One Planet Development Management Plan

Land to the South of Pontygafel, Glandwr, Pembrokeshire
Referred to as Gardd y Gafel
Jacqui Banks & Tom Clare

Contents

INTRODUCTION

The following information supports an application for a low impact development under Welsh Government policy TAN 6, One Planet Development.

This planning application is compiled by Tom Clare and Jacqui Banks, both of whom were brought up in Wales in the towns of Aberaeron and Llanrwst respectively. Tom has more than a decade of experience in horticulture in various situations from small scale gardening on a council estate to large-scale forest management and design. His work in this area has accompanied him to Scandanavia where he worked for some years gaining valuable experience. He returned to Wales three years ago to pursue his interest in setting up his own Permaculture smallholding.
Jacqui has business management skills gained from her career in theatre and arts management. She was Managing Director at Theatre Harlech until 2010 when she decided to invest time in learning about food production and Permaculture practices by traveling within the UK to Low Impact and eco-village projects.

We have brought our diverse skills together to create a viable Management Plan for a One Planet Development smallholding in Pembrokeshire. As part of this process we have called on the expertise of several individuals, including Paul Wimbush of Lammas Low Impact Initiatives, who is widely considered a leading authority in the TAN 6 policy. Leander Wolstenholme has contributed to the environmental assessment. Advice from Julian Bishop, an architect specialising in Passivhaus design, has influenced the design of the dwelling house. Michael Howlett Of Sureline Design Services Ltd. has contributed through his Code for Sustainable Homes (CSfH) assessment of the dwelling plans and assistance with the visual impact assessment. We have consulted many other individuals from the local community (including Pembrokeshire County Council) who have contributed guidance knowledge and support. We have also contacted many specialists for specific advice on certain matters.

We fully intend to call on other experts in various fields during the implementation of our management plan.

SUMMARY

Our proposal is to establish a five acre smallholding. In compliance with the OPD guidelines, we will build a low-impact house with ancillary buildings and make the site our primary residence. From this site we will manage a small horticultural business which will be our primary occupation. The main threads of this business will be a specialist tree (and other plant) nursery, the production of fruit leather for local suppliers and the growing of various horticultural produce (specialising in watercress and asparagus) for the local market. We will grow and rear the great majority of our own food on site and will use the money generated from our business to pay for those items we cannot grow or make ourselves. All our energy needs will be met on site by micro-generation from renewable resources. All our water will come from an on-site spring. The majority of our wastes will be assimilated on site, with recycling accounting for most of what remains. We are confident we will achieve an ecological footprint of 2.4 global hectares within the first few years and will be able to demonstrate clear potential to move towards and beyond 1.88 global hectares soon after that. Through careful design and committed management we will maximise the bio-capacity of our site, which within five years will meet and exceed our needs as occupants and therefore have a net beneficial contribution to the wider area by enhancing environmental quality and supporting the local economy.

For as long as we can remember we have aspired to own and farm a piece of land in Wales. Sustainability has always been central to our personal ethics and we are both well experienced in practicing a low impact lifestyle.
Prohibitively high property prices and comparatively low profits associated with small scale diverse agriculture have so far made it impossible for us to realise this ambition. When we learned of a new policy (in our home country no less) in support of exactly the kind of development that would make it possible for us to start working at what we do best, we couldn't wait to begin. We are also very encouraged to see that wider national policy objectives have begun to treat environmental issues with the respect and urgency they deserve. There is, after all, only 'One Planet'.

BASELINE

Location
The plot of land is freehold and in our names, Tom Clare and Jacqui Banks. The land is located about 70 meters North-East of the village of Glandwr, Pembrokeshire (please refer to Appedix1, Drawing 1.1). It comprises of 5.1 acres made up of two fields. The Western field is 1.6 acres and the Eastern field is 3.5 acres. The site is rectangular in shape, approximately 240 by 90 meters. The boundaries on all sides are neglected hedgerows with the exception of 100 meters of stock fence that forms the North boundary of the Eastern Field. There is a council maintained road running the length of the Southern boundary. Lammas Low Impact Initiatives (an ecovillage made up of nine smallholdings of approximately eight acres each, hereafter referred to as Lammas) owns the field bordering to the East, which is currently down to grass. Pontygafel Farm grazes horses in the pastures to the North and West.

There are currently no existing on-site services, though there is a spring issuing in the North-West corner of Western field. A telephone wire runs North to South through Eastern field, fifty meters East of the hedgerow. There are currently no working access arrangements to the site, though there is a derelict vehicular access in the South-West corner which we have been utilising as pedestrian access and parking. There are also two overgrown pedestrian accesses from the council maintained road. There are various neglected livestock accesses to adjacent fields.
The underlying geology of the site is an Ordovician bedrock[1]. There are no sites of cultural importance or existing buildings on site.

Landscape
The site is a gently, predominantly South facing slope with an average gradient of 15 degrees. It is 130 meters above sea level at the highest point and 110 meters at the lowest, with a steep drop to the council road to the South owing to the high hedge bank. The hedge bank to the North of the Western field is faced with dry stone wall which is largely in a good state of repair. All vegetation in all hedges is both overgrown and overgrazed with many areas of damage to the bark of the trees. Some trees have grown to a considerable size, affording shelter from wind as well as visual screening from immediate surroundings in the area where residential development is proposed. The site is very typical landscape of the surrounding area, which is mostly down to pasture with patchy areas of deciduous woodland and occasional stands of conifers. The LANDMAP Visual and Sensory assessment for the area (Afon Taf) defines the settlement pattern as scattered rural/ farm[2]. The Gafel Valley, (¼ mile to the North-West of the site) and the Elwyn valley (½ mile to the South-East) are both wooded and are of significance with regards to wildlife.

Views into the site from the road immediately beneath it are minimal, owing to the large hedge bank above the road and to the lay of the land (see Appendix 2 for Visual Impact Assessment).

Presently the land is being used to graze horses. It has been down to pasture for

[1] LANDMAP Geological Landscape, Aspect Area: Hermon, http://test.landmap.ccw.gov.uk
[2] http://test.landmap.ccw.gov.uk

several decades. There are no statutory designations applicable to the site or the immediate vicinity (see Appendix 3 for the Ecological Assessment which has details of the closest sites with statutory designations). Traffic currently generated by the site is minimal, as tenants visit twice daily for stock management and our own visits average one journey a week as we visit to familiarise ourselves with the land and repair fences etc. The site is adjacent to a council maintained road, which runs West into Glandwr from Llanfyrnach. Please see the Transport Assessment and Travel Plan section of this application for details of existing public transport provision.

DESIGN / STRATEGY

Our Objectives:
-We will create full-time land-based employment for ourselves.
-We will provide for our basic needs from the land, independent of subsidy.
-We will create a smallholding that caters for the needs of wildlife alongside human needs.
-The design of our smallholding will be mostly based on Permaculture principles (see Appendix 4 - Technologies & Principles). Every part of it will produce a yield, either directly or indirectly, through careful design.
-We will contribute to the resilience of the local community both socially and economically.
-Through the example of a low-impact smallholding we will have a net positive effect on the wider environment and will seek to inspire others to find solutions for themselves.

Our design proposal comprises of a great number of individual yet integral elements designed in such a way that every part will contribute synergistically to the functioning of the site as a whole. Our objective is to cultivate a landscape that is diverse, robust, largely self-regulating and yet extremely productive, able to be managed on a human scale (i.e. largely non-mechanically) and is aesthetically pleasing and engaging for residents and visitors alike. The principles of Permaculture explain our ethics and methods very well. The overall distribution of land uses will be as follows (see Appendix 1, Drawing 1.2).

A forest garden and orchard (5000m^2)
The forest garden is 3800m^2 and the orchard 1200m^2. The forest garden will resemble a young to mid-succession woodland with a sparse and low canopy. To achieve this, the rootstocks of fruiting trees will be selected carefully and other trees will be coppiced. The emphasis will be on a diverse range of fruiting or nut-bearing trees and shrubs. This will provide the basis for the fruit leather and tree nursery aspects of our business (see Business Improvement Plan). Many glades and rides will be included to maximize light penetration to the ground layer. Occasional standards will rise above the canopy to slow the overall wind-speed above the productive canopy. Trees selected for this purpose will either be limbed (for specialist timber products) or will be of a fastigiate form to ensure they do not cast too much shade. A shelterbelt of native fruiting species such as *Prunus spp*, *Sorbus spp.* and *Sambucus Nigra* will protect the garden from strong winds and hopefully go some way towards drawing the birds away from our more valuable crops. Careful attention to the detail of design will ensure the optimal microclimate for every individual plant and thus maintain high productivity throughout. Every plant will contribute to overall productivity either directly or indirectly. Direct yields will include fruits, herbs and leaf-crops, mushrooms, flowers, seeds, cordage, medicines, firewood, and miscellaneous materials for other roles on site, e.g. beanpoles and crafts etc. The plants that will contribute indirectly include dynamic accumulators / nitrogen fixers / soil conditioners etc. to mine and cycle nutrients; plants which attract pollinators; plants which attract predatory insects for pest control and companion plants that exude health giving properties to neighbouring, higher yielding crops. The planting scheme will include many dense evergreen trees to provide year round shelter and nesting sites. The underlying landscape of the forest garden will be lightly swaled / terraced

to increase the capacity of the land to retain the nutrients from leaf fall. This is essential when the net export of biomass from harvests is considered. It also helps to mitigate stresses to the soil caused by extremities of precipitation, allowing it to drain well in flood conditions and retain moisture in drought, bringing it into good heart generally. The terraces will follow contour, meaning footpaths will be level, making harvesting easier. Once planted with trees of varying heights, the terracing will not be noticeable outside of the forest. (See Appendix 4, Technologies and Principles, Forest Garden Information for further details.)
The orchard will be an area of transition between the forest garden and the vegetable garden. Here trees will be planted at regular spacings and the understorey will be kept under control by poultry. High yielding mainstay crops for our own consumption and for our fruit leather business will be situated here, where they will benefit from a greater degree of maintenance than in the wilder forest garden system.

A reed-bed system with associated planting of short rotation coppice (SRC) ($6000m^2$)
This area will be located at the border of the forest garden, where the canopy of the SRC will blend into the canopy of the forest garden and orchard. This will help to reduce the otherwise industrial aesthetic of the coppice. We also intend to include a few other fuel crops, not simply relying on a monoculture of willow. This will provide the majority of our fuel needs for space heating and cooking (the rest will be sourced from our hedgerows). Within this area will be a purposefully constructed wetland to process the grey-water from the dwelling. It will comprise of a primary and secondary reed-bed, a settlement pond and a leech field. The entire system will be immediately surrounded by a high diversity of water loving plants. These plants will also be regularly coppiced and the materials used elsewhere on the site e.g. as a mulch in the forest garden, for crafts etc. By re-distributing biomass in this way, the system is amply able to cope with the nutrient load from the grey-water,[3] and the high transpiration capacity of willow coppice will account for elevated ground water. We have visited many sites where such a system is installed and works excellently. The biodiversity benefits of reed bed systems is widely recognized.

At a glance, the reed-bed system, SRC and the forest garden will resemble natural landscape features typical of the surrounding area.

The main area of cultivation ($3430\ m^2$)
Comprising the vegetable garden ($2250m^2$), the main garden ($700m^2$) and the area to the North-East of the dwelling ($480m^2$).
The area surrounding the dwelling and the North-East corner of the three-acre field will be devoted to horticultural production. These areas will resemble the conventional approach to home food production and will have a familiar 'cottage/kitchen-garden' aesthetic. Part of the landscape surrounding the dwelling will be more carefully terraced with stone built retaining walls. Again this will be greatly beneficial for nutrient retention, drainage and ease of cultivation but additionally the stone will provide thermal mass, thus creating a microclimate for optimum crop yields. The walls will not exceed 100 centimeters in height, thereby allowing for the harvesting of crops at the top of the wall by hand from a standing position on the terrace below, making the process ergonomic and very efficient. This

[3] http://info.cat.org.uk/questions/water-and-sewage/what-are-reed-beds

is where we will grow the asparagus and watercress, which will be the main threads of our horticultural business.

Wild flower meadow (1000m^2)
The meadow will surround our glasshouse to the North and West. This area will serve as a wildlife haven as well as providing a small amount of hay for the goats and a valuable source of wild flower seed for our business. It will be traditionally managed. The diversity of rare species found here will be dependent on low overall fertility, presenting an opportunity to continually export nutrients from the meadow to other more demanding areas of the site.

The hedges around the periphery of the entire site (not included within the area calculations)
The hedgerows that surround our plot account for a large area of the land we own. They will provide a high yield of craft materials as well as some fruit and fuel. All hedgerows will be re-stocked, thickened, and traditionally managed to increase biodiversity.

Goat paddock (4050m^2)
An area of approximately an acre, this will be a strip of land along the bottom of our fields dedicated to grazing/forage for two milking goats. The strip will be divided equally into three quarter-acre paddocks with cleft chestnut fencing. The goats will be folded between the three enclosures throughout the year. Some years before their introduction, the area will be planted up with herbs, bushes and trees that goats like to browse upon, in order to supplement their diet. The effect will be a low, dense, species-rich scrub, providing valuable niche habitat for wildlife. The hedge surrounding the enclosures will also comprise of known fodder crops, which will either be coppiced in winter for bark browse or cut in summer as 'tree hay' for later use.

Horticultural glasshouse
Approximately 360 m^2 in area, the glasshouse is central to our food production strategy and although the area of land it occupies is relatively small, this will be one of the most highly productive areas on site, especially in the winter months. All propagation for the tree nursery and horticulture will be carried out here. A small proportion of our main cash crops (asparagus and watercress) will be grown under cover here so as to extend their season and marketability. In the Northern third we will grow indoor tree crops such as citrus and almonds for our own use. We will irrigate the beds using a pitcher system (see Appendix 4 - Technologies and Principles, Pitcher Irrigation), which will make massive savings in water otherwise lost to evaporation (and prevent the associated buildup of mildew). Summer ventilation will be passive and the glasshouse will occasionally be mildly heated in the winter using heat from the production of Biochar (see information on Biochar under 'Land Management'). The glasshouse will be situated close to the dwelling since these two buildings are where we will spend most of our time.
While we appreciate the short-term advantages of polytunnels (familiarity, low cost, ease of build) we have found them to be fraught with problems in the long term (e.g. lifespan and fragility, ventilation, visual impact). Given the importance of an internal growing space in the Welsh climate, it seems to us more in keeping with the principles of OPD that any such structure should be built to a high standard,

preferably from reclaimed materials and with a view to low maintenance, longevity and an agreeable aesthetic (see Appendix 2, Visual Impact Assessment). For these reasons we have sourced a second-hand horticultural glasshouse. The structure will be low impact, with minimal foundations and will be easily reversible in line with the exit strategy. For drawings see Appendix 1, drawings 6.1-6.4.

Dwelling house
Approximately 115m^2 in area, there will be a single dwelling on site for just one household. This will be our sole residence and our land-based business will be managed from here. The dwelling is designed to be Solar Passive and highly insulated. Natural degradable materials will be used wherever possible. The dwelling is designed to look at home in the locality and will be mostly concealed from nearby viewpoints by planting. For drawings see Appendix 1, drawings 2.1 - 2.7.

The outbuildings
These amount to approximately 180 m^2 in area. There will be a workshop to store tools and to work on various necessary projects (e.g. tool maintenance). This is sited to the North of the dwelling so it will be obscured from view. Also to the North of the dwelling, a solar kiln for wood storage and for dehydrating fruit and fruit leathers is sited (all our firewood will be kiln dried, leading to increased burn efficiency and less pollution). Next to this is the entrance to the root cellar, a building entirely recessed into the landscape, with only a door visible. This double-chambered cellar is essential to our strategy for food production because it will store our fresh produce over many months (bridging the 'hungry gap') with no power required. Two chambers are required because when storing food in bulk for a lengthy period it is important to separate certain foods that are not compatible in storage.
The undercover area adjoining the dwelling will be used as a working area for the processing of produce (when it will usually be used in combination with the kitchen) and for the preparation of craft materials. We opted to site this building here so as to share the roof structure with the dwelling and save on resources, and because of the high level of interactivity between it and the dwelling space. As we live in such a wet climate this area will make it easier for us to carry out some 'outdoor' tasks associated with our business whatever the weather making our business run more efficiently. The roof space here will provide essential storage for equipment and craft products ready for market.
A goat shelter to house two milking goats and a modest milking parlour will be situated just above the goat enclosures. For drawings of all outbuildings see Appendix 1, drawings 3.1 - 7.1

Although we have laid each element of land distribution out separately they will be integrally linked. They will be physically linked through watercourses and nutrient flows (see Appendix 1, drawings 8.1 and 9.1). The entire site is designed so as to support systems of biodiversity that link together throughout as well as underpinning the human systems which will form our enterprises and the provision of our basic needs.

With regards to area calculations for food production, it must be taken into account that a large proportion of our diet will be derived from non-conventional food plants growing in wild or semi-cultivated peripheral areas on our site. For example, we like to eat nettles (*Urtica dioica*) in the spring. These will be found growing naturally in

the hedges, SRC and goat paddock areas and do not need deliberate cultivation in a vegetable garden. Therefore garden space which would normally be needed to produce an equivalent crop of cultivated spring greens will be freed up for something else.

