

Audit of Local Sustainable Construction Materials in the Greater Exmoor Area

Final Report



March 2010

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1. Introduction

1.1 The Project Brief

The aim of the project was to help encourage the increased supply and use of local sustainable construction materials in the Greater Exmoor Area.

It sought to:

- analyse gaps in the supply chain for local sustainable construction materials;
- propose approaches to closing those gaps; and
- provide and promote the use of a directory of local sustainable building materials.

The project comprised of the following activities:

- The identification of the range and type of sustainable construction materials from sources within the Greater Exmoor Area that could be used in projects inside and outside the National Park, covering both existing and potential future sources of such materials.
- The development of a comprehensive inventory of local sustainable construction materials.
- Identification of the quality and quantity of local sustainable construction materials available and the degree of processing required.
- An assessment of their current utility and any changes that may be required to specifications to make best use of the resources available.
- An assessment of the supply chains for local construction materials identifying any barriers and opportunities and putting forward strategies for developing supply chains as appropriate.

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- Publication of directory of local sustainable construction materials on partner websites.
- The organisation of a networking event at the end of the project to present the conclusions of the research.

1.2 The Client and Steering Group

The client was the Exmoor National Park Authority (ENPA) and guidance was provided by Tim Stokes, David Wyborn, Mark Clitherow, and Colin Savage from ENPA.

1.3 The Research Team

The research was undertaken by Tim Simmons and Florent Dubois of the Genesis Project at the Somerset College of Arts and Technology, Charles Couzens of Ecos Trust and Gareth Walton of the Devon Sustainable Building Initiative (DSBI).

1.4 The Study Area

This project covers the Greater Exmoor Area, which is defined as the National Park plus parishes within 10 kilometres of the Park boundary. The map below shows the study area outlined in red.

Figure 1. The study area



2. Context

The project took place in a context where there is increasing concern about the impact of energy consumption and CO₂ emissions in construction and the impact upon climate change.

The Exmoor National Park Management Plan¹ contains several policies to respond to this concern:

An increasing proportion of agricultural and building materials will be sourced locally over the period of the plan including, timber, stone, cob etc. (D2.1)

and

A programme will be in place by the end of 2008 to move towards the achievement of a carbon neutral National Park by 2025. (D3.1)

Many of the materials used in constructing and repairing buildings on Exmoor are extracted, processed and transported from locations a considerable distance from the National Park. Such materials have considerable embodied energy and carbon arising from their transportation to building sites within Exmoor. Many modern construction materials are also manufactured using processes that involve high energy inputs further adding to their embodied energy and carbon.

The use of construction materials from a variety of locations outside the National Park may also inhibit the development of locally distinctive designs that are in keeping with the area.

It is assumed that one of the causes of the use of non-local materials is a lack of information about the range, type and source of local sustainable construction materials available in the Greater Exmoor Area. As a consequence developers, clients, designers and builders are less likely to specify and use local materials in their building and repair projects.

¹ www.exmoor-nationalpark.gov.uk/index/nmp_2007-2012_final.htm

There is an opportunity to derive an economic benefit to the area by sustainably exploiting local building materials and from developing a workforce skilled in their use.

Furthermore the sensitive exploitation of sustainable construction materials such as hemp, wool or straw could present opportunities for land managers to diversify and develop new income streams from such resources.

3. Method

The initial research was undertaken between mid December 2008 and mid March 2009 through interviews of key organisations, construction and design businesses active in the Greater Exmoor Area and research into sustainable construction materials and standards.

Over thirty contacts were interviewed to develop an understanding of the sources and supplies of materials in the Greater Exmoor Area.

A usability assessment was then conducted with a questionnaire sent to twelve clients, specifiers and users of construction materials, of which eight provided responses. See Appendix D for a copy of the questionnaire and Appendix E for copies of the completed questionnaires.

A networking event was held in May 2009 to help develop relationships between producers/suppliers of local construction materials and specifiers/users of construction materials, to discuss the findings of the research and identify next steps in developing local sustainable construction material supply chains. See Appendix F for a list of the people who attended the event.

Further research was undertaken in September 2009 updating information on specific materials.

4. Research Results

4.1 Survey of Sustainable Construction Materials and Supply Chain Capacity

Collation of contacts provided by the Exmoor National Park Authority (ENPA), the Genesis Centre, the Devon Sustainable Building Initiative (DSBI) and Ecos Trust created an inventory of producers, suppliers and users of sustainable construction materials in the Greater Exmoor Area. See Appendix A for a list of these contacts.

Over thirty of these were then interviewed by telephone in order to identify the current supply and processing capacity and to identify potential for increased supply.

The materials that were investigated were:

- Earth for cob and rammed earth walls
- Green roofs
- Hemp for insulation and hemcrete
- Lime for limecrete and render
- Paper pulp for cellulose insulation
- Stone for walls
- Straw for insulation and in walls
- Thatching straw for roofs
- Timber for structural, cladding and finishing elements
- Wool for insulation

The list of contacts is broken down by material as shown in Table 1 below.

Table 1. Breakdown of contacts by material type

Material	Number of contacts
Earth & cob	3
Green roofs	1
Hemp	5
Lime	2
Paper pulp	1
Stone	1
Straw	1
Thatching straw	5
Timber	12
Wood Fuel	2
Wool	6

4.1.1 Earth and cob

Interviews have identified that earth and cob construction represents a small proportion of construction on Exmoor. The majority of soil within the National Park is unsuitable for construction purposes. Currently most of the earth used for cob repairs is imported from outside the Greater Exmoor Area. This is earth which has already been tested and mixed.

Pockets of suitable soil do exist within the study area, mainly in the valley bottoms. Approved soil testing, such as that provided by David Clark at the University of Plymouth, should always be carried out before soil is used for construction. This is especially important because much of the soil within the study area would require mixing with additional material before they could be described as 'fit for purpose'.

The potential for supplying earth or cob for use in building has not been researched further as it was considered that the opportunities are mainly outside the Greater Exmoor Area.

Figure 2. A new build cob house under construction in Devon



4.1.2 Green roofs

Blackdown Horticultural Consultants consider that any plant species present on Exmoor would be suitable for green roofs as far as the structure of the roof can support the weight and the rain water capacity. There are therefore opportunities to create green roofs with plants from the locality. An approach to green roofs that uses suitable local substrate and materials could be promoted.



Figure 3. A green roof at Great Bow Wharf in Langport, Somerset.

4.1.3 Hemp

The hemp plant is composed by the seed, the fibre and the shiv (up to seventy-five percent in weight). The seed can be used to produce oil, the fibre to make fabric or paper, and the shiv can be processed to produce insulation or mixed with lime to turn it into hemcrete. In association with a softwood structure hemcrete represents a good way of achieving a single skin structure with a good insulation value and high thermal mass.

4.1.3.1 The supply chain

Lime Technology holds a UK licence to produce the variety of hemp seed which does not contain the active ingredient Tetrahydrocannabinol (THC), although it is also possible to import seeds from other European countries. Lime Technology (formerly Hemcore) agree contracts with farmers to grow hemp with the hemp fibre sent to them for processing into the different end-products. There is only one current producer of hemp in the Greater Exmoor Area, who is based near Barnstaple.

Figure 4. Hemp shiv and hemp binder for producing hemcrete.



4.1.3.2 Potential development

The UK national target is to reach 800,000 acres of hemp being grown and Hemcore plays a key role in developing the market and are actively looking for farmers to grow hemp. The crop can be grown on arable land within the Greater Exmoor Area and will require farmers to develop the skills required to grow a high quality standard crop suitable to processing. Guidance from Lime Technology on growing hemp is enclosed at Appendix B.

Figure 5. A hemcrete wall under construction.



Given that hemp fibre has to be processed by Lime Technology, which is based in Suffolk, there are some relatively small environmental impacts as a result of the transport. However, straw is currently imported from East Anglia to the West Country by lorries from East to West, which then return empty. As a result there is an existing route which could potentially be optimised by filling the lorries with hemp on their way back. This should have the advantage of reducing the price for current transportation as well as meaning no increase in transportation and minimising the environmental impacts of the transportation of hemp.

Hemp has the potential to be a very profitable crop for producers, as illustrated by figures provided by Hemcore comparing margins for different crops.

Table 2 below shows the gross margin that can be expected for different yields of hemp compared with alternative break crops. Like all crops the yield can vary depending on the weather and growing conditions. In good years yields of nine tonnes per hectare have been achieved but an average of seven and a half tonnes per hectare is more likely.

Table 2. Margin per hectare of hemp and alternative crops.

	Rape	Beans	Barley	Hemp ,		
Aid (£/ha)	0	37	0	0	0	0
Yield (tonnes/ ha)	2.0	3.5	6.0	6.0	7.5	9.0
Crop Value (£/tonne)	265	130	130	142.5	142.5	142.5
Return (£/ha)	530	492	780	855	1069	1283
Seed (£/ha)	64	130	60	122	122	122
Fertiliser (£/ha)	240	75	270	235	235	235
Chemicals (£/ha)	78	88	98	13	13	13
Cutting (£/ha)	20	20	15	60	60	60
Raking (£/ha)				10	10	10
Baling (£/ha)	60	60	60	66	82	99
Drying (£/ha)	4	7	12	0	0	0
Total cost (£/ha)	466	380	515	506	522	539
Gross Margin (£/ha)	64	112	265	349	547	744

4.1.4 Lime

Records from the late 1800's reveal some sources of lime in the area.

“Lime exists at Watchet and Doniford; but is chiefly used for agricultural purposes. Exmoor is poorly supplied with lime: there are but patches between Dulverton and South Molton, at Combemartin, Exford and Withycombe. A very excellent silicious sandstone, slightly coloured with iron oxide, has been found at Williton. It is admirably adapted for building purposes, and is manifestly superior to the oolitic stone of the Bath district.”²

Limestone has historically been extracted at Newlands near Exford and Clicket Valley near Luxborough and was used locally in limekilns to production of quick lime for both construction and agriculture.

There is currently no production of lime for construction from sources in the Greater Exmoor Area, although there are some suppliers of lime construction products near the study area. The nearest primary resource of limestone is located near Somerton.

Figure 6. New build homes in Somerset rendered using lime.



² John Lloyd Warden; *An exploration of Exmoor and the hill country of West Somerset, with notes on its archaeology*; 1890.

4.1.5 Paper pulp

Despite repeated attempts to contact the paper mill at Watchet to research the potential for supply and the opportunities for local production of cellulose fibre insulation no information was collected due to a lack of response.

Figure 7. Wall detail showing insulation made from recycled newspaper.



4.1.6 Stone

There are currently few sources of stone within the Greater Exmoor Area and there are potential negative impacts from re-opening quarries in the park for stone other than for repair. However, one quarry owner was interested in promoting the use of local supply of stone for construction and considered that the resources available from his single quarry would supply conservation builders for many decades.

There are outcrops of slate within the National Park which were quarried at Treborough Quarry and Chibbett Ford near Exford. The material was used locally for roofing, hearths and water cisterns.

A review of the quarrying and mining on Exmoor was published in 1996: Investigation and Management of Industrial Sites within Exmoor National Park by Vervan Heal, 1996 in The Archaeology of Mining and metallurgy in South-West Britain.

Figure 8. A new build hemcrete house in Cornwall faced with local stone.



