SUSTAINABILITY STATEMENT

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INTRODUCTION

Sustainability is fundamental to the ethos of Border Oak and underpins all of our decisions, designs and strategies.

We take a holistic view of the three elements of sustainability outlined in the NPPF – social, economic and ecological - ensuring that all three aspects are considered equally and in balance.

The proposed new dwelling has been designed primarily with a 'fabric first' approve - to fundamentally achieve exceptional energy efficiencies (reducing the reliance on fossil fuels), reduce carbon dioxide/carbon emissions, implement water efficiency, utilise only the finest sustainable, natural materials, enhance biodiversity and improve ecology networks and also provide a high quality built environment.

All other aspects have been considered in detail with regard to improving sustainability and delivering exceptional, innovative and low impact properties.

Border Oak are widely recognised as one of the most sustainable construction companies in the UK, pioneering the industry and producing some of the most sustainable and ecological homes available. Some of the main sustainability considerations represented by this application are outlined below.

SUSTAINABLE DESIGN

Border Oak have adopted a detailed and bespoke design approach to sustainable construction, shared by our clients. The proposals are site specific.

The proposed new dwelling will be prefabricated in North Herefordshire, minimising transport miles and the importation of goods. It will be hand crafted utilising traditional carpentry methods, and partenered with high specification engineering and industry leading technological advances and materials.

Oak and Timber
The proposed new dwelling will be built with structural green oak frames internally and oak framed elements externally.
The Timber Research and Development Association (TRADA) in its publication GREEN OAK IN CONSTRUCTION, has made an assessment of the environmental and life cycle impacts of an oak framed building, with the following conclusions:

The net growth energy of a sustainably managed forest is zero, and only a small amount of energy is used in the felling process.
In terms of transport of the material timber is relatively lightweight in comparison with other structural materials, and can be close stacked for more efficient use of space.
Green oak requires only a single cutting operation, and requires no energy input.

Green oak is an effective carbon extraction and store – absorbing C02 during its long growth (producing oxygen) which is then locked into the house frame in perpetuity. Traditionally jointed oak frames are hand erected without the use of metal fasteners, and require a minimum of mechanical handling or processing.
An oak frame can be virtually maintenance free for its service life – its service life can be in excess of half a millennia.
Oak framing can be re-used/recycled and as a natural product has no limitations on disposal.
In conclusion the use of green oak as the primary structural material represents a form of low embodied energy construction with minimal transport miles. It is a natural, toxin free material with a net carbon store, exceptional longevity and supports a broad bio system during its growing period. It can be recycled, reused and is crafted with minimal waste production.

Timber (oak and other softwoods as proposed) is a naturally occurring construction resource, capable of replenishment without abusing finite natural resources – unlike every other construction material such as steel, concrete, brick etc.

Sustainably managed timber has numerous environmental benefits as it grows, providing a food source and habitat for a wide variety of wildlife and interconnected ecosystems, absorbing and converting carbon dioxide, (the principal "greenhouse" gas) to oxygen. Atmospheric carbon is extracted and then stored within timber providing carbon reduction. Well managed forests provide soil stability, maintain nutrient cycles and has a proven ability to reduce the impact of flooding.
Well managed forests and oak farms rely heavily on the creation of a desirable 'end product'– in this instance oak framed houses – to prosper.

The energy required to convert raw oak into a structural building component is minimal - substantially less for that for masonry or metal (especially as Border Oak frames are made by hand) - meaning oak frames are inherently low in embodied energy.

Border Oak are one of very few UK construction companies to be fully FSC® & PEFC certified. Border Oak are audited annually by FSC and PEFC to ensure our timber and timber products are sourced ecologically and ethically and that a continuous chain of provenance can be demonstrated at every stage. Our FSC approved Ethical Procurement Policy (attached) further endorses our commitment to only purchase and use timber that can be proven to be ethical and ecological.

Insulation

The proposed house will have exceptionally high levels of thermal insulation and heat retention – predominantly using Kingspan Tek SIPS panels - supported by an energy efficient heating system. The house will meet and exceed current Building Regulations Part L 2023 standards.
The dwelling will have a 'fabric first' approach and will achieve thermal U-values which are considerably better than current building regulation standards.