In the management plan which follows we have laid out how we will utilise the elements of our design to provide food and an income from this site upon which we will both be fully occupied (see Appendix 5 for a breakdown of activities throughout the year).

Within five years of beginning this project we will have met the criteria set out by TAN 6. Beyond the five years our site will continue to develop and as the planting matures it will become increasingly abundant and we will have a great surplus. Our project will be an example of small scale, sustainable, low carbon, regenerative agriculture that is robust and not reliant on outside inputs or subsidies. By including a diversity of components in the system design we will avoid relying on a single crop or product and will be able to respond swiftly to fluctuations in market and environmental conditions. We will be able to supply a range of products locally, so contributing to the diversification and revival of a local rural economy.

BUSINESS AND IMPROVEMENT PLAN

Land Based Activity

Objectives

We plan to meet nearly all of our basic food needs from the site. In order to achieve this we plan to have a fruit and vegetable garden for familiar crops; a forest garden and orchard for fruits, nuts and 'wilder' perennials; and a glasshouse for important tender crops and to extend the season of others. We will have two milking goats whose male offspring will be slaughtered for meat. We will raise ducks and chickens for their eggs as well as for meat. Rabbits and even some fish will be raised for their meat too. Using the principles of Permaculture design, we will create intuitive, manageable systems that will operate synergistically to successfully work the whole five acre site to high productivity and biodiversity.

Any of our basic food needs not met by that which is described above will be purchased using the money we earn from the various enterprises, which we plan to establish on site using produce grown on the land.

One of the key points about our enterprises, as you will see in more detail later in this section, is that they are many and varied and draw from resources with very low maintenance requirements in the context of overall site upkeep. This allows a high degree of flexibility and resilience in response to changing climatic / market pressures. Successful threads can be selected and developed promptly without detriment to others that may temporarily be lagging. The modest income generated will meet our minimum income requirements.

Components

Subsistence

Our current food budget is £70 per week (this is based on the past years expenditure, we do not currently grow any of our own food) and breaks down annually as follows:

Table 1: Annual household food needs		
Category of food	**Percentage of our household food spend**	**Value £**
Meat	7	254.80
Poultry meat & products	3	109.20
Fish	4	145.60
Fruit & Vegetables	49	1783.60
Cooking oil	2	72.80
Dairy	19	691.60
Grain Mill Products	7	254.80
Bread/ rice/ pasta/ cereals	4	145.60
Cocoa Chocolate etc.	2	72.80
Other	2	72.80
Non Alcoholic Beverages	1	36.40
Total	100	3640

Total annual food needs for the household = £3640
The equivalent of £1820 per person

Within 5 years we aim to meet at least 65% of our food needs from the site. We will do this in a number of ways. Following is a list of crops from the three distinct elements of our garden as well as a summary of the livestock we expect to keep.

Table 2: Kitchen garden crop list												
Crop	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Globe Artichoke												
Broad Bean												
French Bean												
Haricot Bean												
Runner Bean												
Beetroot												
Broccoli												
Brussel Sprouts												
Cabbage – spring												
Cabbage – winter												
Carrots												
Cauliflower												
Celery												
Squash												
Cucumber												
Kale												
Leeks												
Salad												
Sweetcorn												
Courgette												
Onion												
Parsnip												
Peas												
Potatoes												
Spinach												
Tomatoes												
Turnips/ Swedes												
Dried /processed												
Fresh harvest												
In store												

Table 3: Glasshouse crop list												
Crop	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Moringa oliefera												
Lemons												
Grapes												
Stevia Rebaudiana												
Caper Vine												
White Sage												
Piper Auritum												
Aloe Vera												
Lemongrass												
Hibiscus												
Gotu Kola												
Physalis Peruviana												
Culinary herbs												
Asparagus												
Watercress												
Preserved												
Fresh Harvest												
In store												

(For simplicity we have only listed perennial crops of significant nutritional or marketable value in the table above. Around half of the internal growing space will be used to extend the season of vegetables already listed in Table 2 above. Annual/biennial culinary herbs have also been included.)

Table 4: Forest garden crop list												
Crop	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Apples												
Pears												
Medlar												
Plums												
Quince												
Mulberries												
Cherries												
Persimmons												
Chilean Guava												
Apricot												
Elder												
Juneberries												
Japanese Raisin												
Sea Buckthorn												
Kiwi												
Grapes												
Rowan												
Whitebeam												
Service Tree												
Hawthorn												
Autumn Olive												
Guomi												
Barberry												
Goji berries												
Currants												
Gooseberries												
Raspberries												
Blueberries												
Oregon Grape												
Blackberries												
Rosehips												
Blue Honeysuckle												
Rhubarb												
Hazels, Filberts												
Walnuts												
Acorns												
Chestnuts												
Almonds												
Pinenuts												
Preserved												
Fresh Harvest												
In store												

Animals & their produce

Animals are an essential element of our closed-loop Permaculture design. They are not merely kept for their meat and their other products, which we will of course benefit from. They will contribute to cycling biomass, and building the soil biota and the overall health of the site[4]. Their browsing presence will maintain valuable niche habitat for wildlife.

We intend to sell surplus animal products such as eggs from the ducks & chickens and meat from the goats. It will be possible to cover the cost of any bought in feed required and stock replacement through these sales so that the animals effectively pay for themselves.

Chickens

We will keep approximately ten hens and one cock of a multi-purpose breed such as Light Sussex, which are known to be good layers as well as being suitable as table birds. By keeping a breeding cock we will ensure that we always have a few birds in their first flush of lay. In this way we will ensure a steady supply of eggs throughout the year. The flock will be kept to a manageable size by slaughter (for our table only), and any excess eggs will be sold in local outlets or to visitors. We will also use the chickens to sit on the duck eggs when breeding the latter. The chickens will be kept in a coop, which will be moved around the plot to constantly provide them with fresh forage. This will also maximize their pest control potential and minimize parasite build-up. A number of crops will be grown specifically for chicken fodder and they will also receive byproducts such as fruit peelings and seeds from processing fruit leathers to supplement their diet. In this way we will greatly reduce the costs of bought-in feed.

Ducks

We will keep approximately five Khaki Campbell ducks and one drake. The primary role of the ducks will be as biological slug control in the garden, we will also get eggs throughout the summer for our own consumption. Surplus ducks as a result of breeding will either be eaten or sold at point of lay. They will be housed in a small shelter near a pond in the garden.

Geese

We will keep a pair of breeding Brecon Buff geese, a traditional Welsh breed. They will be kept in the forest garden and orchard areas to keep the grass down and we plan to breed from them for personal consumption and a small number for the Christmas market. They will be housed in a purpose built shelter and confined to concentrated areas.

Bees

Tom has a few years experience of bee husbandry and has studied the advantages and disadvantages of a variety of different hive styles. For our intentions, we have chosen to keep a Haengekorb style of hive, now known in Britain as the Sun Hive. This hive, currently being promoted by the Natural Beekeeping Trust[5], has been designed to prioritise optimal conditions for colony health over the convenience of hive manipulations and the maximising of honey yield[6]. Sun Hives have been shown to

[4] Seymour, J (2004) The new complete book of self sufficiency, Dorling Kindersley, page 23

[5] www.naturalbeekeepingtrust.org

[6] Mancke, G (2005) The sun hive, The Natural Beekeeping Trust, page 16-18

greatly improve over-wintering survival rate, have substantial disease and parasite resistance, and to exhibit increased colony activity and cohesion in general. They also look very beautiful and intriguing, inviting interest and respect from visitors.
In response to the deepening crisis of bee populations in the natural world as a whole, we consider it extremely important to adopt a more holistic, less interventionist approach to bees, regarding them more as sustainers of life than as producers of honey. Indeed, our bees will primarily be kept for the pollination of tree fruit and the garden crops on which our livelihood relies.
We estimate that one healthy Sun Hive will provide us with ample pollination service on our site (remembering that there are a number of other beekeepers in the immediate area). We will not be aiming to harvest a commercially significant amount of honey but expect to harvest enough for our table. Should we need more honey than we are producing, we hope to trade with Melissa Holloway at Lammas, who keeps many hives of the higher yielding 'National' style.
We recognise the essential importance of bees and have witnessed first-hand and with great concern the decline in the bee population due to intensive farming and the associated habitat / forage degradation, pesticide use etc. We hope our approach to a land-based livelihood will demonstrate that the habitat requirements of bees (and of other wildlife) and the requirements of a population of humans can be satisfied simultaneously.

Goats
We will keep two Golden Guernsey milking goats in a series of three enclosures amounting to approximately ¾ an acre in size. We have carefully designed the planting of the enclosure to provide the goats with the most nutritious diet. All hedges, for example, will be of a mix of palatable species such as Goat Willow (*Salix Caprea*), Mulberry (*Morus spp.*) & Poplar (*Populus spp*) and stock fenced to protect them from over grazing. We will plant up the enclosure as early as possible, only introducing the goats once the shrubs have reached thicket stage in 4-5 years. The enclosure will be divided into three sections so the goats can be folded between them. Knowing when the goats need to be moved to a new section will be a matter for close daily observation. The aim will be to allow enough time for forage to re-grow and to break the cycle of parasite build-up. We will also have a small amount of solar-powered electric fencing on standby if we need to pen the goats in elsewhere on our site for a short while. Using this system, the goats will have nearly year-round access to a wide diversity of forage, keeping them in excellent health, reducing feeding costs and giving consistent, high and nutritious milk yields. One of the goats will be impregnated each year, using a local billy goat, meaning that we will always have one in milk and sometimes both in milk. This will allow each of them to rest for some of a two-year cycle. Their male offspring will be brought up and slaughtered for meat in their first year and their female offspring will be sold as milking goats. We will satisfy our household milk requirements throughout the year and a proportion of our meat, cheese and yogurt requirements.

Rabbits
We will keep rabbits, allowing them access to the glasshouse to rest (they will be securely fenced!). They will be to provide a small source of heat and carbon dioxide within the glasshouse to increase the productivity of the plants growing within. As a byproduct we will eat their meat.

Fish
Within the pond in the glasshouse we will keep a small stock of fish. They will regulate the health of the water by cycling nutrients as part of a small aquaponic growing system. We plan to keep enough to eat approximately one per fortnight, though this will obviously be subject to many factors. These fish will feed on various biomass in the aquaponic system.

We have described the different ways we plan to produce our own food. In the table below we have laid out what percentage of each food category will be provided directly from the land by year five:

Table 5: Food produced by year 5				
Category of food	**Percentage of our current household food spend**	**Value £**	**% produced on the land**	**Value £ of category grown**
Meat	7	254.80	5	182
Poultry meat & products	3	109	2.5	91
Fish	4	145.60	2	72.8
Fruit & Vegetables	49	1783.60	43.5	1583.4
Cooking oil	2	72.80	0	0
Dairy	19	691.60	13	473.2
Grain Mill Products	7	254.80	0	0
Bread/ rice/ pasta/ cereals	4	145.60	0	0
Cocoa/ confectionery etc.	2	72.80	0	0
Other	2	72.80	1	36.4
Non Alcoholic Beverages	1	36.40	0.5	18.2
Total	**100**	**3640**	**67.5**	**2457**

More than 65% of our basic food needs will be produced on site. This is the amount required by TAN 6. Therefore we will not need to provide for any of our food needs from our land-based enterprises.

There are obviously costs associated with rearing animals and growing your own food. Estimates for annual animal associated costs and fruit and vegetable production on site are shown in the following table:

Table 6: Annual costs associated with growing / rearing our food				
Item	**Value £**	**% of this we will produce**	**Value of % produced £**	**Cost of growing/ rearing food**
Hay[7]	316	15	47.25	268.75
Tree Hay	100	100	100	0
Straw*	100	100	100	0
Rabbit & Poultry Grain*	96	75	72	24
Goat Concentrate Mix *	96	50	48	48
Fresh Fruit /Vegetables for animals	120	100	120	0
Veterinary Bills	120	0	0	120
Slaughter House	22	0	0	22
Vegetable Seed	100	75	75	25
Compost	100	100	100	0
Tool maintenance/ replacements	50	0	0	50
Total	1220		662.25	557.75

Figures are based on research carried out at various smallholdings

*It is important to note that we may not produce like for like but we will replace the need for some feed through the design of our animal enclosures and will use other plants, such as miscanthus, for the job done by straw.

[7] Nix, J (2008) Farm Management Pocketbook, Imperial College London, - 139 &140

Enterprise

The amount of money required to meet our basic needs will be earned from our land-based enterprises. The following table is a breakdown of these basic needs. Figures are projections for our requirements by year 5 and are based on our current expenditure and the information within our management plan:

Table 7: Annual Basic Needs	
Requirement	**Value £**
Growing/ rearing food costs	557.75
Food	0
Clothing & Footwear	300
Travel (Purchase of Vehicle: £60 Car Insurance: £450 Maintenance: £500 Rail: £250 Buses & Taxis: £20 Vegetable oil, 260 litres x £0.85 =£221)	1501
IT / Communications	443
Council Tax	720
Total	**2964**

The business

'An intimate knowledge of their land, produce and markets allows viable livelihoods to be created on small, previously marginal sites. Most profitable land based enterprises on 10 acres or less are labour intensive and use labour that cannot readily be replaced by large-scale, mechanised production. These livelihoods can therefore compete on their own terms within the wider market place.'[8]

Through observing the many smallholdings we have spent time at throughout our lives, studying their successes and their weaknesses, we have formed the business ideas that follow. Our business proposals are intentionally small scale and achievable, with great emphasis on diversity and the seasonal nature of our venture. We have spent two years focusing on the specific enterprise requirements for a One Planet Development and have evaluated the skills and ambitions we have to create a robust business plan.

Our combined experience covers many areas including designing, making, growing, animal husbandry, leading workshops, customer service, marketing, accountancy and company management.

Tom has over a decade of experience in horticulture, both in his own garden and working for others. He has hosted many plant identification talks and has recently

[8] Maxey, L & Laughton, R & Rodker, O & Wangler, Z (2011) Small is Successful, Ecological Land Co-operative Ltd. Page 42
http://www.ecologicalland.coop/sites/ecologicalland.coop/files/Small_is_Successful.pdf

become more involved in offering consultancy on garden design. Through his work he has amassed a large seed bank collected from all over Wales and over the past two years he has been working on collecting specimens of herbs and trees that will form the basis of the nursery stock. He has a large network of contacts in the area with whom he trades goods and advice. Currently he is voluntarily tending to the communal gardens at Lammas and has found similar paid employment with a number of neighbours in nearby Glandwr.

During Jacqui's three years at Theatr Harlech she gained much experience in running a business, keeping accounts and marketing, all of which are very relevant to our plans. Her work there was predominantly conducted through the Welsh language and we intend for all of our marketing to be bilingual for our new businesses. The protection and promotion of the Welsh language is close to our hearts. Since moving to Pembrokeshire, Jacqui has been actively involved in local markets, both selling our own craftwork and promoting community transport through her work at Green Dragon Buses. As a result, she has established a good local network and formed an impression of the goods that do well in this type of market space.

The business will be a joint partnership between Tom Clare and Jacqui Banks with profit split 50:50.

The threads of our business are many and varied:
-Tree / perennial plant nursery and seed delivery
-'Food Forest' Fruit Leathers
-Cash crops
-Crafts derived from natural materials
-Courses
This is a result of utilising the huge diversity of crops we will be growing on our land. Many of these crops have a primary function within the design of our plot but also yield a byproduct integral to our enterprise, thus stacking functions within our space and economising our resources. For example, *Phormium tenax* (New Zealand flax) will be planted as wind breaks throughout the horticultural area, which will increase its productivity. Its leaves, which must be regularly thinned to keep the plants vigorous, are an excellent craft material and so we utilise what would otherwise be a waste product. This demonstrates the holistic design of our management plan as most things we have included in this final application have been chosen to have at least a primary and secondary function, if not many more.

As stated in a study into land based livelihoods on small acreages conducted by the Ecological Land co-operative:
'Combining a range of enterprises allows robust, resilient and efficient livelihoods on small acreages. Efficient use of resources can be made by choosing enterprises where the byproduct of one can become the raw material of another.[9]'
This is very much in keeping with our approach.

The main attraction of all of our products will be:

[9] Maxey, L & Laughton, R & Rodker, O & Wangler, Z (2011) Small is Successful, Ecological Land Co-operative Ltd. Page 42
http://www.ecologicalland.coop/sites/ecologicalland.coop/files/Small_is_Successful.pdf

-Small quantity, high quality produce
-Local provenance
-Friendly, informative customer service
-A pleasing ‘country bazaar’ presentation (when attending markets)

We feel that our products will stand out from other similar products on the market because of the appeal of goods produced attentively on a small scale. We hope our customers will feel a sense that when they buy our products they are supporting a local economy and community resilience. Also, many customers will be aware that they are helping environmental issues (such as increasing and protecting pollinator habitat) by supporting businesses such as ours.

Most of our business will be at the mercy of the whims of the Welsh weather, so total failures of some crops could occur in some seasons. This is mitigated by the diversity of crops grown and the fact that we will not be dependent on any particular one. There will always be something to fall back on and market within our existing networks. The small scale, varied and seasonal nature of our business means we will be well positioned to continually assess our successes and failures and adjust our production to our customers’ changing needs accordingly.