4.1.7 Straw

Straw bales are increasingly used in new construction as an in-fill in timber frame buildings to provide strength and insulation. There are also many examples of straw being used as a structural construction material on its own including in a new straw bale building at Raleghs Cross on the boundary of the National Park.

There is no current 'standard' for using straw bales in construction, only good practice recommendations. The BRE Centre for Innovative Construction Materials at the University of Bath³ recommends that the straw should be baled dry and that the bales should be kept dry and have a density of approximately 112 kg/m³.

Figure 9. Detail of straw bale wall construction for new build straw bale houses at Raleghs Cross, Exmoor.



³ www.bath.ac.uk/bre

There is a significant area of cereal crops in the Greater Exmoor Area which is shown by the most recent DEFRA statistics (2007).

North Devon and West Somerset only: 10,845 ha of cereal crops

Estimated straw production for North Devon and West Somerset based on a yield of straw of 250 small bales per hectare, gives 2.7 million bales potentially sourced from the area.

There is clearly a significant resource in the Greater Exmoor Area available to use in construction.

Our research has shown that, where demand exists, farmers within the Greater Exmoor Area have the willingness and a level of capacity to provide building bales for individual, small to medium size, buildings. For larger scale projects, Abbott and Co based in Wessex can provide construction bales in quantity, but are understandably cautious about the capability of larger vehicles to negotiate small roads.

Figure 10. Interior of a straw bale house in Devon.



4.1.8 Thatching straw

There is limited information on production within Greater Exmoor Area but it has been found that several producers exist though they are wary of releasing information.

The cost of growing thatching straw is around £300 per tonne, while it sells for around £1,300 per tonne, although there is quite a lot of variance depending on supply.

Our research indicated that for most growers of thatching straw the main barrier to increasing their production is the fact it is very labour intensive, requiring three to four people per ten acres. It was considered a significant potential product worthy of further investigation, in particular given its importance in heritage restoration.

There is debate within the thatching profession about the relative merits of thatch using wheat straw compared to water reed or Phragmites. A report from Devon County Council in 2003 and research at Duchy College has sought to clarify the issue:

“The lifespan of thatch, particularly the question of whether water reed lasts longer than combed straw, is a contentious subject and there has been a lot of argument about it. Many people, including thatchers, believe that water reed lasts longer, but no-one has collected figures to prove this in Devon and, as explained above, every roof is different. Some thatchers prefer to work with combed wheat reed, others prefer water reed. Devon, with a high rainfall and a warm climate is not, in general, as kind to thatch as drier regions. Neither combed wheat reed nor water reed lasts as long in the county as it does in drier counties.”⁴

⁴ Devon County Council; *Thatch in Devon*; March 2003.

Concerns over the suitability of thatch as a material for construction focus on the longevity of the material. There are a growing number of examples of new thatched stone houses being built in Dorset and these are expected to last many decades with appropriate maintenance of ridges every decade. The life of a thatched roof is likely to be determined mainly by the specific exposure of the roof and the average rainfall in the area. In Devon the average lifespan is expected to be between twenty to thirty years.

Much of the material is grown in Devon and Somerset by farmers and thatchers who specialise in producing straw for thatching. The specific knowledge required to produce the tall varieties of wheat require special growing methods and special machinery for harvesting, threshing and combing to ensure the best quality roofing material. The long straw varieties are particularly vulnerable to wet summers and causing the crop to collapse and be difficult to harvest and dry. For this reason there is marked variation in thatching straw production year to year, causing scarcity and price increases and this in part drives some thatchers to prefer to use more reliable supplies of Eastern European water reed.

A new initiative called the Devon Sustainable Coppice Partnership⁵ has been set up by woodland conservation expert Dr Tean Mitchell and master thatcher Adam Hyne from Moretonhampstead to produce local hazel thatching spars for thatched roofs rather than imported them, mainly from Eastern Europe, which is costing Devon's thatchers alone an estimated £150,000 a year. They are seeking to reintroduce traditional coppicing in Devon's hazel woodlands and by planting new coppice woodlands, and have received funding from the Dartmoor National Park's Sustainable Development Fund.

⁵ www.sustainablecoppice.org

4.1.9 Timber

Approximately 8,400 hectares or twelve percent of the land surface of the National Park is wooded. Of this figure around fifty-eight percent is broadleaved woodland, whilst the remainder consists of coniferous and mixed plantations. The ancient semi-natural woodlands which form the most valuable ecological and historical resource account for just 2,000 hectares. The remaining estimated 6,400 hectares is divided into 3,528 hectares of conifer and mixed plantations and 2,872 hectares of broadleaved woodlands.

An estimation of the productive capacity of the Exmoor woodland was under preparation by the Forestry Commission during the course of this study and is not available at the time of writing. However a rough estimate of productivity can be provided based on information supplied by South West Woodland Renaissance.

It is important to note that this figure is only a rough estimate and should not be relied on any further. The more detailed Forestry Commission study will be far more accurate since it takes account of factors which will limit production including access, ground conditions and assumptions about forest owner's motivations to harvest.

Use a yield class of 3m³/ha/year for broadleaves and 12m³/ha/year for conifer the total available sustainable yield is 42,336 m³ of softwood and 8,616 m³ of hardwood per year. To put this in the context the volume of timber used in an average three bedroom timber frame house is 6m³. So there is a significant resource available for local construction needs within the Greater Exmoor Area given suitable quality, the willingness of owners to harvest and the correct processing capacity. The potential value of annually harvested timber could be as high as £465,000 per year for softwoods (based on £11/m³) and £603,000 for hardwoods (based on £70/m³).

The issues of quality and processing capacity are ones which can be addressed through improved information and this is a priority for South West Woodland Renaissance.⁶ The upcoming Forestry Commission study has identified an increasing proportion of oversize logs caused by delayed harvesting in many forests in the region. This then creates problems for mills that are unable to process such large diameter logs.

⁶ www.silvanustrust.org.uk/woodland_renaissance.php

4.1.8.1 Timber Quality

Two significant aspects to timber quality are strength and durability. The acceptable strength classes for hardwood are assessed visually for softwoods both visually and by machine grading. South West Woodland Renaissance are trying to access low cost acoustic grading machinery that will make machine grading available at lower cost to processors in the region. This will enable more timber to be used for higher grade uses, since grading will become less costly and also will overcome the tendency of visual grading to down grade the timber, sometimes by two or three classes. Better knowledge of the technical performance of locally grown timber would avoid over specifying thicknesses and lead to more economic use of the resource with consequent reduced waste and cost. This is backed up by experience of the quality of South West timbers such as Douglas Fir which has been underestimated and it is stronger and stiffer than expected.

Durability of timbers for external cladding is becoming better understood and there are many local examples of timber used as external cladding.

Figure 11. Sustainably sourced timber used as an external cladding.



The recent Forestry Commission report *Sustainable Construction Timber*⁷ compares UK and Imported timbers and highlights strength and durability differences – see Table 3 below.

⁷ [www.forestry.gov.uk/pdf/fcfc152.pdf/\\$FILE/fcfc152.pdf](http://www.forestry.gov.uk/pdf/fcfc152.pdf/$FILE/fcfc152.pdf)

Table 3. Substituting imported softwoods with UK grown softwoods.

Imported timber	Nearest UK equivalent
<p>EUROPEAN WHITEWOOD</p> <p>A trade name for several <i>Pinus</i> and <i>Abies</i> species, most usually Norway spruce. The most common machine grade is C16 though grades up to C35 are available</p>	<p>WHITEWOOD</p> <p>A trade name for UK grown Sitka spruce and Norway spruce. The only machine grade is C16.</p>
<p>EUROPEAN REDWOOD</p> <p>The trade name for imported Scots pine. Mainly used for joinery, the timber is available in several joinery grades and as laminated sections</p>	<p>SCOTS PINE</p> <p>The term for UK grown Scots pine. Most is made into panel products or fencing. A few sawmills in northern Scotland can sometimes supply the timber for joinery or as visually graded structural timber</p>
<p>WESTERN RED CEDAR</p> <p>Imported from western Canada the timber durability is rated class 2 (durable). Several joinery grades are imported mainly for cladding, decking, and shingles. Shingles are normally preservative treated.</p>	<p>WESTERN RED CEDAR</p> <p>Small quantities of UK grown western red cedar are available, particularly in western Britain. The timber durability is rated class 3 (moderately durable). It is also less dense than imported material and is usually quite knotty.</p>
<p>SIBERIAN LARCH</p> <p>A trade name for the species <i>Larix sibirica</i> imported from Siberia. The timber is dense and often knot free and is used for external cladding. Although some importers claim that the timber is particularly durable, test evidence ⁽¹⁾ shows it has similar natural durability to UK grown larch.</p>	<p>LARCH</p> <p>There are 3 larch species grown in the UK: European, Japanese and Hybrid. All are rated as being of variable durability but averaging class 3 (moderately durable). The timber is more knotty than Siberian larch and tends not to machine as well. Nonetheless, it is suitable for most external cladding.</p>
<p>DOUGLAS FIR</p> <p>Imported from north America the timber can be strength graded to C16 or C24. It is rated durability class 3 (moderately durable).</p>	<p>DOUGLAS FIR</p> <p>UK grown Douglas fir can be visually strength graded to C16, C18 or C24. It is less durable than imported timber being rated class 4 (slightly durable) ⁽¹⁾.</p>

4.1.8.2 Processing Capacity

Within the study area there are several specialist timber processors including:

- Bernard Dru Oak
- Dunster Woodland Products
- Exmoor Mobile Sawmilling
- Fouracre Brothers/Milverton Sawmills
- Lethabys
- Pennymoor Timber Ltd
- PJ Timber Ltd
- Tom Vanstone Timber Buildings
- TRUCE
- Woodbills Ltd
- Woodenways

However there is a lack of secondary processing capacity amongst local sawmills which means they are unable to produce kiln dried, planed and graded timber required by the mainstream construction market. Furthermore local sawmills also lack the advanced processing capacity needed to produce laminated and finger jointed timber which is used extensively in joinery. Investment in these two areas of timber processing would allow greater returns from timber harvesting in the Greater Exmoor Area.

Figure 12. Locally sourced timber.



Regional studies indicate a continuing reduction in the number of sawmills in the South West with a twenty percent decline between 2002 and 2009. According to the April 2009 *South West England Woodland and Forestry Strategic Economic Study*⁸ there are an estimated thirty-five sawmills, including mobile sawmills, active in the region in 2009. The same study also found that post-consumer reclaimed wood now accounts for eighty percent of the raw materials used at the Nexfor plant at South Molton to make particleboard for construction uses.

Our survey of three local sawmills produced only one response, but this did indicate that there is already significant amounts of local timber being processed for construction. An estimated 3,750m³ of timber processed in this one sawmill was from sourced from Exmoor forests. There was also a willingness and ability to scale up production significantly given the right investment and markets. See Appendix C for a copy of the completed survey.

⁸ www.forestry.gov.uk/forestry/INFD-5J3FJC

The conclusions of many forestry experts is that the lack of investment in processing capacity leads to a poorly presented product to a market with consequently little interest in the use of local timber. Recent investment in solar powered kilning capacity at TRUCE in Minehead supported by the Exmoor National Park Authority's Sustainable Development Fund addresses this gap, and further developments like this are needed to help increase the use of local timber.