The insulation products specified in Border Oak homes include recycled waste product wood boarding and recycled glass spun fibre treated with a unique plant based eco binder.
The high levels of thermal retention of a Border Oak home reduces the demand on natural finite resources, with the property only requiring minimal heating if any.

Wood-burning stoves will provide a secondary carbon neutral heat source.

Airtightness and Thermal Bridging

All Border Oak homes are designed and constructed with minimal thermal bridging and are virtually airtight, with significant investment in high technology products and innovative design detailing to eradicate both air leakage and thermal bridging above required standards. This further enhances the thermal retention of the building and the low energy demands for heating.

STANDARD AIR LEAKAGE RATE ACHIEVED – 3M3/HR/M2 @ 50PA

The proposed design of house would meet all accredited detail requirements and also meets all Kingspan accredited SIPS standards and details.

Repeating Thermal Bridges

Repeating thermal bridges occur where a material with a significantly worse thermal conductivity interrupts the insulation layer in a construction i.e. timber studs etc. U-value calculations for conventional timber frame systems take into account the effects of repeating thermal bridges. Guidance documents for the calculation of U-values, BS / I.S. EN ISO 6946: 2007 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method) and BR443 (Conventions for U–value calculations), indicate that in a typical domestic timber frame building, a minimum of 15% of walls and 6% of the pitched roof is un-insulated.

*The percentage figures quoted include structural timbers and noggins, but do not account for timbers that are outside the wall or pitched roof area used for heat loss calculations, such as timbers around window zones, and at intermediate floors. The insulation layer in the Kingspan **TEK®** Building System is not interrupted by repeating studwork. Therefore, there is less repeating thermal bridging, which can yield better thermal performance. There are, however, some thermal bridges, e.g. where timbers are used to support point loads etc. The overall result is that the Kingspan **TEK®** Building System only has 4% thermal bridging from timber elements for a typical domestic building wall and 1% thermal bridging from timber elements for a typical domestic building roof.*

The Above information was derived from the Kinspan TEK® Building System Specification Manual (10th Edition; July 2015)

Linear Thermal Bridging

Linear thermal bridges occur at junctions, e.g. wall to floor, and openings, e.g. windows, in the building fabric, and are expressed as psi-values (ψ). A ψ-value is the heat loss through a junction, which is additional to the heat flow through the adjoining plane elements, divided by the length of the junction, and is expressed in W/m.K. The effect of all linear thermal bridges in a building is expressed as a building's y-value.

The Kingspan TEK® Building System', which will be adopted for the external walls achieves very good ψ-values due to the continuity of insulation at junctions and openings. Kingspan has a number of standard junction details modeled and psi values calculated accordingly. Many of these calculated ψ-values are better than the values used to set the Building Regulations compliance targets.

The Above information was derived from the Kinspan TEK® Building System Specification Manual (10th Edition; July 2015)

Performance Criteria

All thermal bridges(repeating or linear), which occur as a consequence of the proposed dwelling design, will be required to achieve compliance with one of the following standards:

1) *Use Accredited Construction Details, provided by the Government's planning portal website.*
2) *Achieve the Association of Environmentally Conscious Builders (AECB) Gold or Silver Standard details as a minimum to achieve y=0.08W/m2K*
3) *Improve on the Accredited Construction Details to achieve a maximum y=0.08W/m2*

Kinspan Building System' Linear Thermal Bridging Calculations (PSI Values)