There may be some difficulty in creating an umbrella that incorporates each of these diverse business strands under one clear and marketable brand. We hope to overcome this problem by emphasising that the common thread between all our products is that they are hand produced on one small site that prioritises local and environmental values. In this way, the diversity becomes an advantage.
The market stall will have many diverse products displayed together. Colourful fruit and vegetables will be displayed in home made baskets, cut seasonal foliage and flowers will add to the visual appeal, seed packets of said plants will be available to buy, a few of our potted trees will stand on the floor either side of our stall and the awning will be framed with tree branches decorated with our craft products. Altogether, we think that the overall effect will be that our diverse display blends into one that will have an appealing aesthetic to a wide customer base. By offering products and services that appeal to many different market segments we can encourage customers who have come to us for one reason to buy other products as well. This will be less relevant when marketing our produce by other means, such as the fruit leathers in local shops.

Tree and Perennial Plant Nursery

Here we will explain how the forest garden will generate a significant income in addition to the fruit yield. It will act as a stock bank for seeds and cuttings, from which we will be able to continually propagate plants for the market. As part of the routine maintenance of the forest garden (weeding, thinning, pruning, root division etc.) we will be in a position to observe and select plants of particular interest or merit for propagation. Examples of this are as follows:

Plant sale held at Pontygafel, April 16th 2014

-Cuttings / scions of a particularly good specimen tree would be removed as part of its pruning management and then rooted or grafted onto rootstock grown for the purpose.
-Often, young self-sown saplings will need to be removed to maintain aspects of overall design. Similarly, suckering species will have to be kept in check by the uprooting of suckers. Of these, selected stock would be potted up.
-The division of clumping perennials and thinning of ground cover plants will provide plenty of material for potting up.
-Each year, a few selected trees / shrubs will be protected and allowed to go to seed. By harvesting and propagating these, we hope to cultivate improved fruiting cultivars specifically adapted to the locality.

Trees and other plants sold from our nursery will be given added value in a number of ways:

-Trees will be grown on in a type of pot known as an Air-Pot. These recyclable and reusable pots have an innovative structure that optimises the root structure of plants, working especially well with trees. They are made from recycled milk bottles in Scotland[10].
-The soil they will grow in will be enriched with Biochar activated with a special aerated microbial treatment, both created on site. This will guarantee healthy and diverse soil biota around the trees roots, being particularly effective in combination with the Air-Pot.
-The roots will be cultivated with a mycorrhizal mushroom appropriate to the tree species. This will ensure excellent health in the tree and, depending on the species of fungi, a good possibility of a future edible mushroom harvest where it is planted.[11] This element is particularly compatible with the first two features. A good friend and neighbour specializes in manufacturing the inoculant product.
-Some pots will be planted with a companion plant appropriate to the tree species.

[10] http://www.superoots.com/air_intro.htm
[11] Stamets, P (2005) Mycelium Running, Ten Speed Press, page 75

Here are just a few examples of the type of products we will be offering, with a brief description of the advantages they offer:

-A Scots Pine (*Pinus sylvestris*) with Bilberries (*Vaccinium myrtillus*) cloned from a parent plant selected for good fruit. The roots will be inoculated with mycelium of Cep (*Boletus edulis*).
All three components in this product are known to thrive in similar conditions. The Cep mycelia will colonise the roots of both plants, growing as they grow, improving their nutrient uptake. Its mushrooms are considered one of the best edibles.

-A clump of Raspberries (*Rubus Idaeus*) with wild Garlic (*Allium ursinum*) around the base. The roots will be inoculated with a diverse mycorrhizal fungi mix, predominantly containing the *Glomus* species.
The Rose family (of which the Raspberry is a member) and the Allium family are well known companion plants, each complimenting the other's health, which is noticeable in the flavour of edible parts. The *Glomus* is not a significant fruiting mushroom, but has been identified as one of the most important mycorrhizal species for facilitating the mutualistic relationships between such plants[12] and for the production of glomalin, a substance that is very important in naturally maintaining aggregate stability in soils.

-A pot containing Bluebells (*Hyacinthoides* non-scripta), Red Campion (*Silene dioica*) and Greater Stitchwort (*Stellaria holostea*).
The blue, deep pink and white flowers (respectively) bloom together and are a well-known sight in the hedgerows of Pembrokeshire in spring. We hope this will appeal to visitors and locals alike. They are in flower around the time of the first major plant sales in the local area. They are native, tolerant of part shade, perfectly compliment forest gardening and provide early nectar for insects. Some larger tree pots will be under-planted with this mix too.

Information about our products will be clearly displayed wherever they are for sale. Since growing in Air Pots and using mycorrhizal / microbial inoculations is relatively new to the tree market, we will clearly explain the advantages of our approach to tree cultivation. Simple illustrations will be drawn to effectively depict the pattern of root growth in an air pot and relationships in the rhizosphere between the mycorrhizae and enhanced root structure of our products.

Seeds and plug plants
As part of our nursery business we will grow and sell a large variety of seeds, plug plants (cuttings or seedlings in 100ml pots - about the size of a shot-glass) and bare roots at certain times of the year. As these items are small or lightweight, this will be where we place the emphasis on internet sales and postage. These items have a high turnover and will likely be our mainstay in the establishment years of our nursery business. The items for sale represent no significant export of nutrients from the site.

The nearest post box is in the village but larger orders will necessitate a trip to Crymych. We will explain on our website that orders are only checked and processed on one day of the week since we are unlikely to have guaranteed or consistent power /

[12] Stamets, P (2005) Mycelium Running, Ten Speed Press, pages 196-9

access to the internet and we intend to concentrate most of our sales locally. We will, however, be in a position to concentrate more of our energies on this thread of our business if it proves successful.
Tom already has experience in trading plants on the internet, using websites such as Ebay, Gumtree and Green Plant Swap. From our observations there seems to be a thriving online market network of independent gardeners whose specialist needs are not being met by conventional big-business outlets. Our products will stand out in their field by concentrating on certain plants that are sought-after but hard to find. Having spent a lot of time in these networks, Tom has a good grasp on what is popular. Another main market of ours will be in the wider locality from customers wanting to source seed of known local provenance.

From our preliminary research, we have found that there is a moderate and stable market for these products. Great interest has been expressed from a number of diverse parties so far. Visitors to the Saturday tour at Lammas will likely represent a steady customer base. These often have an above average interest in issues such as food production, perennial crops, habitat restoration / wildflower cultivation etc, and will typically have transport convenient. We are therefore confident that the Lammas shop will provide a small but successful outlet for our products. By utilising this outlet and associating our business with the Lammas project, we hope that a mutually beneficial relationship will be created. Barely any extra traffic would be generated by this plan (please refer to the Transport Assessment and Travel Plan Section of this application).


Cae Hir Plant Fair May 5th 2014

At the time of writing, we have attended a number of plant sales in the area as stallholders, as well as hosting a few sales at home. All have been very successful despite our products not yet having the benefits that we hope to offer once the business is established. Plants for these sales were bought in bulk with the intention of obtaining parent stock for permanent planting and future propagation. In the meantime we took the opportunity to test the market by selling the surplus. Eventually our land-based activity will add value to these products. At the sales, we noted that casual customers are often keen to try something new in the garden and that interest in unusual fruit is, as we expected, relatively high.
From anecdotal evidence, we project that interest in such things as forest gardening, perennial food crops, wildflower cultivation etc. are set to gain momentum in the future. In recent years, for example, sales of vegetable seeds have overtaken sales of flower seeds - a phenomenon that has been attributed to rising food prices[13].
Similarly, interest in flower cultivation has shifted away from cultivars and exotics and toward native wildflowers as more people become aware of the deepening biodiversity crisis:
'Wildflowers are having a moment: sales of cornflowers, field poppies and other pollinator-friendly blooms have tripled this year, influenced by Sarah Raven's TV programme *Bees, Butterflies and Blooms*'[14]. We are also very encouraged to see

[13] http://www.guardian.co.uk/lifeandstyle/2008/apr/22/foodanddrink.food
[14] http://www.guardian.co.uk/lifeandstyle/2012/jul/20/gardens-wildflowers-olympic-park

many other OPD applications in the area and hope that our land and business will act as a stock bank for the type of plants that will inevitably be in high demand for these sites.

All things considered, we believe that the market for our products is strong.
We also predict that an understanding of the importance of mycorrhiza / microbial relationships within the soil and their central role in plant health will become more mainstream very soon and that horticultural businesses working with this technology will have a market advantage. The leading commercially available mycorrhiza linoculant in the U.K. has seen a surge in popularity recently[15]. Similarly, the environmental advantages of biochar are entering the wider public conscious.

Running a tree nursery may at first seem incompatible with the OPD criteria of establishing a business from an empty field within a five-year window, but there are plenty of shortcuts that can be made in the early years. In the few years it takes for our more valuable stock to reach marketability, we can concentrate our efforts on fast growing tree species, on herbs and shrubs, on seed sales and plug plants / bareroot stock.

The tree nursery side of the business will be run in line with DEFRA regulations.

Market Segment
The trees and other plants we have for sale will be aimed at the following market:

-Private landowners with an interest in planting a specimen tree.

-Local organisations wanting to use planting on a premises e.g. A fruit tree in a village green, trained / potted trees or hanging baskets at the entrance to a restaurant etc.

-Landscapers.
-Forest gardeners.
-Conservationists / restorative agriculturalists.
-A gift with a difference.
-Local nurseries such as Ty Rhos Trees.
-Other OPD applicants.
-Internet customers seeking specialist products (seeds and plug plants only).

Market size and potential

-Awareness of environmental issues seems to be becoming more mainstream everyday. Aspects of this that are relevant to the market for our products include awareness of the importance of sourcing plant stock of local provenance (following the introduction of Ash dieback from imported ashlings for example), the urgent need to restore habitat and forage for pollinators, and the growing movement towards local food production.

-Since we will not be mass-producing any particular tree species we will be relying on single or small batch purchases based on the merits of the individual plants, the quality of our care for them, and the unique features of their cultivation, mentioned above.

-Most small sales we envisage taking place on site, at the nearby Lammas hub

[15] http://rootgrow.co.uk/our-passion/zones/retailer.html

shop, or at the Glandwr village shop. We hope that many visitors to Lammas will be inspired to make a purchase following their visit, where they will have been in an environment filled with the same fruiting trees and wild flowers we will have for sale.

-Larger stock (trees that don't fit in the car) is typically sold and delivered by arrangement following a visit where the items have been selected. These sales will be very infrequent.

-We have arranged to sell a batch of trees annually to Ty Rhos Trees near Newport (see Appendix 10 – Letters of support).

Current market

Our research shows that there are already a number of established garden centres in the wider locality that already stock a supply of trees and perennial plants. On some level we will be in competition with these suppliers. However, what these large retailers gain in size and turnover is often lost in attention to detail and resulting quality of produce. We have spent a lot of time at garden centres all over the country, calling in to any that we pass for market research. We have consistently found that:

-A significant proportion of tree stock is unsatisfactory, with problems ranging from deformed roots to strangling by forgotten stake ties.

-Invariably the emphasis is overwhelmingly on exotics and generic cultivars of little worth to wildlife.

-More often than not the fruit trees, when there are any, are a bit of an afterthought with scant information on cultivation and provenance.

-Staff seldom have much knowledge or experience in these matters when asked.

Of course there are exceptions, though they are few. These are the kind of problems we will be able to avoid by keeping our business small and manageable. We will have an advantage in being able to offer an informed and personal service and believe that our products will appeal to a more discerning customer.

On a national level, Martin Crawford of the Agroforestry Research Trust in Devon sells many specialist fruiting trees on his website[16]. However, he seems to be very often sold out of certain stock, suggesting that demand outstrips supply and that there is a niche in the market, putting us in a strong position.

Our products stand out in the following areas:

-Plants of local provenance or of high traceability.

-Well-selected stock e.g. proven fruiting reliability in the local climate.

-All plants carefully looked after in the nursery.

-Friendly, informed and reliable customer service.

-The special soil amendments / companion planting combinations (mentioned previously).

Sales

All product prices are loosely based on the volume of the pot. This offers a standard pricing system for plants for the table below, though in reality prices will vary owing to a variety of factors based on rarity, growth rate and propagation techniques. For example, a semi-mature slow growing tree in a 30l pot could fetch up to a few hundred pounds to the right buyer. In the following figures we have used the lowest

[16] http://www.agroforestry.co.uk

value of any plant that would be contained within the listed pot volume. Figures are therefore approximate and conservative. With regards to running costs we have assumed that all our compost will be brought in for the first three years. After this, we will begin to see these costs fall a little as we begin to generate our own on-site compost and biochar etc. However, we will always need to import most compost to supplement our nursery business. Calculations will assume this to amount to 75% the overall volume used from year four onwards, though we envisage this being lower eventually. All imported compost will be purchased from Charlie Martin of Martins TLC in Rhydlewis, who makes his own peat-free compost from worm castings. Rootstocks of various species such as apples and pears will be brought in initially from Frank P. Matthews of Trees For Life, and thereafter propagated on site. All other rootstock species will be propagated on site. All scion wood and seed will be grown on site.

Table 8: Number of plants sold annually				
Year	2	3	4	5
Number sold: Plug plants & Bare roots £1	50	100	150	200
Number sold: Seeds £2	25	50	75	100
Number sold: 3 liter £5	20	30	30	30
Number sold: 6 liter £10	5	20	30	30
Number sold: 15 liter £20	0	5	20	30
Number sold: 30 liter £50	0	0	5	5

Table 9: Annual takings for tree nursery				
Year	2	3	4	5
Plug plants & Bare roots £	50	100	150	200
Seeds £	50	100	150	200
3 liter pots £	100	150	150	150
6 liter pots £	50	200	300	300
15 liter pots £	0	100	400	600
30 liter pots £	0	0	250	250
Total £	**250**	**650**	**1400**	**1700**

Table 10: Annual running costs of tree nursery				
Year	2	3	4	5
Compost £	16.5	44	88	110
Pots £	0	5	10	15
Rootstock £	30	30	30	30
Sundries £	20	20	20	20
Tool Maintenance/ Repair £	20	20	20	20
Total	**86.5**	**119**	**168**	**195**

Table 11: Annual profit of tree nursery				
Year	2	3	4	5
Total Sales £	250	650	1400	1700
Running Costs £	86.50	119	168	195
Profit £	**163.5**	**531**	**1232**	**1505**

Operations

Premises

The majority of the stock for our business will be sourced from our forest garden. The only exception could be the rootstock of some mainstay trees, which will be outsourced if demand outstrips supply. We will keep all potted stock not ready for sale on the hardstanding immediately outside our dwelling, where the sheltered

situation will help growing conditions. We will also be able to keep a keen eye on the general condition of our stock and watering will be made easy. Propagation will take place in the glasshouse and many trees will be over-wintered here.
We do not intend to advertise for visitors to make casual visits to our site for the express purpose of viewing or buying a plant, since we don't want the traffic (one of the disadvantages of our site is that we will not be able to accommodate many vehicles at once). Realistically however, we imagine that occasional (unexpected or pre-arranged) visits will be made to our site as our business becomes established and is recommended by friends (see Transport Assessment and Travel Plan).
One of the main advantages of running the nursery from home is that we will always be on site to make a sale to a visitor, even if it should be a friend or neighbour on an informal visit.
Stock that is ready for sale can be kept on display at the Lammas shop or at the Glandwr village shop, both of which are a ten minute walk from our site, allowing for care of the plants to be carried out casually on an evening walk. These two outlets represent a small but steady amount of passing trade, which is enough for our modest business. Ty Rhos Trees, who will buy a number of our trees, is a 20-minute drive away.

Equipment
We have already invested in most of the equipment needed for running the nursery all maintenance will be carried out with hand tools we already own. The Air-Pots are re-usable and are removed from the tree before sale. All smaller pots are sourced second hand and are typically free. A very small amount of running costs will be associated with sundries.

Food Forest Fruit Leathers

As you can see from the crop list (Table 4), our Forest Garden will comprise many unusual fruits, some of which will be for our personal consumption. A large portion is being grown to be used in combination in the making of fruit leathers. These will then have a storage time of up to five months and will allow us to command a value added price for unusual fruit that may be difficult to sell fresh and individually due to their unfamiliarity and the short shelf life of the fresh product.

Blackcurrent Fruit leather made in Septemember 2013

Fruit leather is made by pulping fruit and adding honey, the mixture is then spread thinly on baking parchment and dried. This can be done in a cool oven but we will use our solar kiln to the same effect.

We will have two fruit leather products. A snack size roll, measuring 3cm x 30cm, presented wrapped in baking parchment, this will then be encased in a sealed translucent biodegradable bag to keep the product fresh. The second product will be small squares of fruit leather presented in a translucent biodegradable bag, this product emulates jelly sweets and is a good opportunity to use up any messy edges produced during the production of the snack size roll. Each bag will hold the equivalent of a 12cm x 30cm section of fruit leather.

The flavours available will vary throughout the season depending on which fruits are ripe at the time of production. We will design a label listing all possible fruits on which the relevant ingredients will be ticked for each batch.

The yields from our fruit forest will take some years to establish, we do not envisage starting the production of fruit leathers until year four and then only a limited selection of fruit will be available. Every successive year will yield greater quantity and diversity of fruit. The fruit leathers will not depend on any particular crop or proportion of ingredients, so occasional individual crop failures will not present a problem.

We plan to use the kitchen at the Lammas Community Hub for the production of our fruit leathers, as this is certified by environmental health for safe food production.