4.1.8.3 Demand

The *South West England Woodland and Forestry Strategic Economic Study* stated that:

"...demand for UK timber may grow in future months owing to the favourable exchange rate. The low cost of locally produced timber relative to imports may stimulate growth in the sector in the short to medium term, aided by other market developments such as increasing demand for the supply of material for timber frame buildings (both hard and softwoods)."

And the authors concluded that policy should:

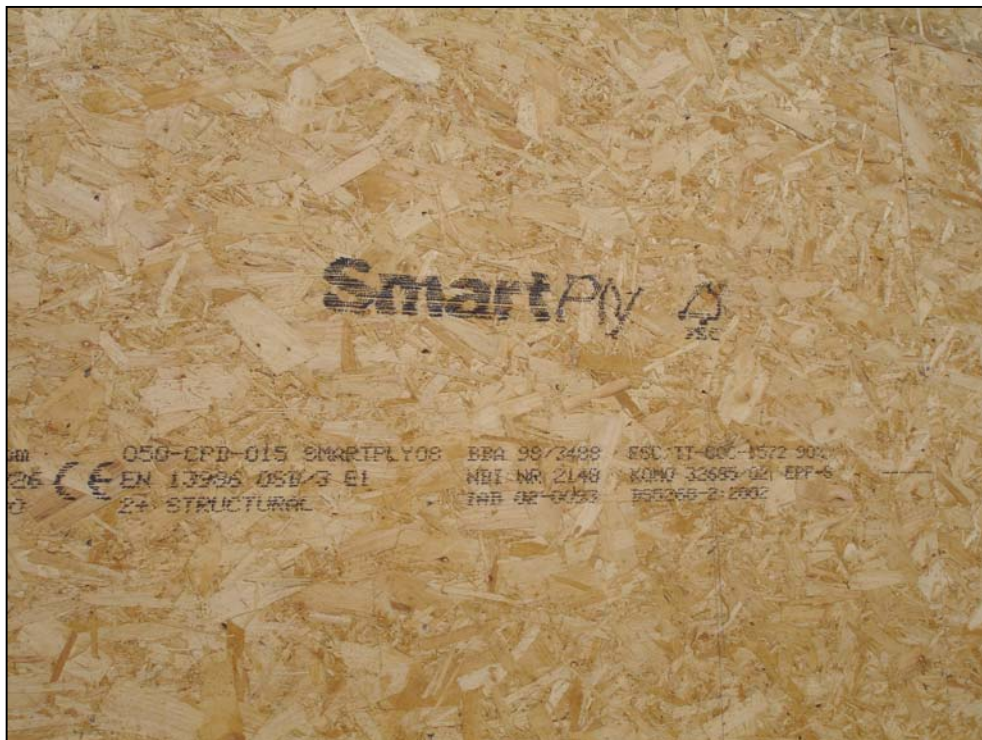
"Seek to directly increase the proportion of regionally-grown resource inputs to processing, through piloting and demonstrating supply chain models that connect the regional resource with organic processing capacity, exploiting the limited window of opportunity afforded by a devalued pound to engender a business-culture shift."

The work of South West Woodland Renaissance has promoted and supported increased regional and local supply of timber and discussions with local suppliers have identified several critical barriers to increased local supply, including limited understanding amongst designers and specifiers due to a lack of experience in the use of local timber. Many have concerns based on preconceptions that local timber has a lower performance and/or higher cost. The perception of costly local products is reinforced by the use of unseasoned timber in bespoke and traditional construction which is often associated with a more costly, niche product. Consequently it is

assumed that all local timber will command the same price premium and require craftsman processing and is best suited to historic restoration.

Another issue for small scale producers is the cost of meeting the requirement of public sector clients to specify timber from legal and certified sustainable sources. This can lead to the small local processors being excluded because they see certification as a costly and time consuming exercise in a market that only considers price and is unable to support local sourced timber.

Figure 13. Plyboard displaying the Forest Stewardship Council (FSC) certification mark.



4.1.9 Wool

Wool from the Greater Exmoor Area is mainly sold through the Wool Marketing Board. However a significant amount of wool especially the lower grades remains un-sold and is a waste product. As a result there has been much interest in seeking new uses for lower grade fleeces. From current DEFRA statistics (2007) it is known that there are nearly 700,000 sheep in North Devon and West Somerset.

Dartmoor National Park Authority (DNPA) has trialled local processing of wool fleeces into an insulation material. They set up a group of volunteer producers who donated their fleece. The processing formed a wool quilt thirty centimetres thick. The main barrier remains the treatment used against moth. Borax was recommended but its durability seems to be uncertain. DNPA has approached the Rural Enterprise Gateway at the University of Plymouth to see whether they would be interested in analysing borax properties. One of the solutions could be to dilute the borax into an oil solvent instead of water to prevent the borax from drying.

Dunkeswell-based Woolly Waste has developed useable wool insulation initially for insulation for cool packs⁹ and is now seeing increasing demand for its product as building insulation.¹⁰

Second Nature¹¹ is the main producer of sheep's wool insulation in the UK, which is marketed as Thermafleece. This product rates very well as an insulation product as it has a very low thermal conductivity and is certified by the British Board of Agrément (BBA).

During discussions with DNPA it was reported that Second Nature does not seem interested in setting up a processing factory in the South West. However, they are looking at increasing both their capacity and their sources of wool and the company's Managing Director, would be interested in coming to the South West to present the product and meet regional representatives interested in working together around this issue. Second Nature cannot buy the fleece directly from the producers because it is regulated by a European auction market.

⁹ www.woollyshepherd.co.uk/wool%20packaging.asp

¹⁰ www.thisiswesternmorningnews.co.uk/news/Shoppers-wolf-food-chilled-sheep-s-clothing/article-1172799-detail/article.html

¹¹ www.secondnatureuk.com

In February 2008, Second Nature and a Welsh sustainable building products supplier Ty-Mawr launched a wool insulation product sourced from with seventy-five percent Welsh fleece,¹² probably in response to the entry into the market of Welsh sourced and manufactured Black Mountain Insulation.¹³

Figure 14. Thermafleece sheep's wool insulation produced by Second Nature.



Currently, prices for wool insulation average £8.25 per square metre for a 100 millimetre thick batt, produced to a density of twenty-five kilogramme per cubic metre. Therefore the value at sale is approximately £3.30 per kilogramme. For the type of breeds common to the Greater Exmoor Area a fleece weighs between one and a half and two and a half kilogrammes. The fleece is worth around thirty to thirty-five pence per kilogramme. So the processing and presentation for sale increases value by ten times.

It appears that Exmoor or Dartmoor wool insulation production could be developed using new local processing capacity. This would depend on reaching a critical size to make the potential supply chain worth developing. This could be achieved through focussing on the existing collection point at South Molton. Breeders bring their fleece to this collection point and receive a pre-payment which is balanced afterwards. Suitable breeds would be ones which produce low grade wool to ensure a competitive price. Also, short hair fleece would be preferable to aid processing.

¹² www.lime.org.uk/products/insulation/ty-mawr-thermafleece-welsh-wool-insulation/

¹³ www.blackmountaininsulation.com

Table 4 below presents the grades which may be suitable, with their availability from the depot in South Molton every two weeks.

Table 4. Amount of sheep's wool which may be suitable for insulation available at South Molton

Grade ,	Approx weight available (tonne/fortnight) ,
663 !	8.0 !
666 !	5.0 !
707 !	2.0 !
709 !	10.0 !
Blackface cast !	22.0 !
Blackface grey !	6.5 !
Total	53.5

The first barrier for a producer to sell their fleece is the unattractive price that they can receive for low grade wool. Taking account of the cost and time of transport it is often not worth sending the fleeces for sale.

Second Nature believes that their product could be more competitive if they did not have to deal through the Wool Marketing Board. For low grade wool, the costs including transportation are hardly covered by the sale price. From the experiment led by DNPA with Buckfast Spinning it seems that to make the processing viable a very large amount of fleece has to be processed because it is difficult to negotiate good prices for low quantities. Buckfast Spinning would have the capacity to process insulation wool if they invested in new needles adapted to make the required quilt (with the proper density for insulation).

The other UK based wool insulation manufacturer is Black Mountain based at Ryl in Wales.

There are several options for supply chain development including:

- a) manufacture under licence from Second Nature, Black Mountain or an overseas supplier
- b) development of a new process with a industry partner such as Buckfast Spinning or
- c) development of on-farm processing

In each case it would be essential to achieve accreditation from the British Board of Agrément (BBA) for the insulation properties and suitability as a building product.

The key findings are that the Wool Marketing Board is seen as an obstacle to viable local production of sheep's wool insulation, and that low fleece prices are restricting the viability of the market. Therefore the prospects of creating an additional income by manufacturing low grade fleeces for insulation is of significant interest.

An example of the potential of the market is given by the experience of Buckfast Spinning who trialed the processing for insulation. They purchased fleeces at 45 pence per kilogram. After the washing process where up to fifty percent of the weight of the fleece is lost, the cost of the fleece increases to 90 pence per kilogramme. The total cost to produce a finished, but non-treated, insulation materials is estimated at £2 per kilogram. The selling price of treated wool insulation is approximately £3.30 per kilogram.

Buckfast Spinning cannot treat the wool with Borax during the washing process as they discharge the process water into the River Dart. They also lack space to store wool and fleece which greatly limits capacity.

There are a number of further developments planned

- Woolly Waste are investigating lavender and neem oil treatments alongside borax misting post processing.
- A dedicated needle felt-line to produce building insulation would cost an approximately £40,000.
- Product is to be tested at a Nottingham Trent University or the University of Plymouth.
- The National Trust will test the product for insulation in cottages.

4.2 Usability Assessment

The aim of the usability assessment was to identify any issues, barriers and opportunities regarding the use within the Greater Exmoor Area of the sustainable construction materials identified as priorities by our initial audit.

Initial analysis of the barriers and opportunities of the following materials produced a list of the priority materials considered to provide the greatest potential for production and use within the Greater Exmoor Area and therefore worthy of further research.

Based on the results of our initial audit the following five materials were selected for the usability assessment based on the results set out below:

- hemp for hemcrete
- sheep's wool insulation
- straw bales
- thatching straw
- timber

4.2.1 Questionnaire

As part of the usability assessment we sent a questionnaire to some selected clients, specifiers and users of construction materials. These were either suggested to us by the Exmoor National Park Authority (ENPA) or chosen due to their experience of projects in the Greater Exmoor Area, some of which utilised sustainable construction materials. See Appendix D for a copy of the questionnaire.

Questionnaires were sent to agents, architects, builders (covering both new build and refurbishment), building control, clients, planners and quantity surveyors. Further details of those that responded are shown in Table 5 below.

4.2.2 Responses

The response rate to the questionnaires was good, with eight out of twelve (75%) of those contacted responding and respondents covering all roles targeted apart from agents. See Appendix E for copies of the completed questionnaires.

Figure 15. Breakdown of responses received to usability assessment questionnaire.