	SAP Conventions Detail Reference	Junction Description	Default Value in SAP 2012	ADL1A 2013 Compliance Target Values	Kingspan TEK® Standard Detail Reference	Psi-value (Ψ) (W/m·K)				
						Basic Kingspan TEK® Building System	Walls Lined with 20 mm of Kingspan Thermawall® TW55*1	Walls Lined with 50 mm of Kingspan Thermawall® TW55*1	Walls Lined with 75 mm of Kingspan Thermawall® TW55*1	Walls Lined with 90 mm of Kingspan Thermawall® TW55*1
Openings in a Kingspan TEK® Building System External Wall*	E1	Steel lintel with perforated base plate and with Kingspan Kooltherm® Cavity Closer	1.00	0.05	W8	0.06	0.05	0.04	0.04	0.04
	E3	Sill with Kingspan Kooltherm® Cavity Closer	0.08	0.05	W7a	0.03	0.03	0.02	0.02	0.03
	E4	Jamb with Kingspan Kooltherm® Cavity Closer	0.10	0.05	W6b	0.06	0.05	0.04	0.04	0.04
Junctions with a Kingspan TEK® Building System External Wall*	E5	Concrete ground floor (U = 0.13 W/m²·K)	0.32	0.16	W2A	0.06	0.06	0.06	0.06	0.06
	E6	Intermediate timber floor within a dwelling	0.14	0.00	F4	0.10	0.10	0.10	0.10	0.10
	E7	Intermediate timber floor between dwellings (in blocks of flats)	0.14	0.07	F3	0.07	0.07	0.07	0.06	0.06
	E10	Loft floor at eaves *1	0.12	0.06	R10	0.06	0.05	0.04	0.03	0.03
	E11	Kingspan TEK® Building System panel pitched roof at eaves	0.08	0.04	R1 *1	0.09	0.09	0.09	0.09	0.09
	E12	Loft floor junction with gable *1	0.48	0.06	R11	0.03	0.03	0.02	0.02	0.02
	E13	Kingspan TEK® Building System panel pitched roof at verge	0.08	0.08	R12	0.04	0.03	0.02	0.02	0.02
	E15	Flat roof with parapet*5	0.56	0.56	R13	0.10	0.08	0.08	0.08	0.08
	E16	Wall corner (normal)	0.18	0.09	W5A Ext	0.05	0.03	0.01	0.00	0.00
	E17	Wall corner (inverted – internal area greater than external area)	0.00*2	-0.09	W5A Int	-0.03	-0.03	-0.03	-0.02	-0.02
	E18	Party wall between dwellings	0.12	0.06	W18A	0.04	0.04	0.03	0.03	0.03
Junctions with a Kingspan TEK® Building System Party Wall	P1	Concrete ground floor (U = 0.13 W/m²·K)	0.16	0.08	W18D	0.08	0.08*3	0.08*3	0.08*3	0.08*3
	P2	Intermediate floor within a dwelling	0.00	0.00	W18F/18G	0.00*4	0.00*4	0.00*4	0.00*4	0.00*4
	P3	Intermediate floor between dwellings (in blocks of flats)	0.00	0.00	W18F/18G	0.00*4	0.00*4	0.00*4	0.00*4	0.00*4
	P4	Loft floor *1	0.24	0.12	W12B	0.02	0.02*3	0.02*3	0.02*3	0.02*3
	P5	Kingspan TEK® Building System panel pitched roof	0.08	0.08	W18H	0.03	0.03*3	0.03*3	0.03*3	0.03*3
Openings in a Kingspan TEK® Building System Pitched Roof	R1	Head	0.08	0.08	R6a	0.09	0.07	0.07*3	0.07*3	0.07*3
	R2	Sill	0.06	0.06	R6a	0.09	0.07	0.07*3	0.07*3	0.07*3
	R3	Jamb	0.08	0.08	R6b	0.08	0.07	0.07*3	0.07*3	0.07*3
Junctions within a Kingspan TEK® Building System Pitched Roof	R4	Ridge (vaulted ceiling)	0.08	0.08	R3b	0.03	0.01	0.07*3	0.07*3	0.07*3
	R5	Ridge (inverted)	0.04	0.04	R7a	-0.01	-0.02	-0.02*3	-0.02*3	-0.02*3

*1 Junction R1 includes an intermediate floor in the junction detail.
*2 SAP conventions document notes that there is no ACD for inverted corners and that a value of 0.00 W/m·K should be used.
*3 Not tested – use best case tested value for this detail.
*4 For solid and filled party walls there if no heat-loss, as no thermal bypass is possible via this route.
*5 Insulation between and over ceiling joists and 15 mm plasterboard ceiling to achieve a U of 0.13 W/m²·K.
*6 Warm deck flat roof with 15 mm plasterboard ceiling.
*7 External wall assumed to be: brick outer leaf, 50 mm cavity, foil faced breather membrane, Kingspan TEK Building System panel, 12.5 mm thick plasterboard on 25 mm deep battens.
*8 Internal insulation is installed directly against the inner surface of the Kingspan TEK Building System panel and lined with 12.5 mm thick plasterboard on 25 mm deep battens. Where the wall construction has an additional layer of insulation, the ceiling also has 25 mm of the same insulation behind the plasterboard ceiling with no airspace between.