Any edibles we produce will have to be prepared in line with environmental health for which we will be assessed. At least one of us will need to hold a level 2 hygiene certificate (which Jacqui currently has) this will need to be renewed every three years at a cost of £50.

Market Segment

Fruit leathers are aimed at the following customers:

-Parents who would like a healthy snack for their children.
-People who take a pack lunch to work.
-People who like to have a snack in the cupboard.
-Heath conscious people who are aware of the health benefits of eating a great

variety of different fruits throughout the year.

-People who prefer honey to refined sugar as a sweetener.

-People who prefer to support local producers and local economy.

-People conscious of the biodiversity crisis associated with conventional food production and who want to support an alternative.

-People who themselves have a personal interest in the potential of forest gardening at home.

-Health food shops and delicatessens (wholesale).

Market size and potential

-Packed lunches are consumed daily by school children and workers so by tapping into a regular market the potential for this product is very large.

-The awareness raised by government campaigning on healthy eating has increased the market for healthy snacks in recent years[17].

-Local health food shops stock a great variety of snack bars to cater for this market so by selling wholesale and emphasizing the local provenance of ingredients we plan to create a good market for this product.

-We envisage a good amount of spontaneous and passing trade in fruit leathers when they are included in the display of our market stall.

Local outlets have already expressed interest in stocking this product when we have described our plans to them (see Appendix 10, Letters of Support). Anecdotally many people in the local area have also shown interest and have enjoyed our trial batches, leaving positive feedback regarding price and quality. In short we are confident in the viability of this idea as one of our business lines.

The market is currently being satisfied by:

There are a great variety of healthy snacks available from many large companies. The following offer fruit leathers specifically:

-Bear Yo-Yo

-Strech Island

-Frutina Fruit Bar

Our product stands out in the following areas:

-Ingredients of local provenance / high traceability.

-A wide variety of different and unusual fruit, many of which are popularly considered to be 'superfoods'.

-A raw food product.

-Honey instead of sugar as the only sweetener / preservative.

-A handmade / small batch production presentation.

-Grown using clean natural methods – no monocultures, pesticides etc.

Sales

Fruit leathers will be sold in local outlets such as health food shops and delicatessens. We also plan to attend local markets with all of our products and fruit leathers will be a key part of this. Sales to retailers will be repeat orders whereas market stall sales are likely to be predominantly passing trade largely linked to the sale of other products on the stall.

[17] http://www.nhs.uk/Change4Life/Pages/be-food-smart.aspx

Fruit leathers will be produced in the Summer months during the fruit harvest and will store for up to five months, so sales of this product will be concentrated into the late Summer, Autumn and Christmas. Due to the small batch and seasonal nature of this product we will not have stock to sell throughout the year. This may be considered a disadvantage for conventional, larger and less diverse companies but we consider this to be in our favour - when available, we hope the fruit leathers will be remembered from the previous season creating a 'buzz' around the product. In the spring, we can concentrate on other aspects of our business.

We have estimated that we will have 100kg of fruit available for fruit leather production in year four. In year five we estimate 150kg will be available. 1kg of fruit + 150g of honey produces a 48cm x 30cm sheet of fruit leather. Each sheet will produce either sixteen snack sized rolls or four bags of fruit leather squares.

In the following figures we will assume that we will need to pay a commercial wholesale price for the honey, which will be sourced locally. We will also assume that we split the quantity of fruit leather produced equally, in weight, between the two different products. The rolls of fruit leather will wholesale at 25p each and be sold direct from market stalls etc. at 50p. The bags of fruit leather pieces will be £1 wholesale and £2 direct.

The figures for harvest in years 4 and 5 are conservatively estimated and have been reached by estimating yields for each of our crops and assuming that we will use only a portion of this yield for fruit leathers. This is because much of the fruit will be eaten fresh and also ensures that we are not over estimating quantities. We must also take into account the need to create a market for the product. Year 4 will be used to promote the product and to pursue links with local shops willing to stock the product.

Table 12: Annual sales for snack sized rolls of fruit leather		
Year	4	5
Quantity sold wholesale	400	600
Quantity sold direct	400	600
Value wholesale £	100	150
Value direct £	200	300
Total sales £	**300**	**450**

Table 13: Annual sales for bags of fruit leather pieces		
Year	4	5
Quantity sold wholesale	100	150
Quantity sold direct	100	150
Value wholesale £	100	150
Value direct £	200	300
Total sales £	**300**	**450**

Table 14: Annual Running Costs for Fruit Leather		
Item	**Year 4** **£**	**Year 5** **£**
Baking parchment [18]	5	7.5
Biodegradable bags[19]	3	4.5
Honey Local supplier	152	228
Hire of Hub Kitchen Daily rate £20	100	160
Food Hygiene Certificate £50 every three years	16.67	16.67
Total	**276.67**	**416.67**

Table 15: Annual Profit for Fruit Leather		
Year	4	5
Sales **£**	600	900
Costs **£**	276.67	416.67
Profit **£**	**323.33**	**483.33**

Operations

Premises

The production of fruit leathers will involve harvesting on our site and transporting the goods on foot a short distance to the kitchen at the Lammas Hub community kitchen.

Equipment and ingredients

All fruit will be harvested from our site. All honey will be harvested from our site or sourced locally - there are several honey producers in the area. All packaging will be sourced from ethical companies who provide biodegradable packaging. We will need a solar fruit drier, a mouli and general kitchen equipment, all of which are already in our possession or are part of the general set up of our smallholding.

[18] www.ethicalsuperstore.com
[19] www.polybags.co.uk

Cash Crops
We will be growing Asparagus and Watercress as cash crops.

Asparagus
We will grow three outdoor 30m^2 beds of asparagus (the dimensions of each bed will be 15m x 2m). The varieties we plan to grow are Gynlim, Thielim and Backlim, all are favoured for their reliability and are the popular choice for commercial production. They are known and proven to yield successfully in our climate. Asparagus crowns will be planted in year two so the first commercial yield will be in year five. The plants will harvest for ten years or more with yields increasing year on year. We will also grow some asparagus in the glasshouse to extend the market season.

Watercress
We will establish a watercress bed in the area above our dwelling. It will cover an area of approximately 50 m^2. The bed will be shallow, lined with bentonite clay and have a base of gravel and soil. The crop will be flushed regularly with spring water that has passed through a (homemade) charcoal filter. Submerged alder logs will cause the water to meander through the bed to prevent erosion. The Watercress beds will be established during year three with the first harvest in year four. Again, a small bed of watercress will be grown in the glasshouse to extend the market season. Local suppliers of vegetables have expressed an interest in locally sourced Watercress in particular as this product has a short shelf life meaning that small regular batches would be ideal.

Market Segment
-Local shoppers
-Visitors to Lammas eco-village
-Local food co-op
-'Glut Bag' customers linked to local co-op
-Local restaurants

Market size and potential
-Both asparagus and watercress are specialist crops which appeal to restaurants, presenting a consistent market often willing to reflect the seasonal nature of local vegetables (particularly 'The 25 Mile' in Cardigan who source their main ingredients within a 25 mile radius of the restaurant).
-The village shop in Glandwr will represent a small local outlet for watercress especially, since this product is not offered by C & M Organics vegetable shop nearby.
-Visitors to Lammas in the Spring / Summer months when our crops will be at their height are a large potential market particularly as the site gains wider recognition.
-The food co-op is a regular weekly market consisting of approximately 20 customers and has the added potential of their glut bag system that allows for abundant seasonal vegetable to be marketed to an already loyal customer base.
-C & M Organics have indicated that they would be in a position supply our produce to other shops further afield as part of their routine deliveries.

The market is currently being satisfied by:

-C & M Organics vegetable shop is nearby and offers a range of organically grown vegetables. Bwyd Y Byd in Crymych stock fruit and vegetables and have expressed to us their interest in increasing their range of locally grown produce.

-Small-scale local growers often supply asparagus to the local market but it is so highly sought after that there seems to be a greater demand than there is supply.

-Watercress is supplied by large companies. We have not identified any other local sources and the local organic supplier has indicated that there is a shortage of this product, suggesting that it would be a good niche.

Our product stands out in the following areas:

-Local provenance / high traceability.

-Grown using clean natural methods - no pesticides etc.

-Selected varieties for flavour over yield.

Sales

The asparagus crop will be concentrated into mid-spring.

Table 16: Annual Sales of Asparagus	
Year	5
Harvest Kg	33.25
Price per kg £	10
Total Sales £	**332.50**

Figures are based on information from CALU (Centre for Alternative Land Use) at Bangor University and our own market research.

Asparagus will be packed in bunches tied with *Phormium tenax* from the garden.

Watercress beds produce an average of approximately 500g of watercress per square meter per week throughout the summer (May-October). Although they yield throughout the winter the harvest is much lower so we will not take this into account here.

Table 17: Annual Sales of Watercress		
Year	4	5
Harvest Kg	75	75
Price per kg £	4.5	4.5
Total Sales £	**337.5**	**337.5**

Figures are based on our own growing experience, market research and speaking to local growers.

Watercress will be packaged in biodegradable food bags in portions of 100g.

Table 18: Annual running costs for Cash Crops			
Item	Packaging (watercress)[20]	Tool repair/ replacement	**Total**
Cost £	23.23	40	**63.23**

Table 19: Annual profit for Cash Crops		
Year	4	5
Total sales £	337.5	670
Running Costs £	63.23	63.23
Profit £	**274.27**	**606.77**

Operations

Premises

Asparagus will be grown on site in dedicated beds in the vegetable garden. Watercress will be produced in a specially designed waterbed with charcoal filtered spring / rain water. Both crops will benefit from the South facing aspect of our property and our daily presence on it. Some of each crop will be grown in the glasshouse so that it will be available for longer.

The remote location of our site does not present a disadvantage. There are many nearby outlets for our produce, two being within walking distance.

Equipment and ingredients

After initial set up of the site neither crop will require specialist equipment. Packaging will be kept to a minimum and will be biodegradable.

[20] www.polybags.co.uk

Surplus Animal Produce

Earlier in this document we have described the various different animals we will keep as part of our smallholding and their associated costs. Here we will demonstrate the small income we will generate from the surplus produce we will have.

Market Segment

-Our network of friends and locals
-Visitors to Lammas eco-village
-Glandwr village shop
-'Glut Bag' customers linked to local co-op

Market size and potential

-This is a small market because we will be selling only surplus. There will not be a consistent supply and it will be largely conducted on a casual basis.

The market is currently being satisfied by:

-Other local smallholdings often sell surplus to friends and neighbours.

Our product stands out in the following areas:

-Local provenance / high traceability.
-Grown using clean natural methods - no pesticides etc.
-Selected breeds for flavour over yield.

Sales

Table 20: Annual income from surplus animal produce in year 5

Item	Cost per unit £	Quantity	Total £
Chicken Eggs	0.2	312	62.4
Duck Eggs	0.2	156	31.2
Goat meat	5.5 / kg	20kg	110
Goose	10.5 / kg	16kg	168
Ducks at point of lay	6	10	60
Total			431.6

Associated costs are already accounted for in table 6 and 7 so will not be included here.

Operations

The running of this element of the business is part of the daily work associated with the smallholding and will require no additional facilities.

Crafts derived from natural material grown on site

Key to the craft element of our business plan is the diversity of plants that will define our plot (some are detailed in Tables 2,3 and 4). The primary reason for their planting vary from fruit yield for our own consumption to wind breaks and habitat creation. All of the craft uses we will find from them are secondary and are examples of using waste and byproducts (mainly prunings) we have on site innovatively to create a little extra income.
The craft element of our business is more of a hobby / sideline than a main thread of our business. The main attractions are that it will bring in a small income from our leisure time and that we can expand or contract it according to demand. However, the main threads of our business will benefit indirectly from our craft products, for example our market stall may see increased sales as a result of being well decorated and eye-catching.

Market Segment

-Market stall customers (particularly Christmas time but including other seasonal festivals).

-Local craft outlets.

-Visitors to the Lammas eco-village (particularly Summer).

-Restaurants and cafés (for table decorations etc.)

Market size and potential

-Christmas markets can be very lucrative, it is important to have an intimate knowledge of specific markets as customer bases vary dramatically. This is something we have been working on since living in the area and our knowledge will develop as we gain experience.

-There are several local outlets geared towards marketing local crafts and we intend to supply several who work on a commission basis.

-We have sold some crafts in the Summer months at Lammas eco-village tours and been very successful. As this becomes better established we expect it to be one of our main outlets.

-We have approached various local restaurants / pubs etc. with some of our craft products to estimate the potential for supplying them. Much interest has been shown for such items as dried hop vines for decorating the bar, bread portion baskets, Phormium placemats, pressed foliage lampshades, various table decorations etc.

The market is currently being satisfied by:

-Other households at the Lammas eco-village have craft products for sale.

-There are many local crafts people producing homemade cottage crafts.

In discussion with the residents at Lammas we have found them to be very positive and supportive of our business. The general agreement is that any additional local crafts for sale at their shop would boost the overall success of the project.

Our product stands out in the following areas:

-Innovative materials and a raw / rustic aesthetic.

-High quality.

-Unique designs.

-Direct customer interactions and traceability of produce.

-Materials can be grown on a commission basis.

-All materials grown naturally without harmful chemicals etc.

Sales

Years one to three will be spent establishing ourselves on the site and we do not envisage having time to create many craft products. Following are the details of when we feel we will be able to start producing some of the craft products. The timescales also relate to the maturing of the relevant plants. We have also taken into account the time it takes to produce each product and what sort of demand we expect there to be for them. The following examples represent only a few of the products it will be possible to make from materials sourced on site. Many more will be made and could have been included but we have simplified things to keep our estimations conservative. Therefore, the products themselves will vary year to year (according to market trends and resource availability) but we will aim to make approximately the same total income as shown below.

Year 4
Pressed flower / foliage identification posters 10 @ £20 = £200
Pressed flower / foliage greetings cards 30 @ £2.50 =£75
Christmas wreaths 20 @ £15 = £300
Various Christmas decorations 30 @ £3 = £90
Seed 'bombs' 20 @ £5 = £100

Year 5
Hop and herb pillow 5 @ £30 = £150
Phormium hats 10 @ £30 = £300
Phormium flowers 50 @ £1.50 = £75
Incense smudge sticks 20 @ £5 = £100
Lavender bunches 50 @ £3 = £150
Contorted Hazel 'wands' 20 @ £4 = £80

Sun hat woven by Jacqui in April 2014

Year 5+
Although these examples are not included in our projections for the period of the business plan (owing to slow crop maturation) we have included these to demonstrate the development of our business beyond the initial 5-year set up.

Birch Bark products 10 @ £10 = £100
Hornbeam Chopping board 5 @ £20 = £100
Mistletoe 20 @ £5 = £100
Grafted chair 3 @ £800 = £2400
Natural firelighters 100 @ £3 = £300

Table 21: Annual Sales for Crafts		
Year	4	5
Total Sales £	765	855

Table 22: Annual Running Costs for Crafts				
Item	Sundries	Tool repair / replacement	Stall Costs (approx 1 every 2 months @ £20)*	TOTAL
Cost £	50	50	120	220

*For simplicity stall costs are included here but the cost will, in reality, be spread throughout the business threads as the stalls will include all our products.

Table 23: Annual Profit for Crafts		
Year	4	5
Projected Sales £	765	855
Annual Cost £	220	220
Profit £	545	635

Operations

Premises

Crafts will be produced mostly in the dwelling, workshop or in the barn attached to the house. The barn will allow us both to work on days where the weather is unsuitable for outdoor tasks, and will be where raw materials are processed, typically making a lot of mess, before the item is finished in the house. A selection of certain crafts can be kept on display around our home so friends and visitors can see them and hopefully go on to recommend our produce to others. We can also keep a stockpile of certain crafts at home so that we can select items at short notice to represent what is most likely to be popular at whichever event we are attending. The rural location of our site will mean that the craft thread of our business will be more involved with dried, pressed and preserved items with a long shelf life.

Equipment and ingredients

A variety of equipment will be used in the production of crafts but it is all equipment we already own as we currently make the majority of the crafts listed.

Courses

Both of us have spent several years developing varied skills and acquiring knowledge in the areas in which we plan to run courses. We consider it to be vital to the development of projects such as ours to offer this knowledge to people wanting to do similar work. We have found there to be a consistent demand, which looks set to grow in the future, from people from all walks of life for the sort of information we are able to convey and we consider it the duty of people involved with One Planet Development policy to provide such courses.

We are aware that many residents at Lammas, which is very close to us, are also running courses in a similar vein to that which we are offering. We do not foresee this to be a problem as there is such a demand for courses of this nature and that demand is projected to grow in the future. We have approached residents at Lammas about cooperating with running courses. It is generally accepted that in the fullness of time this will be very agreeable to all involved - both benefiting participants through coming into contact with many practitioners as well as taking the pressure off individuals to run entire courses. Until sustainable development is implemented on a much deeper level, there is a huge need for groups and individuals in every village to provide practical opportunities and training such as we are offering. In our experience the world of sustainable development is one of co-operation and sharing ideas in order to improve our social, economic and environmental awareness.
We are also in a position to be flexible on the content of our courses so if we find that we are offering something too similar to other people we can alter the focus in order to appeal to a different set of people.
For the sake of simplicity in this plan we will assume that the courses are independently run.