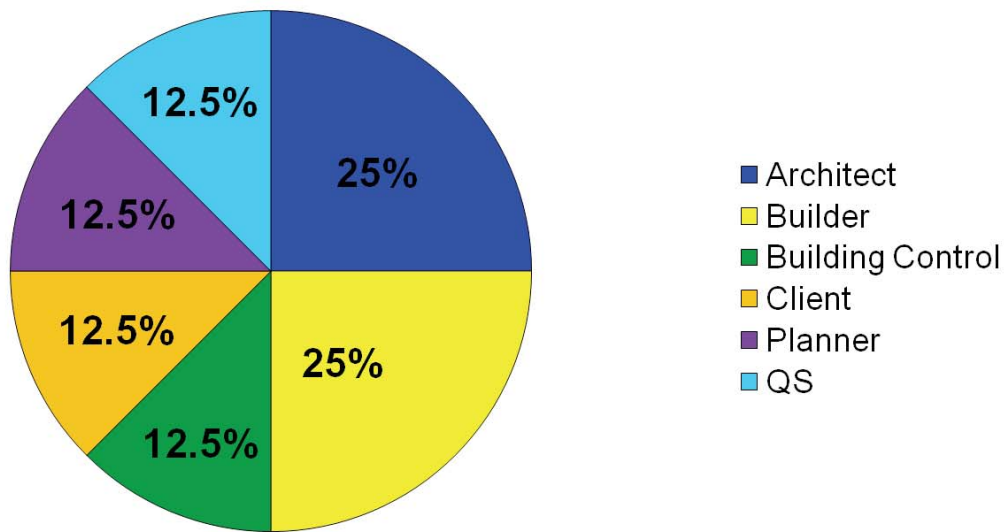


Table 5. Responses received to usability assessment questionnaire

Role	Company/Organisation	Notes
Builder	Woodlouse Conservation	Refurbishment
Architect	Louise Crossman Architects	Suggested by ENPA
Client	Falcon Rural Housing	Exford hemcrete houses
Builder	Quantock Builders	New build & Raleghs Cross straw bale houses
Architect	Stride Treglown	Carhampton
Quantity Surveyor	Cyril Sweett	Lee Abbey
Building Control	West Somerset Council	Suggested by ENPA
Planner	Exmoor National Park Authority	

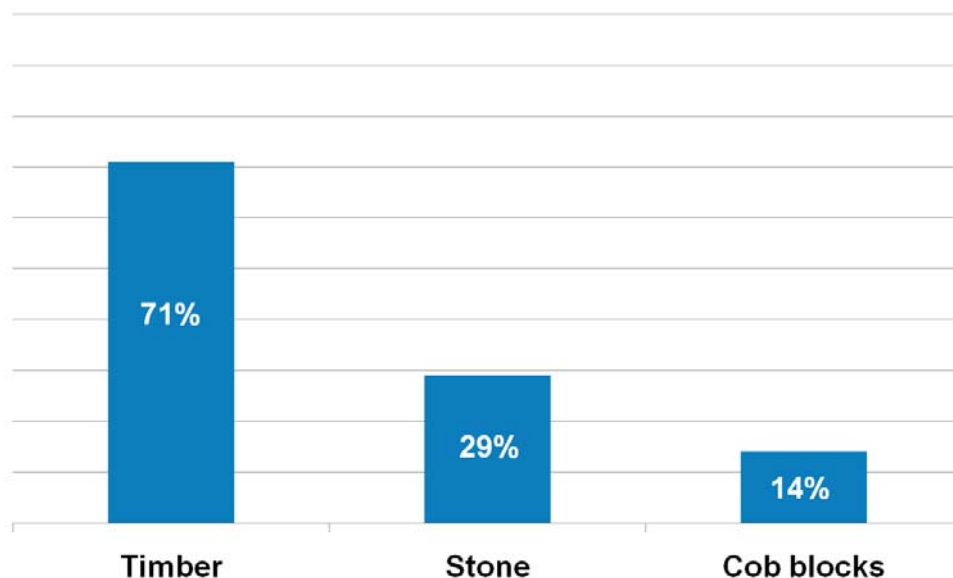
4.2.3 Results

4.2.3.1 Existing Experience

There is a high level of experience among respondents of using both locally produced construction materials and sustainable construction materials.

Eight-seven percent of respondents (7) have already used locally produced construction materials (5) or are intending to use them (2) in projects within the Greater Exmoor Area.

Figure 16. Percentage of respondents using locally produced construction materials.



Unsurprisingly respondents have more experience of using conventional materials, with timber (5) the most common locally produced construction material used, although locally sourced stone (2) and locally produced cob blocks have also been used (1).

However, as well as using locally produced construction materials respondents have also sourced construction materials that are produced locally from overseas for previous projects, such as thatching straw from Poland and timber from America, France and Scandinavia.

Eighty-seven percent of respondents (7) have already used or are intending to use sheep’s wool insulation (5), hemcrete (2) and straw bales (1) in projects within the Greater Exmoor Area.

Figure 17. Percentage of respondents using sustainable construction materials.

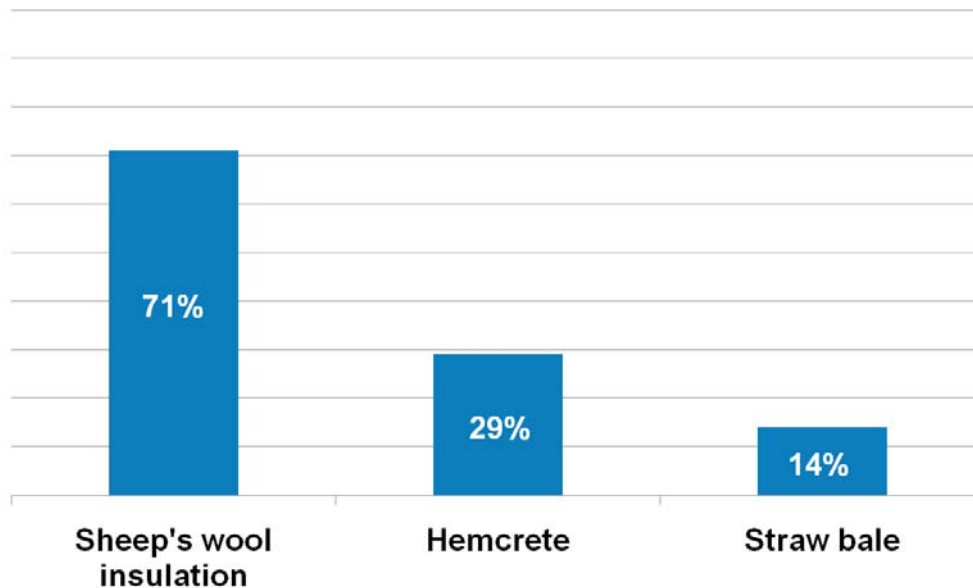


Table 6. Specific projects cited by respondents as using local and/or sustainable materials

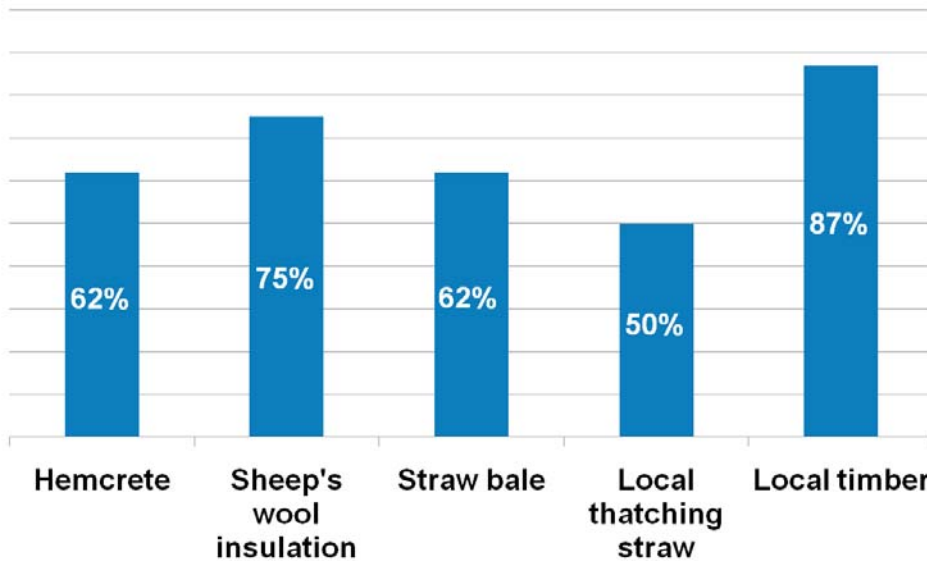
Project	Local &/or sustainable material used
Croydon House - Timberscombe	Sheep's wool insulation
Dulverton Doctors Surgery	Local stone
Exford housing	Hemcrete
Lee Abbey	Local slate, stone & timber & sheep's wool insulation
Lotley Grange - Skilgate	Sheep's wool insulation
Pulhams Mill	Local timber
Rainsbury Farm - Upton	Sheep's wool insulation
Raleghs Cross housing	Sheep's wool insulation, straw bales & local timber
Simonsbath sawmill	Sawn timber

4.2.3.2 Willingness/desire to use locally produced sustainable construction materials

There is a high level of willingness/desire among respondents to use locally produced sustainable construction materials in future projects.

Between fifty to eighty-seven percent of respondents (4-7) are willing to consider using local thatching straw (50%), hemcrete (62%), straw bales (62%), sheep's wool insulation (75%) or local timber (87%) in future projects, provided they are a suitable quality and price.

Figure 18. Percentage of respondents willing to consider using sustainable construction materials.



No one was unwilling to consider using any of the materials listed. The reasons respondents gave where they did not select that they were willing to consider a material were because they do not use a particular material in their projects (eg thatching straw) or have a lack of knowledge about a particular material (eg hemcrete).

All respondents (8) would purchase a locally produced construction product for a project within the Greater Exmoor Area rather than one produced outside the Greater Exmoor Area if both were a suitable quality and price, given the environmental and local economic benefits.

Sixty-two percent of respondents (5) felt that the demand generally for locally produced construction materials is going to increase, while no one thought it was going to decrease.

4.2.3.3 Issues and potential barriers identified

Respondents identified the following issues and potential barriers that need resolving or overcoming if more locally produced sustainable construction materials are to be used in projects in the Greater Exmoor Area, some of which are specific to locally produced sustainable construction materials and others which apply to sustainable construction materials generally.

- Consistent quality – any products/materials need to meet current national standards.
- Cost – any products/materials need to be comparable with the same sustainable construction products/materials produced elsewhere and ideally with conventional construction products/materials that fulfil the same function.
- Consistent guaranteed supply.
- Need for real world evidence of the effectiveness, performance and durability due to the experimental nature of sustainable construction products/materials for some respondents.
- A lack of expertise and knowledge in the Greater Exmoor Area of both producing and using sustainable construction products/materials.
- Has to be commercial benefit from using these products/materials so that those commissioning can realise value.
- Whether the cost of transporting locally produced products/materials to external markets would negatively affect the viability of local production.
- Manufacturers paying a fair and reasonable price to farmers for the supply of sheep's wool.

5. Performance of Sustainable Construction Materials

The technical performance of the five materials have been summarised below and there are particular attributes which make certain sustainable materials well suited to construction applications. There are several aspects that are worth highlighting.

Natural insulation materials such as hemp and wool share several important properties. They have improved insulation performance when wet when compared to mineral and glass wool insulation. They also have the ability to buffer moisture that may diffuse into the structure of a building or be present after construction. Wool is able to store up to forty percent of its weight as moisture compared to mineral wool which can only absorb two and a half percent of its weight. The natural insulation material is thereby able to store and diffuse water vapour allowing moisture to pass out of the structure to the drier outside air. This attribute has been recognised in the restoration of historic buildings and the use of natural fibre insulation materials is suggested by English Heritage when restoring historic buildings because it reduces the risk of damage to the historic fabric.