Table 1: Psi-values (ψ) for Standard Details

Materials

Natural, recycled, low toxin, reusable/biodegradable and low embodied energy products are proposed on all Border Oak projects. Typical materials include: handmade clay tiles, reclaimed slate, timber, handmade bricks, lime mortars and lime renders, natural organic paints (made locally), oak floors and hand made high specification timber joinery (made locally). Other items are handmade locally by blacksmiths, carpenters and craftsmen with many reclaimed products incorporated where possible.

The use of cement, concrete and steel (high embodied energy, toxic and highly processed materials) will be avoided wherever practical.

Border Oaks use of thermally efficient materials to their timber frame roofs and floors and use of Kingspan SIPS for the external walls

Walls - U = 0.118 W/m2K

Roof - U = 0.13 W/m2K

Floors - U = 0.15 W/m2K

Heating

The new dwelling will be installed with the very latest highly efficient ASHP system to run the hot water and Under Floor Heating.

It is also proposed to install an energy efficient wood burner to provide additional heating.

Lighting

It is proposed to install Low Energy Light fittings as well as LED fittings throughout the new properties in accordance with the very latest requirements of Building regulations and in accordance with Liftetime Homes requirements. It is proposed to use a minimum of 75% fixed LED lighting throughout the properties.

Water

All bathroom and kitchen fittings will have low flow rate fixtures.

Recycling and Waste

The proposed design incorporates a dedicated waste and recycling area to each property. This area will ensure the new dwelling has space to securely and safely store waste materials and also allows for a composting bin on site.

Construction Waste Minimisation

Border Oak have an award winning Waste Minimisation Policy which aims to recycle and divert away from landfill more than 85% of waste. In 2013-2016 almost 90% of Border Oak waste was recycled or diverted away from landfill. This proposal will benefit from our waste management and waste minimisation policy and procedures.

Procurement

The majority of products used will be made and procured in Herefordshire, therefore reducing the transport miles, number of deliveries required to travel to site and minimising disruption during the construction phase.

Passive Solar Orientation

Border Oak properties are designed to maximise any potential passive solar gain – for both light and heat. Many of the rooms on the new dwelling are single depth with multi apsect glazing to capitalise on the available natural light and warmth throughout the day. North facing glass is reduced to avoid cold facing openings/glazed areas. The house has also been designed to consider strategies to

minimize the risk of summertime overheating as set out in appendix P of Building Regs Part L standard assessment procedure.

Border Oak would be installing windows to meet the following requirements 1.4W/m2K & g-value 0.55 - 0.65

Self Build and Custom Build

Self builders/custom builders are amongst the most ecological and sustainably minded – aiming to build homes with sustainability credentionals that are not available on the conventional housing market - and it is anticipated that self builders/occupants will opt for further ecologically sustainable systems such as under floor heating, eco boilers, water efficiency products, rainwater harvesting, air source heat pumps, ground source heat pumps, PV panels and electric car points wherever appropriate or required.

Social Sustainability

This proposal can meet a diverse variety of housing 'needs' – not least the needs of 'those wishing to build their own home' (as directed by the NPPF)

It is designed to be sensitively integrated within the established community and landscape.

The requirement for all LA's to identify, facilitate and support small scale & custom/self build opportunities is clearly identified in the NPPF and reinforced through recent Govt. directives on planning guidance, together with emerging initiatives such as 'The Right to Build'. This proposal would meet these objectives in a sensitive and appropriate manner.

The new house will not only solve a specific housing issue for the applicant, but will also meet the needs of others in the future looking for highly sustainable, low maintenance, attractive, inexpensive to run and adaptable family homes.

It is highly likely that the creation of this home will also positively contribute to the local community, helping protect vulnerable rural facilities such as schools, shops, village halls, public houses and post offices.

The floor plans are inherently flexible to ensure the house can be adapted to all future needs – including the provision of ground floor bedrooms (for the disabled, elderly and infirm) and home office spaces (to encourage home working and reduce transport movements and travelling).