Why we can deliver these courses
Jacqui was a Community Arts Officer (before becoming Managing Director) at Theatr Harlech in North Wales and has extensive experience of running art workshops for all ages. She has been experimenting with the weaving of *Phormium tenax* over the past two years and has successfully run flower weaving workshops at festivals in that time.

Tom has extensive experience of Permaculture and Forest Gardening and has already successfully run a forest management course at Lammas early in 2013. He has been involved in hosting many Permaculture themed courses at various eco - villages / co-operatives over the last fifteen years. Throughout his travels in Scandinavia he worked as a garden designer and dry stone waller offering consultation on all manner of land based and low impact projects. He also has experience in running land art workshops, wild plant identification walks and forage days.

Forest gardening - Design & creation
This course will offer a balance of theoretical design and practical hands-on experience through tours of our own forest garden and working on selected jobs within it. In the early years (years 4 – 5) we will concentrate on techniques for successful establishment of tree crops such as sheet mulching, nutrient building, encouraging a fungally dominated soil character, useful ground cover plants, appropriate early succession nurse crops etc. (We have not found any other forest gardening course offering these particular skills). Later, when the garden is

established and bearing fruit, the emphasis will obviously change and then stabilise.

The course will run over 2 days, usually on weekends. Tom plans to run two courses per year, one in summer and one in winter, offering participants the opportunity to return to the garden in changing seasons and experience the different work that is involved. Course attendants will present us with a good opportunity to sell plants from our nursery.

Market Segment

-People with an interest in learning about forest gardening.
-People who are planning to plant a forest garden.
-People interested in the low impact movement.
-Restorative agriculture practitioners.

Market size and potential

-There is an ever expanding market for this type of course as awareness of alternative forms of gardening and feeding ourselves increases and environmental awareness becomes more mainstream.

Weaving with *Phormium Tenax*

Phormium Tenax is native to New Zealand and also known as New Zealand Flax. It is widely grown in the UK as part of municipal planting schemes as it is evergreen and very low maintenance. We will be growing it throughout the site as windbreaks. Jacqui has been making craft products and running workshops using the material for the past couple of years.

Flower woven from Phormium, Dec 2013

One-day courses for beginners will be on offer either to learn how to weave flowers or a large container. A two day course on weaving a Kete (small bag) will be run for more advanced weavers. All materials used for the courses will be harvested from our site. Phormium plants grown as part of our plant nursery will also be for sale to participants.

Market Segment

-People with an interest in weaving - amateur & professional.
-People with a link to New Zealand.
-People who like the aesthetic of this type of weaving.
-People who have a *Phormium tenax* plant in their gardens and want to learn how to make use of it.

Market size and potential

-The market for craft workshops is good as interest in traditional skills remains strong.
-People interested in the discipline of weaving may be attracted to *Phormium tenax* as a material as it is novel and not commonly practiced in the UK.

The market is currently being satisfied by:

-Forest garden courses are run by Martin Crawford in Devon, Karuna in Shropshire, Old Sleningford in North Yorkshire, and Coed Hills near Cardiff. There is only one other forest garden course that we know of locally, which is run by a community group in Cardigan.

-Various crafts people throughout the country run weaving courses.

Our product stands out in the following areas:

-Our forest gardening course will offer detailed advice on a number of subjects not covered by other similar courses in the U.K.

-There are no courses run in weaving with *Phormium tenax* that we know of in the UK.

Sales – Forest gardening design & creation

Although there will be up to 8 places on each course, we have made a conservative estimate of 5 participants per course as a guide for our cash flow.

Participants will be charged £100 for the weekend. There will be a £20 discount for participants who travel by public transport, or who car share. Early communication with prospective participants will be encouraged so as to make such arrangements. This is in line with our travel plan, detailed in the dedicated section of our application. A costing will therefore be worked out for the lower price of £80 per participant.

Table 24: Annual Profit for forest garden courses		
Year	4	5
Forest Gardening 1 £	400	400
Forest Gardening 2 £	400	400
Total £	800	800

Sales - Weaving with *Phormium tenax*

Jacqui plans to run one flower weaving workshop and one large container weaving workshop annually both at a rate of £35 per participant. There will be up to 10 places on each course; we have however made a conservative estimate of 7 participants per course as a guide for our cash flow.

There will be 8 spaces available on the Kete workshop at £70 per participant with one course being run annually, we have conservatively estimated that 5 participants will take up the workshop.

There will be a £10 discount on day courses and a £20 discount for two-day courses for participants who travel by public transport, or who car share. This is in line with our travel plan, detailed in the dedicated section of our application. All costing will be worked out for the lower price of £25 per participant on one-day courses and £50 per participant on two-day courses.

Table 25: Annual Profit for weaving courses		
Year	4	5
Flowers £	175	175
Large Containers £	175	175
Kete £	250	250
Total £	**600**	**600**

All of the money made from courses will be profit.

Operations
Premises
Courses will be run out in the open if the weather permits or in barn attached to the house if it is raining. They will be run mostly in the Summer months which will make this viable.

Accommodation options for weekend courses will be as follows:
-Free camping onsite (we will ensure that we do not exceed the limit of people camping on our land more than 28 nights a year).
-A B&B is situated just two minutes walk from our site.

Food for participants will be either 'bring your own' (most relevant to day courses) or we will charge an extra fee of £3.50 per meal per person which will cover the extra cost of catering for people. Most of the produce for this will come from our land.

Equipment and ingredients
The courses we plan to provide will not require any additional set up costs. There are no tools needed that we do not already own.

Sales - All products
We intend to sell our products in a variety of ways, which we have outlined whilst describing the various aspects of our business. Here we have compiled all the markets we have identified (some of which are not mentioned in relation to a specific product). The following options are available to us and over time we will work out which work best, are most profitable and most sustainable in regards to our ecological footprint.

-The Lammas shop is situated within walking / cycling distance. In the winter it serves the residents and other locals who live in the vicinity and in the summer it also attracts passing trade from visitors and tourists. It sells fresh and preserved food as well as craft items and plants. The shop operates on a commission basis, taking a percentage of any sales made.
-The Glandwr village shop has recently been re-opened by a group of volunteers from the village and is opening every weekend. We have been actively involved in this (baking cakes for sale, volunteering etc). It also sells local produce and operates on a commission basis.
-The health food shop in Crymych, Bwyd Y Byd, have said that they would welcome

more locally grown produce and are particularly interested in stocking fruit leathers (see Appendix 10, Letters of Support).
-The Eco shop in Cardigan is run by volunteers and stocks locally made crafts and plants. They have agreed to stock our produce (we already sell crafts here). The shop operates on a commission basis.
-The '25 mile' restaurant in Cardigan uses ingredients sourced within a 25 mile radius. They have provisionally agreed to buy interesting seasonal produce from our site on a regular basis.
-The delicatessen in Narberth stocks locally grown produce and is known to support local small scale producers. They have provisionally agreed to stock our produce.
-The local delivery company 'Pembrokeshire Produce Direct' was set up especially to promote locally grown produce to people living in Pembrokeshire and across the UK. They have also provisionally agreed to stock our products in the future.
-We have a contact at the Rural Regeneration Unit who run a Wales-wide co-operative food box scheme. They have agreed to put us in touch with their customer base, who will be able to take cash crops that we grow as part of their 'glut bag' scheme (See Appendix 10, Letters of Support).
-We intend to have an occasional market stall - particularly in the run up to Christmas in local towns. This may be in combination with other local producers.
-We will supply Ty Rhos trees, a well-established local tree nursery, with some stock (see Appendix 10, Letters of Support).
-For the advertising of courses we will use local email lists to advertise as well as using the LILI (Low Impact Living Initiatives) website to advertise to a wider audience where appropriate.
-We will develop a web site which any business cards we give out locally will direct people to, helping to increase awareness of our products.
-Ebay and other large websites will be utilised for selling seeds and other small items in the early years but we will be focusing on developing local markets predominantly.

All of our products will be sold under a defined brand. We will develop our branding with professional help from a former client of ours, who is based in North Wales. This will assist us in marketing the large range of products we plan to produce.

Table 26: Total Enterprise Profit

Enterprise	**Year 1 £**	**Year 2 £**	**Year 3 £**	**Year 4 £**	**Year 5 £**
Tree Nursery		163.5	531	1232	1505
Fruit Leathers				323.33	483.33
Cash Crops				274.27	606.77
Crafts				545	635
Surplus Animal Products					431.6
Courses				1400	1400
TOTAL		**163.5**	**531**	**3774.60**	**5061.70**

Management
The general management of the site will be conducted by Tom, who will carry out the majority of the practical tasks and management of crops. Over the course of many years he has gained considerable first hand experience of most relevant responsibilities. Tom has a very clear vision for how the businesses interlink and compliment each other in a holistic and efficient manner. Jacqui will assist in the practical tasks on a daily basis.

Jacqui will manage the financial, administration and marketing elements of the business. She has experience of managing businesses in the past and has worked in marketing as part of her career. The family accountant Terri Hatfield who is based in Aberaeron will assist us in the financial management. Tom will assist greatly in marketing through the production of marketing materials; he has an art degree and a strong eye for aesthetics.

We will be jointly responsible for sales and will share deliveries. Tom will take on local deliveries that can be achieved on foot or by bicycle and Jacqui will take on deliveries further afield. We will run any market stalls jointly.

Quality control will be undertaken throughout production and will be a joint task integrated holistically into the running of the business rather than separated out into a specific task.

Occupants

The design of the site has been considered over many years, firstly theoretically and in relation to no specific geographical site and more recently in relation to the specific site we have bought. The set up will be high input but it is designed to be low maintenance / high yielding in the medium and long term. We have designed the threads of our business so that throughout the year our tasks will vary greatly and fit in with the seasonality of weather and crop yields. Such a variety of activities concentrated into one space will need constant attention in order to ensure everything is functioning as it should. Daily presence will be required if our site is to remain at maximum productivity.

Through the crop lists and the list of animals we plan to keep we have made it clear that there will be enough food produced to satisfy 65% of our food needs. There will be surplus produce for us to sell, contributing to our income which will cover our basic needs. The workload has been carefully considered and after an initial set up period when we will need to employ the help of some paid labourers and volunteers. We are confident we will be able to run the site with both of us in full time employment on site by year five. We plan to employ volunteers beyond year five but this will mostly be as part of our commitment to educating people who want to learn about low impact living, and they will of course contribute to the productivity of the site.

Our crops and animals will depend on our constant attention and by being present we will be able to monitor all aspects of the design and bring it to its fullest potential. Non-profit activities such as the restoration, creation and maintenance of habitat for wild plants and animals will also benefit from our daily interaction with the site. The necessity of our presence on the site is particularly related to our commitment to a low impact lifestyle (see Appendix 5, Activities throughout the year). Having chosen to minimise such things as car use, we feel that a daily commute to this site (which would have to be made by car even from a short distance, owing to the need to bring tools etc.) would be inconvenient, inappropriate and would certainly have a greater net negative impact on the local area and wider environment. From a low-impact perspective, there are many other advantages to living on the site where we will work. For example, it becomes possible to largely substitute mechanised tools (noisy, dirty, expensive) with hand tools (quiet, clean, inexpensive) since daily interaction prevents the scale of any task getting literally 'out of hand'. Our choice to manage the land without the use of herbicides and pesticides will necessitate a constant presence to attend to any problems that may develop. Similarly, expensive, out-sourced medical treatment for livestock can be reduced with careful attention given daily and the necessary preventative measures administered. In general, by living on the site, we can make sure that any developing problems will be spotted and dealt with before they reach a point where excessive measures need to be taken to correct them. This allows us to maintain a high standard of living whilst leading a simple, resource efficient lifestyle on a modest income, fully within the level available to us from the produce of the land. Biodiversity and wider environmental quality will be enhanced by our presence. To us, these are central themes to our One Planet Development project.

Essential Criteria

- The Gardd Y Gafel household will meet at least 65% of its food needs directly

from land.

- The Gardd Y Gafel household will meet its minimum household needs using income derived from land-based enterprise.
- The Gardd Y Gafel household consists of two adults who will manage the site effectively.

Land Management

Objectives

Our objective in terms of land management will be to increase the biocapacity of our site to the upper limits of its carrying capacity whilst still accommodating our basic needs. We consider this to be the foremost indicator that our practices are in alignment with the land that we live on, and are therefore having a net beneficial effect. We will achieve this in a number of ways, outlined below.

One of the many things that attracted us to this particular site was the extremely low biodiversity (see Appendix 3), effectively providing us with a 'blank canvass' to work from. With the possible exception of the hedge banks there are no important habitat features calling for preservation. With proper monitoring, we are confident that we can show a vast increase in biodiversity on the site within a very short time and predict that this trend will continue for many years as the environmental quality increases, systems integrate and become self sustaining. We are also confident that there will be no tension between such positive land management and its productivity for our business.

Components

Management

Biodiversity

The first action we will carry out on the land will be to reinstall the stock fencing to protect the hedgerows from browsing. This will allow us to lay and re-stock the hedges to provide valuable habitat and shelterbelt. Where possible the fence will be erected a good distance from the hedge bank in order to establish thickets. Native, berry-bearing shrubs will be favoured to further encourage wildlife. Any brash generated from reinvigorating the hedge will be kept on site and made into windrows, which will be arranged on contour. This has many advantages - they provide excellent habitat (e.g. for mice and consequently bumble bees), provide root protection and slow release nutrients for nearby trees, act as a windbreak for low growing plants, mitigate surface runoff and erosion, manipulate cold air flows and the formation of frost pockets, and bank up leaf litter leading to long term enhancement of soil conditions. The occasional large diameter log will be included to the same effect with the bonus of attracting perennial fungi, wood boring insects and their associated predators. Other wood will be buried under raised beds in the main horticultural area to build soil carbon reserves. No woody biomass will be burnt in an open bonfire. In effect, all carbon captured in biomass by photosynthesis on our site will stay on our site, where it will eventually stabilise as humic substances and perpetually contribute to overall fertility and biodiversity. With the hedges back in good health, important wildlife corridors will be re-forged between the wooded Gafel and Elwyn valleys.

The forest garden will represent the most significant contribution to the bio-capacity of our site. Being a perennial system of relatively low intervention it offers excellent habitat potential for a huge diversity of flora and fauna. In the first years of its establishment a large portion of nurse trees will be planted to condition the soil and provide shelter for later, more valuable crops. Many such nurse crops are typically associated with high wildlife value, for example Goat Willow (*Salix Caprea*).

Similarly, semi-shade tolerant perennial ground cover crops such as mints (*Mentha spp.*) will replace grasses and provide a valuable nectar yield. As the forest garden matures, nurse trees are selectively cleared to allow the development of the valuable crops. By this time much wildlife will have established itself and will adapt well to such minor changes. Shelterbelts will remain, as will the occasional 'sacrificial' standard. For these purposes, species will be selected not only for tolerance to exposure but for high wildlife value also, specifically prioritising berry-bearing trees such as the native Rowan (*Sorbus aucuparia*) to attract farm birds. In theory the birds, to some extent, will tend to take these high visibility fruits first, allowing the grower time to harvest the cash crop which is typically in the lower canopy.

As with the hedge management, a proportion of woody biomass generated from thinning the forest garden will be kept on site to return to the soil. Saprotrophic fungi such as Turkey Tail (*Trametes versicolor*) will be introduced and cultivated to accelerate this process. Together with the application of biochar and microbial teas we will fast-track the creation of rich forest soil able to support the range of species we will eventually introduce and to sustain their regular cropping.[24] The last major step in establishing a largely self-sustaining forest garden system is to cultivate a diverse community of mycorrhizal fungi. These fungi form extensive subterranean networks of spongy mycelium, further improving soil structure. They cycle nutrients from leaf fall, root dieback etc. and deliver them directly to the roots of the growing plants with which they form a symbiosis[25]. The presence of these fungi in the soil is essential for the closed-loop fertilisation of heavy yielding components of the forest garden system. This system calls for an overall planting scheme that includes many plants known as dynamic accumulators. These are plants that have the ability to accumulate high concentrations of trace minerals, often by having very deep roots that pump up nutrients from the otherwise inaccessible sub-soil. Under 'chop and drop' management, whereby plants are routinely cut back and the resulting matter used as mulch for nearby hungry crops, these minerals are made available and cycled continually throughout the system. Additionally, some root dieback will correspond to the cutting of the accumulator plants above ground. This delivers nutrients directly to the rhizosphere where they are most needed and accelerates the natural soil building mechanisms from the subsoil upwards. In both these cases, a healthy mycelial network of mycorrhizal fungi is instrumental to the process. By this method it is possible to sustainably crop from the forest garden, massively reducing the need to import fertilisers from elsewhere. Occasionally some nutrient rich matter will need to be brought in, for which we plan to use seaweed harvested legally from a local beach.

All activities on our site will be linked by nutrient flows (see Appendix 1, drawing 9.1). After testing the soil and making the necessary initial amendments (for which we will use organic and responsibly sourced substances) most nutrients will be held within a constantly cycling system. We will aim to balance net exports from the system with regular nutrient imports, mainly in the form of seaweed.

Biochar

Our program of biomass cycling and soil enrichment will involve the regular creation

[11] Lowenfels, J & Lewis, W (2010)Teaming with Microbes, Timber Press, page 148-161

[25] Stamets, P (2005) Mycelium Running, Ten Speed Press, page 19-35

of biochar. As a soil amendment, biochar is unsurpassed. A biochar enriched soil will show the following characteristics:

-Retention of water in drought.

