pumps are powered by electricity, leading to potentially higher fuel bills than gas heating systems • 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 circa £2,000 • Low space requirements and no external unit • Significant running cost reduction compared with direct immersion • Low carbon water heating	
Conclusions	
Air source heat pumps are considered technically feasible for the buildings in this scheme.	

Table 11. 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 • Will benefit from ongoing decarbonisation of the electricity grid	• 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 • Ground source heat pumps are powered by electricity, leading to potentially higher fuel bills than gas heating systems • 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+ • Shared ground loop approach eligible for non-domestic RHI. Estimated simple payback at circa 18 years (systems only) • 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 and they provide significant reductions in carbon emissions.	

Summary

5.9. Following this feasibility assessment, it is considered that the installation of highly efficient ground source heat pumps to each dwelling to serve heating and hot water demand are likely to be most suited to the development, delivering highly efficient, low-cost energy to the occupants.

6. Indicative Dwelling Performance

6.1. 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 highly efficient ground source heat pumps to serve heating and hot water demand.

6.2. 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 indicative results for Phase RM1 of these calculations are shown in Tables 12, against the ADL regulatory standards, and Table 13, against the manually adjusted target to align with ADL 2013 standards and demonstrate an 80% uplift over the ADL 2013 standards as expected in the future homes standard for 2025.

6.3. Table 14 outlines the projected % reduction from renewable and low carbon energy generation. This includes the production of energy from ground source heat pumps once the energy required for operation in deducted. At 400% efficiency, 4 units of energy are generated per 1 unit input.

Table 12. Indicative site-wide Part L compliant and as-designed emissions

	Part L compliant emissions ($kgCO_2$/year)	As-designed emissions ($kgCO_2$/year)	Improvement %
Site-wide emissions	360,031	106,401	70.45

Table 13. Indicative site-wide Part L compliant and as-designed emissions with manually adjusted ADL target (For FHS alignment)

	Part L compliant emissions ($kgCO_2$/year)	As-designed emissions ($kgCO_2$/year)	Improvement %
Site-wide emissions	521,784	106,401	80%

Table 14. Indicative site-wide Part L compliant and as-designed Energy Demand.

	Part L compliant energy Demand (kWh_2/year)	Energy Delivered from renewables (kWh/year)	% reduction from renewables
Site-wide energy	675,627	564,147	83.50

Fabric Energy Efficiency

6.4. Table 15 demonstrates that the dwellings will exceed the uplifted Fabric Energy Efficiency targets within Part L 2021 through the proposed specification.

Table 15. Site Wide Area Weighted Fabric Energy Efficiency

	Target Fabric Energy Efficiency (kWh/m^2/year)	Design Fabric Energy Efficiency (kWh/m^2/year)	Improvement %
Site Wide	38.22	37.00	1.22

6.5. This calculated performance indicates that the dwellings will significantly exceed the requirements of ADL 2021 regulatory standards, as well as meeting the projected ADL 2025 regulatory standards, and the planning policy requirement for at least 10% of energy demand to be delivered through renewable and low carbon energy generation through the proposed specification.

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7. Resource Efficiency

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

Materials

7.2. 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.

7.3. 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;

- All dwellings except the Guillemot house type will be constructed using a timber frame construction. This move away from masonry construction will reduce the embodied carbon associated with development significantly as well as assisting with achieving lower U-values than can be achieved with masonry.
- 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. The timber frame construction selected delivers this effectively.
- 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.

Waste

7.4. 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

7.5. 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.

7.6. Arun District Council currently operates a household collection service in the area, through which households are able to recycle materials including paper and cardboard, plastic bottles, tins, glasses and metal foils, along with separate collections for garden and food 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

7.7. 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., $5m^3$ of waste per $100m^2$ / tonnes waste per m^2.

7.8. 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.

8. Water Conservation

8.1. In line with Part G of Building Regulations 2021, water use will be managed effectively throughout the development through the incorporation of appropriate efficiency measures.