Hemp and other plant based insulation also have a greater ability to store heat when compared to mineral insulation. This assists in the creation of stable internal temperatures which is particularly important in roof spaces and in timber frame construction.

Finally hemp and wool insulation materials are better acoustic insulators for reducing airborne sound and plant fibreboards such as hemp and wood wool are good insulators against impact sound.

Natural insulation materials are also able to be used at the end of life either as a compostable waste or an energy source and so reduce the problems of waste production during demolition or alteration of a building.

The use of rammed earth and clay plasters within a building also lead to improved indoor air quality through the creation of stable moisture levels and reduced risk of mould. This is a result of the ability of clay and earth to passively absorb and diffuse moisture from the air.

Straw as a construction material enables a solid wall to be constructed which has good thermal and acoustic insulation properties. In common with timber, compressed straw also has good resistance to fire as its surface will char and prevent the progress of the fire whilst retaining its structural properties.

Natural construction materials frequently have five important attributes:

- Thermal performance – both as insulators when damp and as heat buffers
- Moisture stabilisation – both within the structure and internal air quality
- Acoustic performance – for reducing both air and impact noise transfer
- Fire performance – either intrinsically or through addition of low toxicity fire retardants
- Low impact waste disposal – either as low carbon energy source or as a compostable soil improver

These attributes make these materials worthy of serious consideration in new build and restoration work and are summarised in Table 7 below.

Table 7. Performance of natural construction materials

	Thermal performance & conductivity (W/m K)	Moisture stabilisation	Acoustic performance	Fire	Impact waste
Earth and cob		Buffers moisture	Reduce impact noise		Return to source
Hemp	Buffers temp variation 0.065 W/m K	Buffers moisture	Reduce airborne noise		Compostable
Straw	0.055 W/m K		Reduce impact and airborne noise	Fire resistant	Compostable
Thatching Straw	0.07 – 0.09 W/mK		Reduce impact noise		Compostable
Timber				Fire resistant	Reuse or as fuel
Wool	Retained when wet 0.04 W/m K	Buffers moisture	Reduce airborne noise	Fire retardant	Compostable
Rock Wool	0.04 W/mK	Poor	Poor at reducing airborne noise	Good fire resistance	Non compostable or recyclable

6. Stakeholder Consultation

A stakeholder consultation event was held on 21 May 2009 to discuss the preliminary findings of the research and identify realistic action points and recommendations. Over thirty individuals representing, builders, architects, planners, builder's merchants, timber processors and farmers attended the event. See Appendix F for a list of the people who attended.

The discussion ranged from barriers to production to ways in which property owners could be encouraged to use more sustainable materials in refurbishment. The barriers of cost and the need for some accreditation of reliable quality were also highlighted.

**Figure
20.**



Stakeholder consultation event.

The discussion also extended to the need to provide training and understanding of the techniques needed to use local sustainable materials to best effect. The development of accredited products like single branded sources such as Hemcore and Limetech for hemcrete was seen as only one way of developing new materials and in some cases leads to barriers to greater production and use locally. It was argued that it is therefore better to focus on developing designs and techniques which are approved by insurers and comply with Building Regulations rather than specific products. An example of this was the straw bale construction pioneered by Amazonnails, with the straw bale houses at Raleghs Cross the subject of a guided tour as part of the event.

However for newer materials such as hemp it was considered that contracts for growing with a guaranteed farm gate price would be needed, similar to other crops such as linseed. For straw bale construction more precise information on the density, moisture content and cleanliness of the bales was requested so that farmers could be enabled to produce a suitable product for this market.

The use of unfired clay bricks and clay plasters was also discussed as a material that is frequently locally available and suitable for use in many buildings.

The potential for a local training and demonstration project which could be high profile and enable extended training to be undertaken in the use of the priority materials was discussed and the potential role of organisations such as the National Trust and Ecos Trust highlighted. It was argued that such demonstration projects could move clients and property owners away from always seeking the lowest cost solution and help them recognise the improved performance and quality of local sustainable materials.

Figure 19. Tour of straw bale houses at Raleghs Cross.



7. Training in Sustainable Materials and Heritage Skills

As a result of the research and the discussion with stakeholders, a proposal for training has been developed by the Rural Housing Enabler in partnership with Ecos Trust and the Genesis Project. The discussion with stakeholders and training professionals has identified several training needs amongst different groups, these can be characterised as:

- Training amongst existing building contractors and trades
- Training for new entrants to construction including both the unemployed and school leavers
- Training for designers and specifiers

The skills and knowledge cover both sustainable materials and heritage skills but also could include skills and understanding of renewable energy systems. The approach to renewable energy training developed by the Genesis Project creates a useful template for providing the new skills and knowledge required by construction trades. This involves a one day awareness course to deliver the underlying knowledge of the subject and then three days of practical training with a test of competence. This module is approximately twenty-five hours of intensive training in small groups with a single tutor.

To make the skills training as widely applicable as possible a limited set of skills has been identified for a first stage. They are skills that are applicable in both sustainable and heritage construction and so give the trainees maximum potential benefit, enhance their scope for employment and ensure that the skills are able to be applied within the local area. The important issues for both heritage and sustainability are as follows:

- Moisture permeability or breathability to reduce build up of moisture and rot in timber buildings
- Condensation within buildings and within the fabric of buildings particularly in timber buildings

- Air tightness to reduce energy loss from buildings
- The use of lime and stone

In sustainable construction many of the new developments use timber construction in combination with hemp and straw. Many of the example projects on Exmoor are using lime for bonding and structural material. In heritage conservation there is much use of lime and stone work repair as well as timber repair.

The suggested focuses for training topics would therefore be:

1. Timber frame construction – covering use of moisture permeable materials, understanding interstitial condensation and methods for controlling such risks.
2. External cladding - rain screen on new and refurbished buildings to include timber, lime render, hung slates and stone cladding.
3. Lime – use as a mortar, in mass construction with hemp and timber frame.
4. Building physics and energy efficient construction to cover air tightness, repeating and non-repeating thermal bridging, thermal mass and decrement delay.

This proposal is now being taken forward through separate discussion within the partners.

8. Conclusions and Recommendations

The research has revealed that there is significant potential production of sustainable construction materials from within the Greater Exmoor Area. This includes both traditional materials such as thatching straw and timber as well as newer materials such as wool, straw and hemp.

Research by CIRIA in 2004 funded by the Department for Trade and Industry (DTI) into crops in construction concluded:

“There is enormous potential for crop and animal based products to help make UK construction more sustainable at the same time bringing real tangible benefits to the UK agricultural sector.”

Several of the respondents to the usability assessment highlighted the need to clearly identify the tangible benefits of using sustainable materials that are locally sourced. From research the benefits to builder and owner include improved performance such as wool insulation retaining its insulating qualities when damp and reducing the potential for build up of moisture inside the building structure. Straw also has very good sound insulation qualities which makes it an ideal material to be used in classrooms and other uses where sound insulation is important.

In order for the use of locally sourced sustainable building materials to become more widely used several changes need to occur:

1. Current good practice in and around the National Park needs to be highlighted and promoted. During the course of the project several good examples of recently constructed buildings using local sustainable materials were identified in the Greater Exmoor Area.
2. Clients need to be confident to ask for more local sustainable materials in their construction projects. This means that there needs to be clear guidance from planners and building control about what they consider to be acceptable uses.

3. Builders and suppliers with a genuine interest in using these materials need to be highlighted and promoted through the directory.
4. Collaboration between all parts of the supply chain needs to be promoted through networking and supporting new projects. This might include supporting new processing capacity as well as regular networking events to allow facilitate supply chain collaboration.
5. Education of all stakeholders, including producers, suppliers, designers, specifiers, clients and homeowners, is required to raise awareness of the benefits, application and local availability of sustainable construction materials.
!
6. A training programme is needed which makes clear the principles and objectives of local sustainable materials supply and which would allow greater understanding and participation in the development of local materials supply.

The survey of specifiers and users of construction materials and the consultation with stakeholders identified the need for greater real world experience, training and practical demonstration in order to create a market pull for local products and materials.

This gives rise to a recommendation that existing demonstration projects should be fully recorded and used to communicate the lessons and in addition a training and demonstration project should be established within Greater Exmoor Area to develop greater skills and understanding of the techniques and materials.

Such a local project is likely to be a private or third sector initiative which will require public sector grant from local and/or central government.

Appendix A

List of contacts

- Abbott and Co
- Back to Earth
- Blackdown Horticultural Consultants
- British Wool Marketing Board
- Buckfast Spinning
- Build Something Beautiful
- Collabear Farm
- Dartmoor National Park Authority
- Devon & Cornwall Master Thatcher Association
- Devon & Cornwall Wool
- Devon Earth Building Association (DEBA)
- Exmoor Horn Sheep Breeders Society
- Exmoor National Park Authority
- Forestry Commission
- Fouracre Brothers
- Gymkana Bales
- Hemcore
- Hemp Fabric UK
- J & J Sharpe
- Jonathan Rhind Architects
- Joyces Farm
- Lethabys
- Lime Technology
- Little Clyst William Farm
- Mike Wye & Associates
- Minehead Sawmills
- National Farmers Union
- Pennymoor Timber
- Second Nature UK
- South West Woodland Renaissance
- Spacey Farm
- TRUCE
- University of Plymouth
- Victoria Sawmills
- Wansborough St Regis Paper Mill
- William Theed
- Woodenways
- Woolly Waste

Appendix B

Hemcore *Guide to Hemp Growing 2009*



GUIDE TO HEMP GROWING 2009

The following notes are prepared in good faith to give a broad understanding of the potential for growing Hemp in the coming year. The Company cannot be held responsible for any changes brought about by outside agencies.

INTRODUCTION

In July 2008 Hemcore opened its new £3.6 million industrial hemp processing facility near Halesworth in Suffolk. Full production started with the 2008 harvest and is planned to increase over a four year period until full capacity of 50,000 tonnes per annum is reached.

The hemp plant has two constituent parts: the fibre and the woody core or “shiv”. Demand for both of these products is growing rapidly. Hemp fibre is increasingly used in the automotive sector, primarily in the manufacture of door panels and other parts. Demand for hemp products is also growing in construction, where the shiv is used as an energy efficient building material and the fibre is used as a natural insulation material. Emerging markets for hemp products include plastics reinforcement, and horticulture.

Hemcore works with Braham & Murray proprietors of the “Good Oil” Brand to provide hempseed for cold pressing for this rapidly expanding foods market. Details of this are in the pack under the reference Dual Cropping.

AGRONOMY

Hemp is an annual crop. Planted in late Spring when soil temperatures are warming up, it achieves a remarkable rate of growth often reaching a height in excess of 3 metres by August. Following harvest the crop is stored by the grower prior to delivery to our factory where the straw is processed and the outer fibres separated from the woody inner core. Until now the processing method required the hemp straw to be retted in the field (retting is the bacterial process that starts to break down the lignin and pectin that holds the fibres together) but the new factory can process unretted straw. This de-risks hemp growing as the time between cutting and baling can be much shorter and also considerably increases the yield potential as cutting can be delayed and field losses are much reduced. A cutting period of mid to late August will allow baling 2 to 3 weeks later, so growers can expect to clear their fields by mid-September.