-Good drainage in wet conditions.

-Soil PH is regulated, increasing nutrient uptake and further reducing the need for fertilizing.

-Its micro-porous structure mitigates nutrient leaching.

-It all but eliminates soil-borne emissions of greenhouse gasses associated with cultivation.

-It complements a no-dig perennial system perfectly, supporting communities of mycorrhizal fungi and bacteria essential to nutrient cycling.

-It sequesters carbon, effectively locking it out of the cycle indefinitely[26].

We will utilize the byproduct of heat generated by the production of char in a number of ways. These will mainly be a steaming tank, which will:

-steam wood for bending in the production of crafts.

-sterilise e.g. straw bales for mushroom cultivation.

-steam pulverise char for activation (this further opens the porous structure of the char, making it more effective).

-a hot water tank used for an occasional hot tub or laundry water etc.

-surplus heat can be directed into the glasshouse, house, or solar kiln depending on need. This will be done by heating large stones of high thermal mass value on the lid of the biochar retort and transferring them to the required location.

The recommendations made as part of the Ecological Assessment (see Appendix 3) will also be incorporated into our land management, further enhancing the support of biodiversity on our site.

Cultural Heritage

There are no historic or archaeological features to be considered on this site.

Landscape

Hedgerows will be traditionally managed and native species used for any new planting. We will utilise this planting as screening where appropriate to aid the sites integration into the surrounding landscape. Any landscaping involved in the development of the site will be promptly planted up with a diversity of vegetation in keeping with the wider landscape.

Siting the Buildings

Dwelling

The site of the buildings has been chosen for a number of reasons. The chosen site for the dwelling is the flattest portion of the overall five acres, which will mean a proportionally lower environmental impact to install the foundations / hardstanding. It also has the truest uninterrupted South-facing aspect on site, allowing for the greatest solar gain and therefore the greatest potential performance of the house in terms of fuel efficiency. For the same reason, the area immediately around the dwelling will have greater horticultural potential and the proximity of the two

[26] Lehmann, J & Joseph, S (2009) Biochar for Environmental Management, Earthscan page 207-222

observes the permaculture practice of 'zoning'. The dwelling is sited close to the spring, thereby reducing impact and cost of associated infrastructure. Further water management potential is presented by the steep drop beneath the site and to the East, where we will install the reedbed system. Such a topography will ensure that the system will run efficiently and passively and will mean that the visual screening effect of any associated planting (e.g. coppice) here will be very effective when viewed from the road without compromising the solar gain of the dwelling. All buildings will be recessed into the landscape and obscured by planting to reduce visual impact (see Appendix 2).

Ancillary Buildings

We have chosen to cluster all of the out-buildings associated with the dwelling in one area in order to reduce installation costs, ensure operational efficiency, facilitate visual screening and with a view to minimise impact in the case of the implementation of the exit strategy.

The only exception to this is the goat shed. This is slightly away from the cluster, in the lower section of the Western field. It will be recessed into the landscape and have a turf roof so that it is not visible from the Northern slope of our property.

The visual screening of the dwelling and outbuildings from Pencnwc to the North-West will be achieved using a copse of evergreen trees of columnar form so as to be affective year round whilst not casting too much shade. Other views into the site will be screened by the re-stocked hedgerows. Selected trees will be allowed to grow on as standards in strategic locations, and omitted from future hedgerow management.

Access Track

In a meeting with Pembrokeshire County Council's Mike Harries on February 6th 2014 we agreed on the most suitable place to site the track entrance (see Appendix 1 drawing 1.2). There is an existing oblique field entrance in the South-West corner of the Western field. This is about 70 metres from our dwelling site. There is currently no track. Immediately adjacent to the entrance is a culvert running beneath the council road, presenting good opportunities to mitigate any run-off issues that could arise from installing a track. The entrance lies between the Pontygafel / Trecnwc track (20m) and the Pen Gamell dwelling (50m) and so feels part of the village already.

In choosing the site of the access track we have considered the following factors: There already exists a farm entrance here that has presumably been used for vehicular access in the past, and the visibility of oncoming traffic where the track exits the site was to Mr. Harries' satisfaction. Other dwelling accesses are within very close proximity so refuse collection and postal delivery services can use existing stopping points. Between the point of entrance and the dwelling the grade of the track would be acceptable for easy vehicular access. The back slope will be planted up with soil stabilising shelterbelt species which will protect the house from the prevailing winds. Below the track, vegetation in the hedge around the goat pasture will provide visual screening to the track. Near the entrance, a cleft oak gate will span the track and a retaining dry-stone wall will line the bank.

Glasshouse

Given the necessity of an indoor growing space for a One Planet Development in this climate, we have opted to erect a (24m by 15m) recycled horticultural glasshouse. We believe that a glasshouse will have a better aesthetic than the equivalent area of polytunnel structures. We have sited the glasshouse near the dwelling to create a

sheltered area for the tree nursery and so we can check on our crops with ease. As with the dwelling, the topography of the land lends itself very conveniently to the screening of the glasshouse. Since little light is received from the North anyway, the structure will be recessed into the landscape. Additionally, a hedge will screen the glasshouse to the North and shelter it from cold winds. This will be a clipped evergreen hedge of a species such as the common Yew (*Taxus baccata*) and need not be very high to be effective. To the South, where maximum sunlight penetration is needed (especially in the winter), any screening must be planted at a sufficient distance from the glasshouse and kept sufficiently low to allow this. This will not, however, compromise the screening effect as viewed from the public road, owing to the gradient of the land. Views from over the county border to the South-East will largely be screened by the hedgerows and Forest Garden.

Production

We take a holistic approach to land management and the productivity of our land will rest in a foundation of environmentally sensitive soil improvement and an understanding of nutrient flows within the site (see Appendix 1, drawing 9.1). In the biodiversity section of this chapter we have explained how we will use biomass and biochar as soil improvers. In addition compost teas will aid greatly in the aim to maintain high yields and productivity from the site.

A compost tea is made by aerobically brewing a few handfuls of good garden compost in a solution of water and nutrients in order to multiply the beneficial micro-organisms it contains by many millions. The resulting tea, when applied as a foliar spray, will establish an invisible bio-shield on leaves, protecting plants from disease. When applied as a soil drench, it feeds the foundation of the soil food web, greatly enhancing nutrient cycling and availability in the rhizosphere. This cheap, simple and sustainable technology greatly multiplies the efficacy of garden compost, with obvious benefits in terms of productivity.[27]

'...a growing body of international evidence suggests that farming on a smaller scale is more productive per acre in terms of yield, profit and other social and environmental benefits, including biodiversity.'[28]

Essential Criteria:

- All existing hedgerows will be managed traditionally.
- Future planting will enhance the bio-diversity and carrying capacity of the site.
- All buildings and the access track have been sited so as to be recessed into the landscape and planting is designed to screen and filter views to these built elements.

[27] Lowenfelds, J & Lewis, W (2010) Teaming with microbes, Timber Press

[28] Butler, D. (2010) What it will take to feed the world? Nature 464, 969; Global Conference on Agricultural Research for Development (GCARD) (2010). This collection of the world's top agricultural researchers concluded that smallscale farming is more productive than large-scale farming and called for a shift in focus of world aid and research from large-scale farming to small-scale farming, see http://gcardblog.wordpress.com/. Accessed 16/11/2010.

Energy and Water

Objectives

Energy and water will both be sourced from the site. We will minimise both our water and energy usage. We will re-use water wherever possible and will design our site so that we can operate with the energy available to us.

Components

Energy

Minimisation

Having spent time living off grid in the past we are familiar with how to manage energy usage and are confident we can ensure our needs are met in accordance with the energy that will be available to us. There are many ways in which we plan to minimise our energy requirements, including:

-The heating of our house will be largely solar passive through careful design.

-The house will be highly insulated to reduce energy needs. There will be a draught lobby for each exterior door.

-All glazing will have low U-value.

-Our fuel usage will be minimised through the installation of a very efficient 'Stick Stove'. These stoves have been developed by Black Mountain Woodfuels in Llandeilo. They have been developed specifically to utilise the small diameter wood produced by Short Rotation Coppice and broadleaf hedgerow management. It has been designed to capture more than 80% of the flue heat that the fuel provides[30]. This will be used for the heating of our house in the winter, for hot water and for baking. The fuelstock is gravity-fed, meaning that it doesn't need to be processed into short lengths (this alone leads to large energy savings).

-A fan powered by a stirling engine will circulate heated air and reduce fuel use still further[31].

-Through using the passive solar dryer to dry our wood the efficiency of the stove will be further increased.

-For cooking we will use short rotation coppice in a two-hob rocket stove[32] designed for use in the third world in areas where wood is scarce. It is highly efficient on fuel use (emitting very little smoke). It is ideal for use with Short Rotation Coppice firewood. We will be able to use these in the Summer as well as in Winter without overheating the house. We will not require any usage of gas for cooking. These stoves have recently become available in the UK.

-To further reduce wood consumption for cooking we will utilise a pressure cooker in combination with a simple 'straw box'. This is a highly insulated box in which you place pans of food that have been brought to the boil in order to retain the heat and complete the cooking process without further heat input.

-Lighting will be LED's on a 12 volt system and designed to be localised and directed to key points rather than a general wash which uses far more energy.

-We will ensure that no appliances are needlessly left on 'standby'.

-We will wash our clothes using a homemade, hand cranked, pressurised wash-tub based on a commercial design.

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[30] http://blackmountainwoodfuels.co.uk/improved-wood-processing-technology

[31] www.vulcanfan.com

[32] www.ecozoomstove.com/portfolio-type/zoom-plancha

-Any other appliances such as a blender will be used only when there is sufficient energy- we are prepared to live without such things when necessary.

Sources
There are several sources we will employ to meet our energy needs, we have calculated our annual quantity requirement based on our current usage, our planned use and data on average use within the UK.

Table 27: Energy requirements and sources		
Requirement	**Sources**	**Quantity required**
Heating	Passive solar gain (through house design) Biomass	N/A 2.5 - 3 tonnes annually
Hot Water	Solar collector Biomass	N/A Byproduct of heating
Cooking	Biomass	2 tonnes annually
Electric	Solar PV	1kwh daily
Car	Vegetable Oil	385 litres annually
Chainsaw	Unleaded Petrol	10 litres annually

Biomass
We are planning on planting 6000sq.m / 0.6 hectares of mixed willow SRC. We estimate this should, once established, give us a return of between 4.5 and 7.5 oven dry tonnes of seasoned firewood per year[33]. This will be harvested on a 3-year rotation and stored in the solar kiln. The hedgerows and Forest Garden on the site will provide additional firewood, estimated at an additional 1-2 tonnes annually. Hedgerows will be laid or coppiced on an 8-year rotation and side-trimmed annually. The Forest Garden will have several nurse crops as well as shelterbelt crops and specific timber crops which will need to be thinned annually from approximately year 5 onwards.

Solar PV
It is estimated that in Pembrokeshire there is on average 1.5 hours of sunshine per day in December and 6.5 hours of sunshine per day in June. On balance there are 1455 sunshine hours annually and approximately 4.0 sunlight hours each day.

We expect our average electricity use (across the year) to be approximately 1kWh per day. This would run lights, fire alarms, mobile phone chargers, laptop, occasional stereo/hand blender, occasional tools in the workshop and a UV water filtration system.

In order to meet these needs it is estimated that we will need 600W of solar panels. 13 x 50w panels measuring 5.1cm x 70cm will be used to generate the electricity required. Ten of these panels will be mounted on the roof of our barn (attached to the house), facing South, and will operate at between 95% and 100% efficiency. Three will be mounted on the ground near the house facing East and will operate at 85% efficiency. Thus on the average winters day we would be generating 0.9-1.0 kWh.[34]

[33] Nix, J (2008) Farm management Pocket Handbook, Imperial College London, page 71
[34] http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php?lang=en&map=europe

The system will be connected to a large battery reserve (12v @ 550Ahr) which will balance out the production / demand cycles within the system. A 1000W inverter will convert electricity to 240v within the house.

We have also sought the advice of Preseli Solar and have been advised this system would provide us with the level of electricity we require.
The system will be entirely independent of the national grid.

Solar Gatherer
We plan to have a ground mounted solar gatherer to produce hot water. This will supplement our biomass in winter and provide all that we need in Summer.

Vegetable oil
Our vehicle will be run on recycled vegetable oil purchased from a local supplier in Bwlchygroes.

Unleaded Petrol
Our chainsaw, which we will use occasionally to manage hedgerows and process firewood, will require us to purchase a small amount of unleaded petrol. This will be sourced from the local fuel station.

Water

All domestic water will be sourced from our spring, the capacity of which far exceeds our needs.

Minimisation
-The use of a composting toilet instead of a flushing toilet will reduce our overall water requirements by more than one third[35].
-Through the design of our water ditches, swales and retention ponds throughout the property we will utilise rainwater passively. Also feeding into this system will be the roof runoff from the dwelling house and ancillary buildings.
-The glasshouse will be irrigated using a pitcher irrigation system (see Appendix 4), water for this will be supplied from rain water storage situated throughout the site.

Requirements
In total we will require approximately 180 - 270 liters per day. This breaks down as follows:

Domestic
We estimate that our domestic requirement will be approximately 60-100 liters per person per day based on our current usage and UK averages.

Livestock
Goats will require 20 liters per day between them for drinking water. Another 20-30 liters per day will be used for cleaning the milking parlour.

All other animals will require approximately 20 liters per day between them.

[35] www.waterwise.org.uk/pages/faqs.html

Horticulture
Requirements in the main garden beds, forest garden and SRC areas will be met through a rainwater harvesting system and by using the passive design of waterways (see Appendix 1, drawing 8.1). Some irrigation pitchers will be included in select raised beds.
We will gather water from roof run-off in large water butts where appropriate throughout the property to use for irrigation. These will be disguised by planting. Potted trees in the nursery will be irrigated using a small gravity fed drip irrigation system. Overall water application efficiency on our site will be very high.

Sources
We have a legal right to 50% of the flow from the spring on our land. Currently, the water issues from an alkathene pipe into a trough in the middle of the field. Upon inspection this system is in an advanced state of disrepair with tree roots blocking the pipes and breakages up stream presumably accounting for an area of wet flush. All overflow briefly follows a ditch on contour before running down a gully in the hedge bank and into a culvert.
The flow averages at 44,000 liters per day (measurements taken over a 6 month period). So we have approximately 22,000 liters available to us daily. This far exceeds our requirements.

Systems
In discussion with the owner of the neighbouring fields we have proposed that the spring be intercepted further up its course and a cistern installed to serve the dwelling. This will be a negligibly small structure. All overflow will then be diverted through the land as shown in Appendix 1, drawing 8.1. We have designed this course to have the maximum biodiversity effect possible as well as serving practical elements of our plot design.
The stream will enter our site at point (A) where there already exists a gap in the stone walled hedge bank. This will be lined with large slate flags so that the water will not undermine the wall. It will then pass through a constructed system of ditches that will form our watercress bed. We have sited the watercress bed here to ensure that it is not down stream from any activity that may cause any contamination or silting (e.g. the cleaning of horticultural tools in the stream). It will also help to regulate the temperature of the nearby root cellar. The course of the stream during normal flow periods will then pass the glasshouse and flow through the wildflower meadow and back into its original course. By carefully designing inlet and outlet levels in the watercress bed, we will ensure that flood events will not overload the system. During storm periods the overflow and roof run-off (C) will be directed through the main horticultural area and on into the forest garden area, feeding a network of retention ponds on its way. The ditch channeling the water will be a few degrees off-contour and contain a number of small check-dams made of brash. This will slow the water, allowing it to deposit silts and prevent erosion, provide passive irrigation as well as creating valuable habitat and microclimates. The overflow will then join the passive water system in the forest garden. Throughout most of its course it will be shaded by vegetation and augmented by discharge from various seeps and other surface runoff harvesting features, so we anticipate that the stream will usually have a small flow. As a final measure not to overload the culvert at the end of the system (B), a simple slate overflow weir will disperse shock loads of water into the SRC area. Eventually all water flowing from our site will join the course of the original spring, slightly

upstream from the culvert, which will not need to accommodate any significant change in volume of flow. We are confident that this design will greatly enhance biodiversity and productivity and have a net positive impact on receiving waters.

Water for use in the house and for animals will be piped directly from the cistern. Any treatment required will take place within the house. This will be in the form of a UV filter if needed - the exact design and requirements will be established in communication with PCC Environmental Health when we are installing the water systems. Grey water exiting the dwelling will be treated by our reed bed system (D).

Essential Criteria

- The Gardd Y Gafel Household will meet its domestic water needs from the onsite spring.
- The horticultural and agricultural water needs at Gardd Y Gafel will be met using rainwater harvested from the roofs of the buildings as well as some contribution from the on site spring.
- The Gardd Y Gafel household will meet its domestic heating requirements entirely from timber / biomass grown on site.
- Within 5 years the Gardd Y Gafel household will power all domestic cooking using biomass grown on site.
- The Gardd Y Gafel household will use no more electrical energy than is produced on site.

Waste

Objectives

We will ensure that all biodegradable waste is assimilated on site in an environmentally sustainable way. This will be done by regular composting and charring. By returning the processed matter to the soil in appropriate high-productivity areas, we will form a closed-loop cycle of sustainable fertility on the site.