8.2. Policy W SP1 states that Residential development should be designed to meet the 110 litres per person per day water efficiency standard which is in line with the enhanced standards as outlined within Part G of Building regulations.

8.3. 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 of limiting the use of water during the operation of the development.

8.4. Table 16 shows a typical water demand calculation for a 2-3 bed house type aligned with Vistry specification and shows how the development could achieve a result less than the required 110 litres/occupier/day calculated in accordance with Building Regulations 17.K methodology.

8.5. The calculation results in a total internal water consumption of 108.25/occupier/day for the intended specification, below the maximum of 110 litres/occupier/day required by Policy W SP1.

Table 16. Typical Water Demand Calculation

Installation Type	Unit of measure	Capacity/ flow rate	Litres/occupier/ day
WC (dual flush)	Full flush (l)	4.5	6.57
	Part flush (l)	3	8.88
Taps (excluding kitchen taps)	flow rate (l/min)	5	9.48
Bath	Capacity to overflow (l)	195	21.45
Shower	Flow rate (l/min)	9	39.33
Kitchen sink taps	Flow rate (l/min)	10	13.03
Washing Machine	Litres/kg dry load	8.17	17.16
Dishwasher	Litres/place setting	0.846	3.05
Calculated Use			118.95
Normalisation Factor			0.91
Total Internal Consumption (L)			108.25
External Use			5.0
Building Regulations 17.K			113.25

9. Conclusions

9.1. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants on behalf of Vistry South East to detail the proposed approach to sustainable construction to be employed at the development at Ford Aerodrome, West Sussex.

9.2. A review of National Policy including the NPPF and relevant recent Government statements has established that the Building Regulations are now considered the appropriate method for setting standards relating to CO_2 emissions, giving consideration to building design and site-layout to further reduce energy consumption.

9.3. The standards contained within Approved Document L 2021 have therefore been reviewed, and a 'Fabric First' approach which prioritises improvements to the fabric of the dwellings to avoid unnecessary energy demand and consequent CO_2 reduction is proposed.

9.4. Improvements in insulation specification, efficient building services, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures will enable the relevant standards to be met, whilst building in low energy design and future climate resilience to the design and construction of the dwellings.

9.5. Alongside the above, highly efficient ground source heat pumps will be installed to all dwellings to serve space heating and domestic hot water demand in order to meet the projected ADL 2025 regulatory standards which are approximately 80% improvement in emissions over the ADL 2013 regulator baseline.

9.6. Calculations based on a sample range of house types demonstrates that through following the energy efficiency approach described, including the addition of highly efficient ground source heat pumps, the calculated as-designed emissions are reduced by 70.44% over ADL 2021 and by 80% over the ADL 2013 regulatory standards when the TER is adjusted manually. This demonstrates alignment with the projected requirements for ADL 2025.

9.7. Further calculations based on this sample range demonstrate 83.49% of the predicted energy demand for the development is met through renewable or low carbon energy generation as outlined within Policy ECC SP2: Energy and Climate Change Mitigation.

9.8. This calculation has adjusted for any energy required for operation of the renewable energy source, and only accounts for the additional energy produced due to high efficiency.

9.9. This is therefore in accordance with the requirements of Policy ECC SP2 of the Arun District Council Local Plan (2018) and in accordance with Condition 26 (Decentralised and Renewable or Low Carbon Energy) of the outline consent (ref. F/4/20/OUT).

9.10. As the applicant is proposing a highly efficient ground source heat pump to deliver all space heating and hot water demand, the development scheme contributes positively towards keeping energy costs low for occupants and aligning with the future homes standards and expected regulatory changes to be introduced in 2025.

9.11. For the twenty-one sample SAPs completed, all houses are achieving EPC B ratings with only the flats achieving EPC C ratings.

9.12. It has also been determined that the calculated water consumption could equate to a maximum internal water consumption of 108.25 litres/occupier/day, and therefore offers an improvement on the maximum of 110 litres/occupier/day allowable by W SP1 of the Arun District Council Local Plan (2018).