Previous Cropping

Hemp has an excellent role to play in a number of rotational situations with its twin advantages of late drilling window and good weed control. The two broad categories of use are:

In a cereal rotation as an alternative to the main combinable break crops of rape & pulses.

As a following crop to late cleared root & vegetables, where hemp gives time to prepare the ground rather than being forced to muddle in earlier drilled crops. Our latest sown crop in 2008 was drilled on 12 June and yielded 5.5T/ha.

SEED

The seed, about the size of a peppercorn, should be sown at a rate to achieve a plant population of approximately 150 stems per square metre. This is essential to produce thin stems and good quality fibre. Hemp seed is light & fragile and some air seeders can be very aggressive, damage can be avoided by slowing down fan speeds whilst still achieving good distribution. Any questions speak to Dan Squier on 07768066176.

Drilling

Hemp should be drilled after the risk of hard frosts has passed and when soil temperatures have reached 10°C plus. This can normally be expected from the third week of April onwards and crops have been drilled successfully up to the beginning of June. Leave a one metre gap round the headland, this will help with inspection of the crop and facilitates harvesting.

A successful hemp crop depends **entirely** on good establishment.

Like all small seeded spring crops it requires a well prepared and friable seedbed. Endeavour to conserve moisture and drill into moisture rather than into a dry seedbed in the hope that it will rain soon. On all but the lightest soils, land should be ploughed in the Autumn and left to overwinter. Emergence should occur 5-7 days after drilling. Crops that establish quickly and evenly will rapidly grow away from any pest and weed problems. In a dry spring careful attention must be given to moisture retention. Hemp will not penetrate through soils that are compacted or capped so drilling depth (normally 2-3cms) and soil conditions are critical.

Pigeons are a serious pest at the very early stage of plant growth. They must be kept off from drilling day until the plant is past the cotyledon stage and has the first two true leaves. This will occur in the space of 7 to 10 days.

Fertiliser

Nitrogen is a vital component of yield. Depending on soil indices we would recommend up to the following of phosphate and potash:-

HEAVY SOILS	112 N	60 P	120 K	KGS/HECTARE
LIGHT SOILS	112 N	60 P	150 K	KGS/HECTARE

Hemp is not a greedy crop and returns a substantial quantity of nutrients to the soil. As Hemp thrives on organic matter there may be good opportunities both agronomic and financial to utilise farm yard manure or Sewage Biosolids as a source of nutrients. Because of the need to comply with the protocols and audit trails of our end fibre users and the UK environmental regulations, **no applications should be made without prior approval by Hemcore.**

We recommend checking the lime status and avoiding situations where pH is less than 6.5.

HARVEST

There are two possible harvest routes, these are:

1. Hemp for straw - mown with specialised cutter & square baled or disc mown and round baled.
2. Dual hemp – both seed and straw are harvested.

Please discuss with us which is the right route for your farm.

1. **A) HEMP FOR STRAW – SHORT CUT AND SQUARE BALED**

Hemcore has encouraged the use of a new multi-cutter system for the last 2 years and this is now our preferred method of harvesting. The cutters leave the crop spread evenly across the field ideal for drying.

If individual growers prefer we will accept crops cut with a disc mower but such crops must be round baled. While cutting costs will be cheaper and the cutting of the crop is in the control of the grower storage and transport costs will be higher.

Baling

Once the crop has dried and the majority of green has gone it is ready to be rowed up and baled. A Hemcore agronomist will give the final go ahead. Most large square balers should be suitable, take care with pressure settings as too high can cause problems for knotting mechanisms. Discussion with manufacturers can be helpful eg. Hesston balers can be fitted with deflectors which prevent straw getting into knotters.

2. **DUAL HEMP FOR SEED AND STRAW**

Dual hemp provides considerable opportunity for increased margins, but will delay harvesting until September and greater management input will be required to get the timing of the operations correct. Hemp seed will come off the combine at 16-18% moisture and needs to be dried to 8% moisture within 6 hours. Recent results have been excellent and the straw left after combining can then be cut with the new multi cutter and square baled (alternatively it can be mown and round baled.) Growers producing a dual crop must have a contract for both parts, if you would like to pursue this route please contact us for further details. Due to the extra management required for dual cropping we strongly recommend it be done in minimum blocks of 20 hectares.

The remaining information applies to straw produced from all methods.

Storage

Bales should immediately be removed from the field and stored under cover. Stacking on pallets is recommended on anything other than good quality concrete floors as hemp straw is very absorbent. Please note that bales of hemp do not shed rainwater. Intake to the factory is a year round operation on a "just in time basis" and a monthly increment in the price is paid. Please alert the company if you have specific requirements for movement.

If growers are unable to store all of their crop it is intended to provide a storage facility; this will involve delivery direct from the field and a payment package to reflect the costs involved.

Haulage

Hemcore can usually recommend a specialist haulier but growers are welcome to find their own. Payment for straw is on a delivered factory price; some guidance on price is given in the appendix but each situation needs to be costed individually. All incoming loads must be booked in and must be sheeted if at risk of rain.

Straw Quality

The grower is responsible for delivery to the factory where every load is tested to ensure suitability for processing. We would encourage all growers to check their bales before despatch as rejected bales are a waste of expensive haulage and are subject to a disposal charge at the factory.

The main points to watch for are:

- a. Moisture Content – we aim for 16 % and can accept up to 18 % with deductions. This has proved very achievable over the years, but watch for wet patches when baling e.g. on headlands and ensure safe storage.
- b. Weed Content – a good stand of hemp will allow very little weed competition to survive but in conditions of poor establishment weed can be a problem. Please try to avoid baling any patches of weeds and do not send in weedy bales, as we cannot process them.
- c. Stones – These can cause damage in our factory, please tailor field operations to avoid baling up stones. Deductions will be made for stone contamination, in extreme cases there may be rejections.
- d. Plastic is, thankfully, not a common problem but one that causes major difficulties for our fibre customers. Please take care to ensure fields and particularly gateways are clear of all plastic and other detritus.

Following Crop

Hemp is an excellent break crop providing a good barrier to pests and diseases. It has been of particular use as a break crop in situations where resistant grass weeds are becoming a problem. Its deep roots are very beneficial for soil structure. The majority of our growers follow hemp with a different crop but some have repeated hemp for several years without any apparent difficulties. Where following Hemp with autumn cereals growers have successfully direct drilled with heavy cultivator drills. Slug activity after hemp is minimal compared with oil seed rape.

LICENSING

The term Industrial Hemp is applied to varieties of Cannabis sativa that have been specifically produced by plant breeders to have a THC level (tetra hydro cannabinnol) of 0.2% or less. THC is the psychoactive drug in Cannabis, which in a marijuana plant would be nearer 10 – 15%. However, visually hemp plants are identical to illicitly grown cannabis plants and can therefore be attractive to drug dealers/users despite the very low THC content. We operate a licensing system as an agent of the Home Office whereby growers apply to Hemcore and we consider each application.

PRICING

Seed price is £3.30 per kilo (£3.40 per kilo for varieties for dual hemp) seed must be purchased from Hemcore. The recommended sowing rate is 37kgs per hectare.

Buy back prices for the straw from harvest 2009 are as follows based on price per tonne of straw delivered factory:

HARVEST	£125.00	JANUARY	£139.50	MAY	£145.50
OCTOBER	£135.00	FEBRUARY	£141.00	JUNE	£147.00
NOVEMBER	£136.50	MARCH	£142.50	JULY	£148.50
DECEMBER	£138.00	APRIL	£144.00	AUGUST	£150.00

Hemp, in common with all agricultural crops, can show wide variations in yield from season to season. As part of the Company's supply management they reserve the right, when yields are in excess of 7.5 t/ha, to delay movement of the excess into the period September to December of the following year.

Ex farm prices for hemp grain dried and dressed to contract specifications are as follows;

SEPTEMBER	£460.00	JANUARY	£472.00	MAY	£484.00
OCTOBER	£463.00	FEBRUARY	£475.00	JUNE	£487.00
NOVEMBER	£466.00	MARCH	£478.00	JULY	£490.00
DECEMBER	£469.00	APRIL	£481.00	AUGUST	£493.00

Give us a ring: John Hobson on 07836 552822, Ian Low on 07831 651255, Dan Squier on 07768 066176 or Mike Duckett on 07770 325 154

Or ring the new office at Halesworth on 01986-835678

2009 HEMP GROSS MARGIN

The following tables give some indications of gross margins. We have used our best estimates of subsidy levels, yields and prices – please feel free to substitute your own figures. Also consider with Hemp:

- ❖ Excellent opportunity for controlling grass weeds (especially useful in resistant situations.)
- ❖ Fewer Field Operations, in particular spraying.
- ❖ No Combining Requirements – Unless doing dual Hemp in which case higher margins
- ❖ Prices Based on Contractors – Opportunities to row up & bale in house can considerably increase margins.
- ❖ Opportunities in Organic Situations.
- ❖ Hemp may qualify for other environmental schemes, please check with your advisor.
- ❖ A number of growers have commented on improved yields after hemp than after other break crops.

Gross Margin Per Hectare of Hemp and Alternative Crops

The table below shows the gross margin that can be expected for different yields of hemp compared with alternative break crops. Like all crops the yield can vary depending on the weather and growing conditions. In good years yields of 9 tonnes per hectare have been achieved but an average of 7.5 tonnes per hectare is more likely.

	W Rape	W Beans	S Rape	S Beans	Peas	S Barley	Linseed	Hemp		
Aid	0	37	0	37	37	0	0	0	0	0
Yield	3.5	4.0	2.0	3.5	4.0	6.0	2.0	6.0	7.5	9.0
Crop Value	265	120	265	130	200	130	300	142.5	142.5	142.5
Return	928	517	530	492	837	780	600	855	1069	1283
Seed	45	60	64	130	125	60	60	122	122	122
Fertiliser	336	75	240	75	100	270	138	235	235	235
Chemicals	195	105	78	88	120	98	72	13	13	13
Cutting	25	20	20	20	25	15	25	60	60	60
Raking								10	10	10
Baling	60	60	60	60	60	60	60	66	82	99
Drying/Conditioning	7	8	4	7	8	12	4	0	0	0
Total	668	328	466	380	438	515	359	506	522	539
Gross Margin	260	189	64	112	399	265	241	349	547	744

NB. Figures printed on this page are a guide for comparison only and we recommend you insert your own figures especially for fertiliser

Haulage to Plant Assuming

10 mile radius	£4/t	£30/ha
30 mile radius	£10/t	£75/ha
50 mile radius	£12/t	£90/ha
100 mile radius	£15	£112/ha

7.5t/ha

GM = £517
GM = £472
GM = £457
GM = £435

2009 DUAL HEMP (STRAW & SEED) GROSS MARGINS

Dual hemp is produced for straw and seed both of which are on contract to Hemcore. The straw will go to Halesworth for processing by Hemcore and the seed will go to Braham & Murray for cold pressing for human consumption under the "Good Oil" Brand name.

Dual Hemp Gross Margin per Hectare

The table below shows the gross margin that can be expected from a yield of 6.0 tonnes of straw and 1.2 tonne of grain per ha. Yields of up to 7.0 tonnes of straw and 1.70 tonnes of grain per hectare have been achieved resulting in a gross margin of well over £1000 per hectare.