Human faeces and urine will be composted and cycled on site. Grey water will be treated using a reedbed system. No connection to any relevant mains services will therefore be necessary.

We will endeavour to minimise our consumption of goods that generate non-biodegradable wastes. Inevitably a small amount of such wastes will be generated, for this we will utilise public recycling initiatives to remove items from the site. Very occasionally, and as a last resort, items such as broken hardware will be disposed of at the nearby civic amenity centre at Hermon.

Components

Domestic food waste

Our diet, being predominantly fruit and vegetable based, tends to generate a lot of biodegradable domestic food waste. We have measured this amount to be about ten to twenty liters per week and we expect that this will rise considerably when we are once again growing and processing the bulk of our foodstuffs. All such waste will be easily assimilated on site using a number of composting techniques - mainly the waterless toilet, a vermiculture system and by regularly building purpose built compost piles. Care will be taken to maintain the correct ratios of contents to promote healthy microbial growth and optimal compost turnover.

Grey water

All grey water will be directed through our reedbed system[36]. This purpose built constructed wetland comprises of several sequential elements, as follows:

1. A settlement tank- essentially a septic tank though much smaller because it is not dealing with large amounts of solid waste.
2. A vertical flow reedbed. Here, the effulent percolates through sand, gravel and plant roots. By the time it exits this stage, aerobic microorganisms will have degraded many pollutants.
3. A secondary solids collection tank. Again very small, this settles out any solids (mostly dead micro-organisms) from the vertical reedbed which would otherwise clog the next reedbed.
4. A horizontal flow reedbed. Here anaerobic conditions break down nitrates and further degrade any remaining pollutants.
5. A large settlement pond where even more nitrates and phosphates are removed by various biological activities. Much excess water will evaporate here.
6. A leach field. Outflow from the pond is allowed to soak away through our short rotation coppice stand. Any remaining nutrient load will be utilised here and cycled

[36] http://info.cat.org.uk/questions/water-and-sewage/what-are-reed-beds

back into the system as biomass. Evapotranspiration will account for the elevated ground water.

Overall this system has consistently proven to be highly effective in a variety of situations and climates, fully absorbing shock loads and tolerating periods of low use equally. It needs nearly no maintenance to operate. Additionally, the nutrient rich environment and high diversity of adjacent habitats provide excellent wildlife value.

Human faeces and urine
We will observe the principles of ecological sanitation whereby we will manage our sanitation needs in a way that is helpful, rather than harmful, to the environment. Through nutrient cycles we are intrinsically and symbiotically connected to the biomass on our site in a closed-loop system.
All human waste on our site will be thoroughly composted in a dry, twin chamber style toilet[37]. This will be sited in the dwelling area so as to be easily accessible from all likely centers of human activity. This system uses no water, is completely self-contained, and produces a safe and valuable soil amendment as its only end product. The system employs aerobic activity to decompose waste. Potential pathogens are killed by a number of processes, including die-off and predation by other microorganisms[38]. By returning the end product (which is basically pure soil humus) to the soil, we close the loop of sustainable nutrient cycling on our site. As a precautionary measure, however, it will not be applied directly to primary food crops.

Packaging and paper
We predict that what little packaging and paper waste we currently generate will be greatly reduced. If suitable, paper will be composted or used to start fires. Many jars and containers will be recycled or re-used for miscellaneous purposes. There will inevitably be a marginal amount of waste that cannot be assimilated on site and for this we will occasionally arrange a trip to the civic amenity centre at nearby Hermon. We will seek to co-ordinate these trips with other households close to us so that only one vehicle is used between several households.

Green waste from growing food and timber
Choice green waste will be fed to livestock. Everything else will be composted as outlined for domestic food waste. Waste from timber production will be dealt with either by the methods outlined in Land Management or processed into biochar. No waste will be disposed of by burning in an open bonfire. Nearly all carbon captured by photosynthesis will accumulate on-site as stable humic substances in the soil.

Livestock manures
Livestock will not be confined in densities where natural assimilation of their waste would become a problem. Soiled bedding materials will be incorporated into the compost pile. In our experience, organically managed soils tend to assimilate wastes such as animal manures and deadwood far more effectively owing to the diversity and density of soil biota.

Further to that which has been described above the following miscellaneous points

[37] Harper, P & Halestrap L (1999) Lifting the Lid, C.A.T. Publications, page 134
[38] Jenkins, J (1999) The Humanure Handbook, Jenkins Publishing, page 174

will be part of our waste management:
-There will no significant net export of waste from our site. Almost all materials will be somehow cycled back into the sites productivity.
-We will choose products with minimal packaging or packaging with high recyclability potential e.g. glass jars in preference to cans.
-We will avoid low-quality products of designed obsolescence or disposability.
-We have both been adapting our lives to purposely reduce waste for a long time now, and are well accustomed to the lifestyle. We have found that seemingly minor differences can have surprisingly big impacts, for example cleaning our plates with a piece of bread after a meal (then eating it) has reduced our consumption of washing up liquid (so less refills, less burden on the reedbed).
-The production of biochar from woody waste materials contributes greatly to the process of nutrient sustainability and has the additional benefit of being a net carbon-positive technology, effectively locking carbon out of the cycle indefinitely[39].
-Our natural management of the site (chemical free, lots of composting) means that soil biota will be healthy and diverse. Greatly enhancing the soils' ability to assimilate green wastes. This in turn attracts a wide diversity of wildlife to the site, which further accelerates nutrient cycling. Essentially, in many cases, what would conventionally be considered a waste product to be exported will instead be used as a resource to build fertility. This is the foundation of the regenerative activity we hope will define our presence on this site.

Essential Criteria:

- Within 5 years all biodegradable waste from the Gardd Y Gafel household will be assimilated on site in an environmentally sustainable way.
- All waste handling will comply with Environment Agency guidelines.

[39] Lehmann, J& Joseph, S (2009) Biochar for Environmental Management, Earthscan, page 322

ZERO CARBON BUILDINGS

Objectives
We aim to construct all of the buildings on our site using minimum energy. They will be 'zero carbon' in construction and use in alignment with the aspirations of the Welsh Government.

Components
Domestic
Zero Carbon in Construction
The Code for Sustainable Homes assessment (see Appendix 6) compiled by Sureline Design Services Ltd. demonstrates how we will meet the required standards in regards to the construction of our dwelling. The way in which un-categorised / innovative materials used can be justified in the context of CfSH is clearly laid out. See Appendix 7 for Outline Specification of Dwelling.

In addition the construction will be carried out using the barest minimum of heavy equipment with the vast majority of work being carried out using hand tools and skilled labour. Most of the work will be carried out by ourselves and a small team of workers. We will bring in additional support in the form of local plumbers and electricians where appropriate. Through this low energy / low-tech approach we will ensure minimal environmental impact. Noise pollution will be minimal and most waste materials will be assimilated on site.

Zero Carbon in Use
There is no clear definition of 'Zero Carbon in Use' in the Welsh Government planning literature. However in TAN 22 'Planning for Sustainable Buildings' there is clear guidance on achieving 'Low and Zero Carbon Design Solutions'. In line with figure 9 of the TAN 22 document we have reduced the energy demand of our dwelling, ensured energy efficiency and employed low and zero carbon technologies to minimise our carbon footprint.
Reduced energy demand has been achieved through the passive design of the dwelling including passive solar heating through orientation and layout designs (see Appendix 1 drawings 2.1-2.7), passive cooling through the positioning of skylights, and natural lighting by positioning windows in strategic places and using large windows to the South (all of which are suggested in figure 11 of TAN 22). Energy efficiency is ensured through the use of highly insulative building materials, good quality double glazed windows and well positioned draft lobbies. We have employed low and zero carbon energy technologies including solar hot water, photovoltaics, and a biomass heating and cooking system with on site production of biomass (all of which are included in the list in figure 12 of TAN 22).

In addition it is our wholehearted intention to live in a sustainable way that has a net positive impact on our environment and this principle will underpin all activity on site. Some examples of practices that will be carried out on our site which further reduce our carbon footprint are:
-No-till horticulture and compost tea applications increase populations of carbon capturing microbes and reduce soil-born carbon emissions.
-Production and application of Biochar and the deliberate burial of some woody biomass under raised beds, both net carbon-positive practices.

-Carbon sequestration in building materials (e.g. wood).
-On site food production, reducing associated transportation emissions.
-Reduced personal travel emissions due to full time occupation on site.
-Personal lifestyle choices (e.g. choosing long lasting products over cheaper disposable products thus reducing emissions during production).

Building Regulations
During construction of the dwelling all regulations will be complied with, this will be achieved through communication with the relevant authorities.

Existing Buildings
There are no existing buildings on site (see Baseline).

Ancillary buildings
Zero Carbon in Construction
Ancillary buildings which do not require building regulations will also be constructed from responsibly sourced, local, natural materials and / or reclaimed and recycled materials. The same low impact approach to building will be employed as for the dwelling. All of these buildings will be Zero Carbon in construction with the justification of building materials being in keeping with that of the dwelling (see Appendix 6 for CfSH assessment.)

Below is a materials specification for each building:

Table 28: Goat Shelter, Materials Specification	
Materials	**Source**
Stone	Glogue Quarry (local)
Mortar	Lime
Timber (Douglas Fir)	Growing Heart Co-op (locally grown)
Pond Liner	Recycled
Turf roof	On site

Table 29: Workshop, Materials Specification	
Materials	**Source**
Stone plinths	Glogue Quarry (local)
Mortar	Lime
Timber (Douglas Fir)	Growing Heart (locally grown)
Roofing	Coroline

Table 30: Solar Dryer, Materials Specification	
Materials	**Source**
Stone plinths	Glogue Quarry (local)
Mortar	Lime
Timber (Douglas Fir)	Growing Heart (locally grown)
Windows	Recycled
Radiator (heated solar passively)	Recycled
Wind cowl	Recycled
Roofing	Coroline

Table 31: Root Cellar, Materials Specification	
Materials	**Source**
Stone Walls	Glogue Quarry (local)
Mortar	Lime
Roof covering	Turf (on site)

Table 32: Greenhouse, Materials Specification	
Materials	**Source**
Stem Wall	Glogue Quarry (local)
Mortar	Lime
Aluminium frame	Recycled
Windows	Recycled

Zero Carbon in Use
None of the ancillary buildings will be heated (with the exception of the greenhouse for which any excess heat produced during the process of making Biochar will be harnessed –see Land Management section for further details). However all buildings have been orientated to take advantage of passive heating. Natural lighting will be the predominant lighting in all ancillary buildings with any additional lighting required running from the photovoltaic panels. Any tools run as part of the workshop will also be run from the photovoltaic panels or adapted to be hand cranked / bicycle driven.

Capability of removal with low environmental impacts
Dwelling:
-Simple construction, easy to dismantle. Valuable components (e.g. glazing) easy to separate and salvage.
-Predominantly natural materials. What cannot be salvaged can be left to be assimilated on site.
-Strip foundation of locally sourced stone and other natural materials. Can be left on site or dismantled using small scale machinery.
-Negligible environmental impact compared to conventional development.
-Easy access for removal of materials.

Ancillary Buildings:
-The workshop, goat shed and solar kiln will be almost entirely constructed from locally sourced timber with small pier foundations of lime and locally sourced stone. Most materials could therefore be returned to the site as part of the exit strategy.
-The small proportion of non-degradable materials used could be separated and removed for recycling with little effort.
-The root cellar will be constructed entirely of locally sourced stone and lime mortar. All materials could therefore be returned to the site as part of the exit strategy. Another possibility would be to leave the structure (which will be completely recessed into the landscape) intact for livestock shelter.
-The glasshouse is of modular construction and is therefore designed to be dismantled with simple tools and transported with relative ease.

Essential criteria
-Domestic and ancillary buildings will be zero carbon in construction and use.
-The dwelling house is the only structure requiring building regulations and this approval will be obtained during construction.
-All structures are capable of removal with low environmental impact.

COMMUNITY IMPACT ASSESSMENT

Objectives

We will seek to minimise any negative impact on our local community and will put conscious effort into the positive impacts we are capable of implementing.
We will monitor our impacts annually and actively mitigate any negative aspects that may occur.

Components

Social

We were both brought up in Wales. Tom is from Aberaeron in Mid Wales and Jacqui is from Llanrwst in North Wales. Tom spent several months living in Fishguard in 1999, where he was worked as part of a community project with Cynefin theatre company. He has also lived in Carmarthen and Cardigan at various times. His brother and sister both live in Cardigan and have done for a number of years, so he is well acquainted with the area.
We have been drawn to settle in Pembrokeshire for a number of reasons, not least for the climate, which is a little more conducive to our business plans than was Snowdonia! Pembrokeshire also has historic associations with low-impact lifestyles and cultural resilience. We have found that the area offers the cultural, social and professional support networks essential to what we want to do.

Tom has a good understanding of the Welsh language and can speak at the level of an advanced learner. Jacqui is a fluent Welsh speaker and has spent her working life largely working through the medium of Welsh. We have already found that this is an invaluable attribute in the community.

We have lived in the Glandwr area for approximately two years. We came in March 2012 to volunteer for Paul & Hoppi Wimbush at Lammas. The intention was to search for land nearby on which to apply for an OPD and we were fortunate to purchase our five-acre plot in October 2012.

At this stage we rented a cottage at a farm across the valley and Jacqui started working part time as a project officer for a local organisation called Green Dragon Community Transport. Following the end of her contract in October 2013 she has been working at a sheepskin boot workshop in Narberth.
In the two years we have been here we have already integrated into the community in various ways. We have been involved in the re-opening of the Glandwr village shop. Jacqui bakes cakes for sale at the shop on Saturdays and Tom has found a number of local land-based jobs both paid and voluntary. Jacqui's job with Green Dragon Community Transport meant that she met many people in the wider community. We have made an effort to get to know our closest neighbours, all of whom are outwardly supportive of our plans.

We have continued to be involved at Lammas both in attending and in the organisation of events. We were instrumental in planting up the garden at the community hub at Lammas and continue to care-take for the site. We are shareholders in the Lammas project and are always finding ways that we can support what they are doing whilst benefiting greatly from their facilities and national profile.

We regularly attend local events such as car-boot sales, agricultural auctions and school fares as well as supporting the theatres in Cardigan and Narberth on an occasional basis.

As you will see from our layout plan (Appendix 1, Drawing 1.2) we are intending to have a permissive footpath which will run from the council maintained road, through our forest garden up to the Lammas site thus linking into their network of public footpaths and up into the woodland. This is an exciting prospect for us as we are looking forward to opening our plot to the community and this feels like a great way to involve and welcome locals. In addition to this we plan to hold an annual open garden in mid to late summer for the community, where we will conduct a tour of the garden and answer any questions that arise.

In May 2014 we put up posters in the village of Glandwr and posted a flyer through the doors of our closest neighbours inviting them to a community consultation to be held at the site. We also put our phone number on the flyer for people to contact us with any questions. We had very little response with just one attendant. The attendant was very much in support and interested in the project. In addition to this we have taken every opportunity to talk to neighbours on a more casual basis, as well as specifically calling at some of the houses of people who can see into the site. All have had a positive response to our plans.

Visual Impact

The visual impact of the set up stage will impact negatively on the locality. We are aware that there will be necessary ground-works to carry out which may look alarming. The mitigating element of this is that it will be very short term (and we are confident will be more than compensated for in the long term). Through a sensitive planting scheme to screen buildings from other households, and by all buildings being recessed into the landscape, we will mitigate the visual impact of the site. The house and the workshop have been designed to be in keeping with the vernacular of the area. The glasshouse is sited where the lie of the land helps to protect it from public viewpoints as much as possible. It is worth noting that we intend to train various climbing plants up most available surfaces on the buildings, including the glasshouse, which will greatly mitigate visual impact in the context of the surrounding gardens.

Impact of Transport

Our car use is a negative factor of the development which we will minimise (see Transport Assessment and Travel Plan). We will also inevitably increase pressure on local rural services such as road usage, waste disposal and postal services. This is mitigated as far as possible by our commitment to manage our own waste (see Waste section of this application), and to live a low impact lifestyle.

Economic

We already do all of our food shopping in the local area. C&M Organics vegetable shop supply all of our fruit and vegetables. We get the majority of our dried and tinned goods from Bwyd y Byd in Crymych. Our milk is supplied by a local dairy based at Lammas. What meat we do eat is sourced locally and responsibly, preferably directly from the farmer. We occasionally shop for things that we cannot source so locally in Narberth or Cardigan but never need to go beyond. We will continue to purchase the supplies we require locally thus supporting the local economy.

We also plan to employ local trades people for things such as ground works, plumbing and electrics in the set up stage. In the longer term we will need local tradesmen for specialist maintenance tasks as well as services such as veterinary care. In good time we plan to supply some of the outlets we shop at and look forward to assisting in the reduction of the local ecological footprint by doing so. Any of our goods that we sell independently and locally will be less common crops or 'value added' products so as not to be in direct competition with local vegetable shops. We believe that there is great value in many small businesses doing similar but diverse things such as in the situation that is developing around Lammas. It is widely acknowledged that if there are, for example, several bookshops in a small town such as in Hay-on-Wye, rather than there being too much competition and all of the bookshops failing, the opposite is true. The town becomes known for its bookshops and so thrives as a result of the diversity and choices offered. We feel that is exactly the situation that can be cultivated in Glandwr and that each of us will thrive as a result of the others success.
Eventually we would like to see a network of smallholders and land based enterprises, not just low impact developments but more conventional and well established businesses too, co-operating and supporting each other through internal trade as well as exporting to a wider community. In this way we are all part of a bigger picture that creates a series of resilient local economies. We intend to support this local economy by being an integral part of it.