Tonnes Straw per hectare	6.0
Tonnes Grain per hectare	1.2
Straw Revenue March Price £142.50/tonne	855
Grain Revenue March Price £478.00/tonne	574
Total Revenue	1,429
Variable Costs	
Seed	125
Fertiliser	235
Chemical	13
Combining	60
Cutting	60
Raking	10
Baling	66
Dressing & Drying	48
Total Costs	617
Gross Margin Before Haulage	812

Haulage to Plant

10 mile radius £4/t	£24/ha	GM = £788
30 mile radius £10/t	£60	GM = £752
50 mile radius £12/t	£72	GM = £740
100 mile radius £15/t	£90	GM = £722
More than 100 miles £24/t	£144	GM = £668

The above is based on combining, cutting with the new multi-cutter and then square baling.

NB. Figures printed on this page are a guide for comparison only and may not be actual.



HEMP GROWER APPLICATION

Tel: 0207 035 0467

FORM – HG/001A

Tel: 01986 835 678

Fax: 0207 035 6161

Fax: 01986 835 679

Name of Applicant	
Name, trading title (if applicable) and address of farm	
Telephone number: Mobile number: Fax number: E-Mail: SBI Number:	
Growing location of crop if different from the address shown above Tel. Number (if different from above)	
<u>FULL</u> OS map sheet reference number(s) <u>AND</u> the field reference number(s) as shown on the IACS form. (It is essential that these numbers are identical to those on the SPS form you send to the RPA)	
Total area of Hemp (Hectares)	
Have you, or any persons involved with growing the Hemp, any previous convictions for drug offences?	

Please attach an Ordnance Survey map of either scale 1:2500 or 1:10000 showing the proposed growing sites.

SIGNED

DATE

Appendix C

Completed sawmill survey

All 11 questions relate to the potential for and actual supply and production of timber that is/could be used in **Construction** – including structural material, external cladding **and for use in garages and outbuildings**.

1) Do you currently process timber for use in construction? - **Yes**

What processing do you undertake?

- a) Saw logs - **yes**
- b) Strength grading- **no**
- c) Re-sawing of bought in timber- **no**
- d) Production of finished timber - **for flooring, skirting etc we supply green sawn to people who finish it**
- e) Production of external cladding - **yes**
- f) Production of structural timber- **yes**
- g) Other – please specify-**timber for pallets, sheds, fencing, garden stuff allsorts! Chips, logs, kindling**

2) If yes, does any of it originate from within the Greater Exmoor Area (Please state approx. percentage)? **25%**

3) If so, what are the species of timber and approximate quantities, per annum, of each? **Cedar, larch Douglas, grand fir, hemlock, sitka, sequoia, poplar. Total 15,00m³ at present used to do more precrunch!**

4) If supply and demand of this timber increased, could your processing capacity easily adapt to meet this increased demand i.e. machinery, available space and workforce? **Yes**

5) Are there any technical/financial barriers, at present, that prevent your business from processing certain types/sizes/grades of timber? If yes, please list and comment on the likely investment required to address these barriers? **Buy me a bar mill and I will make things much better for timber suppliers!**

6) What is your current maximal processing capacity? **Depending on size of finished timber small stuff turnover 8,000m³. Bigger stuff=10,000m³**

7) If more timber was available and the demand increased, would/could you consider increasing your processing capacity? **Yes**

8) If yes, what costs would the investment represent, to achieve what level of increased production? **200k could easily double capacity**

9) If you would not consider increasing production capacity, at this time, please state your reason(s)

10) The West Somerset Rural Housing Enabler is particularly interested in the potential production and use larch, due to its tough, waterproof and durable qualities. Do you currently have the machinery and capacity to process larch for roofing shingles and/or exterior cladding/interior panelling? **Would buy saw for shingles if more demand. Why not cedar lots on Exmoor**

11) Do you have any comments on the subject of this survey which have not been dealt with by this questionnaire? **Should be something on woodchip (for fuel) production, as this is the fastest growing sector in the local timber market'**

Appendix D

Usability assessment questionnaire



Local Sustainable Construction Materials in Greater Exmoor

March 2009

The Devon Sustainable Building Initiative (DSBI), Ecos Trust and the Genesis Project are undertaking some work on locally produced sustainable construction materials in the Greater Exmoor area on behalf of the Exmoor National Park Authority (ENPA).

It aims to encourage an increase in the supply and use of these materials within Greater Exmoor by identifying the materials that exist, assessing their usability, analysing any barriers and opportunities, helping develop their supply chains and publishing a directory of their producers, manufacturers, suppliers and users.

The greater use of locally produced sustainable construction materials would bring environmental benefits from reduced transportation of materials and the use of more sustainable materials and local economic benefits from their increased production and from developing the skills of the local workforce.

Following an initial audit, we are focusing on hemp for hemcrete, sheep's wool insulation, straw bales, thatching straw and timber. This questionnaire forms part of our usability assessment and will help us to identify any issues, barriers and opportunities regarding the use within Greater Exmoor of these materials produced from local sources and to make recommendations to overcome or exploit these.

If you have any questions or wish to discuss this questionnaire please contact Gareth Walton on gareth.walton@dsbi.org.uk or 0788 6672577.

We would be grateful if you could return your completed questionnaire by Friday 27 March. Details of where to send it are at the end of the questionnaire.

Thank you very much – we look forward to receiving it.

Yours sincerely

Gareth Walton
Director
DSBI

www.sustainablebuild.org

Charles Couzens
Executive Director
Ecos Trust

www.ecostrust.org.uk

Tim Simmons
Sustainable Construction Manager
The Genesis Project

www.genesisproject.com

The DSBI is an independent not-for-profit organisation which promotes and enables sustainable building in Devon and beyond. It provides advice and support on sustainable building projects and policies, offers training and consultancy services and acts as an advocate for sustainable construction. It works with a wide range of different stakeholders, including the construction industry and related professions, local authorities and clients.

Ecos Trust informs and educates the public and professionals about sustainable construction. Its mission is "to make sustainable construction the norm rather than the exception by 2010".

The Genesis Project, situated at Somerset College, is a dedicated sustainable construction resource centre. It delivers education and training, in modern and traditional methods, to audiences ranging from school pupils and home owners through to building professionals.

QUESTIONNAIRE

Name

Job title/occupation/profession

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- Hemcrete Yes No
- Sheep's wool insulation Yes No
- Straw bales Yes No

If yes, please give details (including the material, the project & the reason it was used)

If no, please explain why not

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

--

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|--------------------------|----|--------------------------|--------|--------------------------|
| • Hemcrete | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local thatching straw | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local timber | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Straw bales | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |

If no or unsure, please explain why.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

If you have any questions or wish to discuss this questionnaire please contact Gareth Walton, Director of the Devon Sustainable Building Initiative (DSBI) on gareth.walton@dsbi.org.uk or 0788 6672577.

Please email your completed questionnaire to gareth.walton@dsbi.org.uk, fax it to 01458 253401 or post it to Devon Sustainable Building Initiative (DSBI), Clock Tower, County Hall, Topsham Rd, Exeter EX2 4QD. We would be grateful if you could return it by Friday 27 March.

Your views and opinions are important to us. Thank you very much for your time

Appendix E

Completed usability assessment questionnaires

QUESTIONNAIRE

Name

Job title/occupation/profession

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- Hemcrete Yes No
- Sheep’s wool insulation Yes No
- Straw bales Yes No

If yes, please give details (including the material, the project & the reason it was used)

If no, please explain why not

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

--

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

• Hemcrete	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input checked="" type="checkbox"/>
• Local thatching straw	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input checked="" type="checkbox"/>
• Local timber	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Sheep's wool insulation	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Straw bales	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>

If no or unsure, please explain why.

Lack of knowledge to do with Hemcrete and do not use thatching straw.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes * No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes * No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes * No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes * No Unsure

Do you have any other comments you would like to make?

--

QUESTIONNAIRE

Name

Job title/occupation/profession

Architect

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes

No

Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

Timber, principally larch samplings used as partially sawn scantlings in traditional roof construction

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

• Hemcrete

Yes

No

• Sheep's wool insulation

Yes

No

• Straw bales

Yes

No

If yes, please give details (including the material, the project & the reason it was used)

Sheeps wool insulation provides good intersitial moisture control, particularly when improving insulation in existing buildings. It is however more expensive than conventional products therefore there needs to be a willingness on the part of the client to support this approach

If no, please explain why not

Hemcrete is a product we have not used but are considering doing so on future "new build" work where its ability to provide air tightness in conjunction with its other qualities is attractive.

In our experience cob construction is usually a more sustainable, and viable approach than straw bales in this area. Both employ similar techniques and perhaps both are both vulnerable to a vermin problem!

PTO



If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

Poland

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

America, Scandinavia, France

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes

No

If yes, please give details (including the material, the project & client, funder or planning authority)

We (client and specifier) positively sought to use local materials and products on the Simonsbath Sawmill project carried out with Exmoor National Park Authority

Further as a practice philosophy we will always seek to source "local" where this can be reasonably achieved within the criteria below of quality, consistency, cost and supply

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

• Hemcrete	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Local thatching straw	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input checked="" type="checkbox"/>
• Local timber	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Sheep's wool insulation	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Straw bales	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Unsure	<input checked="" type="checkbox"/>

If no or unsure, please explain why.

Depend upon quality & consistence of material, cost and supply

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

There has to be national acceptance that the products accord with current standards such as being endorsed by BS kitemark or Agreement certificates. This may not be a barrier but are essential to commercial specification.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes * No Unsure

If no or unsure, please explain why.

My answer is actually "possibly". There are a number of factors to consider as discussed above. It must also be recognised that given the current economic situation that is especially hitting the construction industry this aspiration needs to be seen within the wider context. Government policy alone will not cause these products to be used, there has to be good commercial benefit from doing so those commissioning construction can realise value.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

QUESTIONNAIRE

Name

Job title/occupation/profession

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- | | | | | |
|---------------------------|-----|--|----|--|
| • Hemcrete | Yes | <input checked="" style="width: 40px; height: 24px;" type="checkbox"/> | No | <input style="width: 40px; height: 24px;" type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input style="width: 40px; height: 24px;" type="checkbox"/> | No | <input checked="" style="width: 40px; height: 24px;" type="checkbox"/> |
| • Straw bales | Yes | <input style="width: 40px; height: 24px;" type="checkbox"/> | No | <input checked="" style="width: 40px; height: 24px;" type="checkbox"/> |

If yes, please give details (including the material, the project & the reason it was used)

Westcott Mead, Exford – project currently under construction. Using Hemcrete.
Used as we want to test different sustainable construction methods–Hemcrete seemed like a good product
(on paper – albeit more expensive than other construction methods) and we wanted to see for ourselves
whether it is as good as it claims to be. Once used it will be closely monitored for performance which will
then give us an answer of whether it has a place for use in the future.

If no, please explain why not

PTO
→

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

N/A

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

No

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|-------------------------------------|----|--------------------------|--------|-------------------------------------|
| • Hemcrete | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input checked="" type="checkbox"/> |
| • Local thatching straw | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local timber | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input checked="" type="checkbox"/> |
| • Straw bales | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input checked="" type="checkbox"/> |

If no or unsure, please explain why.

Quality and price is essential – price is the biggest obstacle so far as these methods are not usually competitive against other construction methods.

I would also be unsure about using any of the products listed until there is evidence and undoubted confirmation that these are effective methods of construction. I want to see case studies and fact in how these materials perform (when occupied by normal people!) not purely numbers and speculation.

Once the proof is forthcoming – the methods would be considered.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

A lack of local expertise in the area and I would be surprised if anything could be produced locally to a suitable price as there would be very little in the way of competition to ensure prices were reasonable and therefore competitive.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

The cost of sustainable materials is paramount to organisations such as ours. It is still too expensive to be considered seriously in affordable housing.
In addition to this, these methods are still very experimental and need to be proven in terms of effectiveness, performance and standing the test of time – we need facts not assumptions.
We are building HOMES that must be comfortable and usable by a huge range of occupants – not just ticking boxes as they are of sustainable construction.

QUESTIONNAIRE

Name

Job title/occupation/profession

Director construction company

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

If no, please explain why not

Straw bales came from Dorset, Lime came through Buildbase but not produced locally, Recycled glass insulation & Glass blocks came from Wales. Timber came through local timber suppliers.

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- | | | | | |
|---------------------------|-----|---|----|---|
| • Hemcrete | Yes | <input style="width: 40px; height: 20px;" type="text"/> | No | <input style="width: 40px; height: 20px;" type="text"/> |
| • Sheep's wool insulation | Yes | <input style="width: 40px; height: 20px; text-align: center;" type="text" value="yes"/> | No | <input style="width: 40px; height: 20px;" type="text"/> |
| • Straw bales | Yes | <input style="width: 40px; height: 20px; text-align: center;" type="text" value="yes"/> | No | <input style="width: 40px; height: 20px;" type="text"/> |

If yes, please give details (including the material, the project & the reason it was used)

Raleghs Cross two new semi detached eco houses.
Straw bales for walls. Kiln dried sand for sound insulation
Sheeps wool insulation for roof. Recycled glass insulation in base walls and under floor. Recycled glass blocks for base wall.

If no, please explain why not

PTO
➔

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

--

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

All Douglas fir timber was sawn at Hemyock and produced locally, not sure of actual location.

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

Yes, A number of contracts state that a local stone be used to match existing

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

• Hemcrete	Yes	<input type="checkbox" value="yes"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Local thatching straw	Yes	<input type="checkbox" value="yes"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Local timber	Yes	<input type="checkbox" value="yes"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Sheep's wool insulation	Yes	<input type="checkbox" value="yes"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
• Straw bales	Yes	<input type="checkbox" value="yes"/>	No	<input type="checkbox"/>	Unsure	<input type="checkbox"/>

If no or unsure, please explain why.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes=yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes=yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes=yes please No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes= yes please No Unsure

Do you have any other comments you would like to make?

Our company have completed numerous contracts using lime mortars, local stone, we are currently building the eco houses at Raleghs cross, and find it very interesting. We laid 2 metre deep foundations using limestone laid in lime mortar!, we have not used any cement or plastics within the main construction of the building.
The company that we are working with is called 'AMAZONAILS' from Yorkshire this company supplies designs, information, and lectures on the use and benefits of eco materials . Especially straw buildings.

QUESTIONNAIRE

Name

Job title/occupation/profession

Architect

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

If no, please explain why not

We intend to use materials sourced from Greater Exmoor on our project at Carhampton but have not reached a final design to submit for planning approval yet

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- | | | | | |
|---------------------------|-----|--------------------------|----|-------------------------------------|
| • Hemcrete | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |
| • Straw bales | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |

If yes, please give details (including the material, the project & the reason it was used)

If no, please explain why not

We are investigating strawbale construction and hemcrete for the proposals at Carhampton. Sheeps wool insulation would also be an attractive option should it be suitable for our budget

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

No

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

Western red Cedar from Forest of Dean, Douglas Fir from Scotland used on project in South Somerset

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|-------------------------------------|----|--------------------------|--------|-------------------------------------|
| • Hemcrete | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local thatching straw | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input checked="" type="checkbox"/> |
| • Local timber | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Straw bales | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |

If no or unsure, please explain why.

Although consider thatch to be a beautiful and sustainable material, would be concerned about maintenance issues and costs

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

None other than the above

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

Regarding the last query, as we are based in Bristol and our projects are largely national I'm not sure it would be appropriate to be included in a Greater Exmoor list.

I think this is a very worthwhile initiative. Anything that promotes local, sustainable materials and makes them more readily available is most welcome.

QUESTIONNAIRE

Name

Job title/occupation/profession

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes No Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

- Although at a very early design stage, the Lee Abbey project design brief requires local materials / sustainable construction to be used where possible.
- A biomass boiler using on site wood chip material is proposed to be incorporated – reason: Life cycle cost effectiveness.
- Local quarried stone is likely to be specified for the external walls and roof slates to match existing buildings – reason: Local planning / conservation requirements.
- Possible use of sheep’s wool insulation, but depending on ‘U’ values achieved and detailed design.
- Locally sourced timber will be specified – reason: to reduce embodied energy costs.

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

- Hemcrete Yes No
- Sheep’s wool insulation Yes No
- Straw bales Yes No

If yes, please give details (including the material, the project & the reason it was used)

If no, please explain why not

If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

See above.

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

See above.

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

Salt Quay House and The Boatyard Projects, Sutton Harbour, Plymouth – requested the use of locally sourced Plymouth Limestone cladding by Plymouth City Council.

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|-------------------------------------|----|--------------------------|--------|--------------------------|
| • Hemcrete | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local thatching straw | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local timber | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Straw bales | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |

If no or unsure, please explain why.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

Only the cost of transportation possibly increasing the trade cost of these materials?

Manufacturers paying a fair and reasonable price to farmers for the supply of sheep wool.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes * No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes * No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes * No Unsure

Are you interested in being included in a directory of producers, manufacturers, suppliers and users of local sustainable construction materials in the Greater Exmoor area?

Yes * No Unsure

Do you have any other comments you would like to make?

QUESTIONNAIRE

Name

Job title/occupation/profession

Building Control Surveyor

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes

No

Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

Local grown timber has been used and machined for an oak framed workshop at pulhams mill, the timber came from the owner/builders own land.

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

• Hemcrete

Yes

No

• Sheep's wool insulation

Yes

No

• Straw bales

Yes

No

If yes, please give details (including the material, the project & the reason it was used)

Sheeps wool insulation used at Lotley grange skilgate, Croydon house Timberscombe, Rainsbury farm Upton.

If no, please explain why not

PTO



If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

No as not involved in sourcing materials

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

No as not involved in sourcing materials

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|--------------------------|----|--------------------------|--------|--------------------------|
| • Hemcrete | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local thatching straw | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local timber | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Straw bales | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |

If no or unsure, please explain why.

not involved in specifying materials

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

Transport links, Employment,

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

QUESTIONNAIRE

Name

Job title/occupation/profession

Planner

Company/organisation

Have any locally produced construction materials been used in projects you have been involved in within Greater Exmoor?

Yes

No

Unsure

If yes, please give details (including the material, the project & the reason a local material was used)

I have been involved in many hundreds of projects where local materials may have been sourced but cannot be categorical because this is often down to the contractor and cannot be specified in the planning permissions.

Local stone is being used in the Dulverton Doctors Surgery

Local timber in claddings for many buildings.

If no, please explain why not

Have any of the following sustainable construction materials been used in projects you have been involved in within Greater Exmoor?

• Hemcrete

Yes

No

• Sheep's wool insulation

Yes

No

• Straw bales

Yes

No

If yes, please give details (including the material, the project & the reason it was used)

Hemcrete will be used for the new affordable housing at Exford.

If no, please explain why not

PTO



If thatching straw produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

--

If timber produced outside the Greater Exmoor area has been used in any projects you have been involved in within Greater Exmoor, can you list where it was produced (not purchased)?

Have you been involved in any project anywhere where a client, funder or planning authority has asked or required that a locally produced construction material or materials be used?

Yes No

If yes, please give details (including the material, the project & client, funder or planning authority)

If you are involved in specifying materials for projects, would you be willing to consider using any of the following materials in the future, provided they were a suitable quality and price?

- | | | | | | | |
|---------------------------|-----|-------------------------------------|----|--------------------------|--------|--------------------------|
| • Hemcrete | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local thatching straw | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Local timber | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Sheep's wool insulation | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |
| • Straw bales | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Unsure | <input type="checkbox"/> |

If no or unsure, please explain why.

Are you aware of any specific technical barriers to producing any of the above construction materials within Greater Exmoor? Please state here if you think any of them cannot be produced locally to a suitable quality or price.

No technical barriers- the key area which needs to improve is local knowledge and examples where local materials have been used successfully.

With a growing number of policies from all levels of government aimed at reducing CO₂ emissions and improving the sustainability of buildings, do you think demand generally for locally produced construction materials is going to increase?

Yes No Unsure

If you are involved in specifying materials for projects and were given a choice for a project within Greater Exmoor of purchasing either a local construction product or one produced outside the Greater Exmoor area would you favour the local product, given the environmental and local economic benefits, if both were a suitable quality and price?

Yes No Unsure

If no or unsure, please explain why.

Would you like to receive an invitation to a networking event in late-April for current and potential producers, manufacturers, suppliers and users of local sustainable building materials in the Greater Exmoor area?

Yes No Unsure

Do you have any other comments you would like to make?

The research that you are conducting will be valuable – especially if it can point to examples where local materials have been used.

Appendix F

List of attendees at the stakeholder consultation event

- Andrew Dodd, Andrew J Dodd Ltd
- Barbara Robinson, West Somerset Council
- Bee Rowan, Amazon Nails
- Charles Couzens, Ecos Trust
- Corina Reay, Ecos Trust
- David Miles, Stride Treglown Architects
- David Wilson Partnership
- David Wilson Partnership
- David Wyborn, Exmoor National Park Authority
- Diane Blackman, Rural Housing Project Assistant
- Drew Williams, RGB Building Supplies
- Gareth Walton, Devon Sustainable Building Initiative
- Gill Tesh, Mike Wye and Associates
- Gordon Fergusson, West Somerset Council
- Jan Sharpe, J and J Sharpe
- Jayne Hall, West Somerset Council
- Jerry Sharpe, J and J Sharpe
- Jonathan Sweetland, Chas Sweetland & Sons Ltd
- Jonathan Woolven, Lee Abbey Fellowship
- Kai Whiting, Lee Abbey Fellowship
- Keith Arscott, Travis Perkins
- Kevin Puttock, Milverton Building Services Ltd
- Mark Lidster, Corbel Construction Ltd
- Melvyn Meek, Stacey Construction
- Michael Tidball, Clyst William Farms
- Mike Morgan, Stacey Construction
- Mike Wye, Mike Wye and Associates
- Neil Staddon, West Somerset Council
- Patrick Daley, Travis Perkins
- Paul Carlisle, Bradfords Building Supplies Ltd
- Paul Mote, Chas Sweetland & Sons Ltd
- Philip Chambers, Milverton Sawmill
- Robert Delius, Stride Treglown Architects
- Robin Russell, Corbel Construction Ltd
- Russell Gray, Jonathan Rhind Architects
- Simon Frowde, Property Consortium UK Ltd
- Susan Tidball, Clyst William Farms
- Tim Simmons, Genesis Project
- Tim Stokes, Exmoor National Park Authority
- Val Grainger, Woolly Waste
- Zachary Trump, Woodlouse Conservation