On balance we have demonstrated that the development of our site will have a net positive effect on our community. We will monitor the elements we have described and be in a position to act upon any negatives as well as develop any positives in our future lives in this area.

Essential criteria:

- Community impacts will be monitored, with mitigating measures being implemented for any negative impacts.

TRANSPORT ASSESSMENT AND TRAVEL PLAN

Objectives
We aim to significantly reduce our need to travel from the site and to adopt low or zero carbon modes of transport wherever possible. We aim to minimise the travel impact associated with visitors to the site.

Components
Baseline
Traffic currently generated by the site is minimal. On average we visit once a week as we familiarise ourselves with the land, repair fences etc. Restoration of hedges etc. also require weekly trips to Crymych or deliveries from courier companies for hardware. The fields are also visited twice daily for stock management.

The site is adjacent to a council maintained road, which runs West into Glandwr. It is served by the 223 Carmarthen - Glandwr bus service (1 bus on a Wednesday).

The 430 bus route runs along the A478 which is a 2 mile bike ride from our site. This bus operates a service from Cardigan - Narberth / Narberth - Cardigan, there are 5 buses daily (Mon-Sat).

The Green Dragon Community Bus, which is a dial-a-ride service, operates in the area and offers a door-to-door service from our site. There is a Monday service to Narberth and a Wednesday service to Cardigan.

A Community Car Club, also run by Green Dragon Community Transport, operates in the area allowing us to hire their 7-seater or 5-seater car for any length of journey.

An electric car club has been developed in the nearby town of Newport and a pilot project has been set-up in the Glandwr area. An electric car charge point has been installed at the Lammas community hub.

Transport Assessment

Set up stage
In the set up phase, lasting up to five years, we predict a higher volume of transport generated by the site than the very low level of traffic we will achieve in the long term. This will be in the form of delivery vehicles bringing goods, mainly infrastructure hardware. We hope that it will be taken into account that this is an inevitable part of the set up of any business, low impact or not. Where possible we will endeavour to minimise transport impact by ordering in bulk, ordering several separate components from the same retailer and prioritising local suppliers.
This activity will recede to background levels by year three as infrastructure is installed, tools and hardware are amassed and the site becomes productive.

The following information is based on our intentions for year five and beyond:

Residents
We envisage a significantly reduced need to travel off site once we have become broadly self-reliant. Currently, the large majority of our travel is accounted for by

food shopping and commuting. This will no longer be necessary when the bulk of our food is grown on site. Food that we do buy externally will be largely dry goods and therefore have a long shelf-life, meaning that we can buy in bulk, requiring fewer journeys to re-stock.
We will also be working on site rather than going out to work which will eliminate, or significantly reduce, any commuting currently undertaken by the household.

We own one vehicle, an Audi 80. Currently this runs on 50% vegetable oil in the summer months and we plan to get it converted in order to run on vegetable oil year round. We have a local supplier of waste vegetable oil who lives in Bwlchygroes and is able to supply us with the quantity we are likely to require. The distance to collect the vegetable oil is no further than the closest fuel station. Only Jacqui drives the vehicle. Tom has never owned a car, does not drive and never plans to. He has always used public transport, cycled or walked. We both greatly prefer to walk or cycle wherever possible, only using the vehicle for longer journeys, transportation of bulky goods (e.g. shopping), in bad weather or in other circumstances where there is no other option.

After the initial set up phase of our development we plan to use our car on a car share basis - offering the car to other locals to use when we are not using it. We plan to have a small light-weight trailer made for use with our bicycles for the delivery & collection of goods in the direct locality.

Enterprises
Our on-site enterprises will generate transport movements in the form of receipt of goods by delivery (e.g. plant pots). It is our intention that our enterprises will be embedded in the local economy through selling directly from our site, at the Glandwr shop, the Lammas shop and Bwyd y Byd in Crymych (See Business and Improvement Plan). The majority of goods sold at these outlets can be transported using our bicycles and trailer or by foot. However, journeys to deliver goods further afield may be necessary and we have outlined in the table that follows how we will seek to reduce the impact of these journeys.

Visitors
At various busy times of the year we will employ volunteers to help out at the site. We envisage two or three stays per year each lasting between a month and six months depending on many factors. By accepting only longer-term volunteers we will reduce the number of journeys that might be expected if we were to accept weekly volunteers. We will accept volunteers from a wide range of locations but will endeavour to favour those travelling the least distance to our site, and we will never accept anyone travelling from overseas specifically to volunteer with us.

The courses we plan to run will inevitably cause journeys to be made. We will encourage these trips to be made in a low impact manner by offering discounts to participants who have travelled by public transport, by bike or have shared a car.
In regards to ‘open days’ we hope to keep these numbers to an appropriately low level by not advertising ourselves outside of the direct locality. Our forest garden will always be open to the public via a permissive footpath but we expect that this will mainly be used by locals who are linking into the long established public footpath network that runs through Pontygafel Farm, Lammas and the Gafel Valley Woodland.

Parking
The area of hardstanding to the North of the house will normally be used to keep the larger potted trees of our nursery business and our own car. However, we estimate that it could be used to park around six cars if we moved the pots to the sides. This would only ever need to happen when we are running a course, so it would only be a short-term change. We would also have plenty of warning and know exactly how many cars are expected. The small hardstanding by the goat shed presents a further potential emergency parking / passing place, meaning we could accommodate a maximum of seven cars on our site.

The tables that follow relate to our Transport Assessment and Travel Plan. The tables outline & evaluate the transport generating elements of each aspect of our development in the left hand column, as described in our Transport Assessment above. The estimated number of trips is shown in the central column. An explanation of our strategy for reducing and mitigating transport impacts is shown in the right hand column. Figures in this table are estimated but informed by aspects of our business and improvement plan, our current travel, and by observing patterns that have developed among similar households at Lammas.

Table 33: Transport Assessment & Travel Plan RESIDENTS		
Description	**Trips**	**Strategy**
Collecting or taking delivery of 35% of our food needs	6 annual bulk deliveries	-Orders will be incorporated into the bulk order put in by the Lammas shop to reduce total impact of delivery. -We will condense as much as is practical into one delivery.
	1 monthly trip in Summer/ 1 fortnightly trip in Winter to Crymych or another local town	-The journey will be made by bicycle, with trailer, if the weather permits. -It is possible to make some of these journeys using the Green Dragon community bus. -Car sharing will be utilised where possible. -An electric car scheme to serve the towns and villages in this area is currently being devised by a community group, when it becomes an option we will make use of this. -Our car will be converted to run on recycled vegetable oil.
Social	2 annual trips to North Wales to visit Jacqui's family	-Our car will be converted to run on recycled vegetable oil.
	2 annual trips to Mid Wales to visit Tom's family	-Public transport can be utilised for this journey. We will use this if there is no requirement to take the car. -Our car will be converted to run on recycled vegetable oil.
	4 trips annually to visit friends across the UK	-Car sharing for these journeys with other friends making the same trip will be utilised. -Public transport will be utilised where possible. -Our car will be converted to run on recycled vegetable oil.
	12 annual trips to local social events	-If these events are within walking or cycling distance we will utilise these carbon neutral forms of transport. - Car sharing for these journeys with other friends making the same trip will be utilised. - Public transport will be utilised where possible. -Our car will be converted to run on recycled vegetable oil.

Table 34: Transport Assessment & Travel Plan ENTERPRISE		
Description	**Trips**	**Strategy**
Deliveries of produce to shops	Daily / Weekly deliveries to the Glandwr shop & the Lammas shop.	-All of these journeys will be made by bicycle using the trailer.
	Weekly deliveries to Cardigan & Narberth in the summer months / Monthly deliveries to Cardigan & Narberth in the winter months.	-We plan to combine these journeys with the deliveries of other small-scale enterprises at Lammas & the surrounding area. -We will combine these trips with journeys to buy provisions etc. -Our car will be converted to run on recycled vegetable oil.
Posting seeds	Regularly, esp. in the early spring.	-Seeds sold will be posted to reduce the impact of traffic generated if people were to collect them. -The journey to the post-box in Glandwr will be made by bicycle or on foot.
Craft Fairs / Market Stalls	6 annually	-We plan to combine efforts with other small-scale enterprises at Lammas and the wider locality who are operating at craft fairs to share one vehicle to attend these events. -We have had some informal discussions about creating a single stall to combine the products of many producers, which will reduce the number of craft fairs we need to attend. -Our car will be converted to run on recycled vegetable oil.
Receipt of goods ordered (e.g. plant pots)	6 annual deliveries	-We will order in bulk and order all of our products from the same company where possible to cut down on deliveries. -We will co-ordinate delivery with other local residents.

Table 35: Transport Assessment & Travel Plan VISITORS		
Description	**Trips**	**Strategy**
Social	Approx 8 annual visits from family	-We will encourage our family members to use public transport where possible.
	Approx 12 annual visits from friends (who are not local)	-We will encourage our friends to use public transport where possible. -We will encourage friends to car share.
	Daily visits from friends (local)	-We will encourage friends to use carbon neutral ways of travelling when visiting us.
Courses held onsite	Approx. 42 annually	-Course fees will be discounted for people who have travelled by public transport, by foot or bike, or who have shared a car to encourage these low impact forms of transport.
Volunteers	3 journeys to us annually	-Favour people travelling the least distance. -Not allow any overseas visitors who are coming especially to volunteer with us.
	Weekly journey per volunteer to a local town for provisions etc. for 6 months of the year	-Bike use will be encouraged. -Use of public transport will be encouraged. -Car sharing with us whilst on other journeys will be encouraged.
Open days	Annual event in late Summer	-Our local 'open garden' day will only be advertised within the immediate area thus creating very little traffic. -We will consider linking into one of the Lammas open days so that we will only attract people who were making the journey already.

Travel Plan

Our travel plan is outlined in the right hand column of the tables above. As you can see we intend to minimise the number of journeys we make by sharing journeys with other people who are aiming to live a low impact lifestyle, and by combining orders and ordering in bulk. By implementing all of our proposed strategies we will keep our number of annual journeys well below 1,825, which is half that of the average

household living in rural Pembrokeshire (tables 33-35 estimate that the number of journeys that will be undertaken is only 567). We will also reduce the impact of our car by converting it to vegetable oil as well as reducing our reliance on the vehicle by using public transport and an electric car scheme, when it is set up in our area.
We are also dedicated to using our bicycles for deliveries to the direct locality and walking wherever possible.
To ensure we are maintaining our aims in this respect we will keep a log-book of our own journeys, visitors and deliveries.

Essential Criteria:

- Vehicle journeys to and from the site will be monitored and reported upon in the 'annual monitoring report'
- We will undertake to generate fewer than 1,825 vehicle trips per year. This amounts to half of the expected vehicle generation for rural households, which is 10 vehicle trips per day.

ECOLOGICAL FOOTPRINT ANALYSIS

As part of the requirements for One Planet Development we have demonstrated that we will have reached an Ecological Footprint of below 2.4gha by year five using the Ecological Footprint Calculator designed by the Welsh Government (see Appendix 8 for details). We have based the projections in our Ecological Footprint Analysis on this management plan.

Our current Ecological Footprint is 3.71gha which is significantly less than the national average of 4.88gha (in 2004). In the first year of habitation we predict our footprint will be 2.76gha. By year five of our plans we predict that we will have reached 1.83gha which is within the target of 2.4gha required for a TAN 6 development (see Appendix 8 for breakdown of calculations). Our predictions place us within the ultimate goal of achieving a footprint below 1.88gha outlined as a long-term aim in the TAN 6 practice guidance.

Notes on EFA Calculation (read in relation to Appendix 8)
Row 4
Year 5, this is our minimum annual requirement.

Row 16
Figures based on spreading costs over a ten-year period.

Row 34
Year 5, we will produce a large majority of our own alcoholic beverages.

Row 43
Year 2 = Static Caravan + 50% of Greenhouse + 25% of Main Cultivation Area (as described in Design Strategy)
Year 5 = Dwelling + 50% of Greenhouse + 70% of Main Cultivation Area + 50% of Forest Garden and Orchard + 80% Goats Paddocks.

Rows 50-65
Year 5, figures based on spreading costs over a ten-year period.

Row 73
This is a combination of council tax, veterinary bills and slaughter house service fees.

Other Footprints

Whilst the EFA analysis that has been undertaken is comprehensive, some elements of the project do not fall within its remit. These have been identified as:

Negative influences:
1. Social visitors
The ecological impacts of friends and family visiting are very small indeed and are also very difficult to quantify. For the most part these will centre around the travel implications of such visits. The vast majority of social visits are likely to be from local friends and these will often tie in with practical exchanges / tasks. There will also be occasional visits from family members who live further afield (see table 35).

2. Footprint of ancillary buildings along with capital cost.
For information on these building see the Zero Carbon Buildings section which lays out the details of all our ancillary buildings. The capital costs of these buildings will be approximately £5,000. These buildings will be Zero Carbon in construction and use.

3. Energy purchased for value-adding processes on site (craftwork), as well as transport impacts associated with business activities.
There will be a small amount of fuel used in the chainsaw during the production of some of our craft works. However in all cases these craft works will be the byproduct of routine maintenance (this is accounted for in our EFA calculation).
In the transport assessment and travel plan section we have explained how we will minimise the impact of our enterprise associated transport through sharing transport with other people as well as ensuring all journeys are dual purpose (see table 34).

4. Educational activities
The proposed workshops and courses will bring with them a small ecological impact, primarily as a result of the travel impacts associated with getting people to the site. Referring to the transport assessment and travel plan, we will promote low carbon forms of transport and provide incentive for their use through reduced course fees (see table 35).

Positive influences:
5. Food and craft supplied locally (including fuel for transport).
Within 5 years the project expects to generate over £4000 a year of low-carbon produce for the local economy. Given that the vast majority of food and craft undergoes energy intensive industrial processes and travels thousands of miles, this represents a large energy and pollution saving. The level of produce being fed into the local economy is an indicator of the high level of influence that the project is able to achieve.

6. The indirect effect that the project has on the footprints of the wider community.
The project aspires to have a beneficial impact on the wider community, promoting both the concepts and the practicality of low-impact living. The potential impact of this in the wider community is impossible to quantify. It is possible to state that given the Welsh Governments aspirations towards a sustainable society [40] this is an important task.

Whilst there is currently no way of evaluating these influencing factors, it is possible to note that points 3 and 4 in the negative influences correspond to points 5 and 6 in the positive influences as a result of their common themes. It would also be reasonable to note that points 1 and 2 will have a negligible contribution to the overall balance of energy and resource use.

Essential Criteria:

- Within 5 years the Gardd Y Gafel residents will have an ecological footprint

[40] Planning Policy Wales, Welsh Government, 2013, Chapter 4

equal to or less than 2.4gha (one-planet).

- Residents will continue to work towards an E.F.A. calculation of 1.88gha beyond year 5.

PHASING, MONITORING AND EXIT STRATEGY

Phasing

Management of the site will start after planning is granted. For the sake of this section we will assume that planning will be granted in the region of 3-6 months after submission of the application. This brings us to Winter 2014.

Year 1

Winter 2014/15	Groundworks & infrastructure (including reedbed) Tree planting (pioneers, shelterbelt, ground cover etc.)
Spring 2015	Static caravan installed and first habitation of the site
Summer/Autumn2015	Build workshop, root cellars & glasshouse

Year 2

Winter 2015/16	Tree planting (fruits etc.)
Spring –Autumn 2016	Build exterior of house

Year 3

Winter 2016/17	Finish interior of house
Spring/Summer 2017	Develop & plant up main gardens
Autumn 2017	Build Solar Kiln

Year 4

Winter 2017- Autumn 2018	Tidy up & make the site presentable. Focus on production of produce & establishing branding & enterprises

Year 5

Winter 2018/19	Build goat house
Spring 2019	Goats arrive
Summer 2019	Focus on continuing enterprises & ongoing site maintenance

We request five years temporary permission for a static caravan and a touring caravan on the site. We will reside in the static caravan until the house is completed and volunteers will reside in the touring caravan. When we have moved into the house the caravans can be removed.

We plan to have met all of the essential criteria for One Planet Development in the open countryside by year 5.

Monitoring

We will submit an annual report (see Appendix 9 for template). An Ecological Footprint Assessment will be submitted in years 3 and 5 (see Appendix 8 for template). A revised management plan will be submitted in year 5 for the subsequent 5 years.

Exit Strategy

Landscaping & Planting

The landscaping and planting schemes proposed will undeniably benefit the site in regards to retention of nutrients, habitat creation and accessibility if it were returned to its former use. It is proposed that all planting and landscaping would therefore remain in place.

Buildings

Access to the site will be very good, making the removal of materials simple and low impact. There are two options for buildings either of which could be employed at the discretion of the enforcement officer:

A. All buildings could be removed at a relatively low cost and energy input due to their low impact nature and simplicity of build (see Zero Carbon Buildings for details). Approximately 70% of materials could be salvageable for re-use with the remaining 30% being compostable. Any foundations could be dug up using small-scale machinery.
B. All or some of the buildings could remain in place with all insulation and residential appliances removed for reuse or composting. They could then be used as agricultural buildings.