



Plot 4

Tir-y-Gafel

Plot 4
Management Plan
The Gipsons

February 2008

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Plot Drawing 1:200

1. Background and Introduction

"We belong to no cult. We are not Nature Lovers.
*We don't love nature any more than we love breathing.
Nature is simply something indispensable, like air and
light and water, that we accept as necessary to living,
and the nearer we can get to it the happier we are.*"
~ Louise Dickenson Rich

We are the Gipsons, Marianne, 35, Ayres, 34, Mirelle, 3, and Ellion, 1. Marianne is a native of Bath, and Ayres is formerly of the California Central Coast; we met nearly five years ago. Ayres was a farmer and Marianne a gardener in the commercial Farm and Garden Department at Esalen Institute, in Big Sur, California. Living within the residential community that supports the rugged and isolated landscape of Esalen Institute was our first experience of living in 'intentional community', as well as our first experience of commercial-scale agriculture. Food grown on the five-acre farm and in the half-acre garden was a significant part of the 600 to 900 meals served daily by the Institute's kitchen. For us, this was also the first, delicious experience of eating truly whole foods – organic produce still pulsing with life at lunchtime following the morning's harvest. Mirelle's very first foods, basil and broccoli, were proudly grown by her father on the Esalen farm.

Ayres eventually became the Farm and Garden Manager, as well as managing the medium-scale industrial composting operation, until we decided to settle in the UK in December of 2004. In March 2005, Marianne began working for the Recycling Consortium and the Real Nappy Project. She spent the next year speaking publicly and doing home visits working towards reducing the volume of landfill in the area of Bath and Northeast Somerset. Ayres has been self-employed as a massage therapist and teacher since arriving in the UK. He now has a thriving bodywork practice in Bath and London, teaches workshops in Bath and Bristol, and facilitates ongoing development groups for qualified practitioners.

The Gipsons are committed to living in a way that minimises our impact on the planet and the people with whom we share it. We've structured our lives to allow us to walk, bike, and take public transport, wherever we need to go. We carefully consider each purchase we make, generally preferring second-hand or 'freecycle' and weighing factors such as transport miles, the social and environmental policies of companies, the nature and source of construction materials, how easily the item can eventually become soil, and perhaps most importantly, do we really need it? The vast majority of our waste is compostable and duly composted, and we can smugly (and regularly do) say that, as a family of four in a small, urban, first floor flat with zero outdoor space, we consistently produce less than one carrier bag of rubbish per week.

We are now eager to move on to a new role in our relationship to the land and our global community, to transition from low-impact dwellers to land-stewards. The former, while a necessary stage of environmental awareness, simply forestalls or mitigates destruction, sees humans as separate from and perhaps even bad for the planet, and stands in opposition to consumption. The latter brings forth life, food, and sustenance, sees humans as an integral, beneficial and benevolent function of the 'ecosystem' and affirms the abundance that comes from direct relationship to the planet that is both home and provider for us all.

2. Plot Design

*"The earth laughs at he who calls a place his own."
~ Hindustani Saying*

2.1. Site Survey

A 1:1000 scale map shows that Plot 4 is very flat, with the entire plot lying between 154 metres (at the North-North Western boundary) and 152 metres (South-South Western boundary) above sea level. Soil on the plot appears to be consistently dark brown and black with some clay and slaty fragments. The soil has been extensively sampled and tested throughout the plot (Soil Health Report for Lammas, September, 2007). The soil report indicates predominantly sand and clay earth with sufficient organic matter content. The average pH in the area of Plot 4 is an acidic 4.5. We will need to add lime in bulk, which has been sourced from Clunderwen and Cardiganshire farmers at £40 a tonne, (delivered and spread). We also plan to add large quantities of alkaline worm castings from our on-site commercial organic waste conversion (vermiculture) operation (details of this enterprise are below).

2.2. Integration of Permaculture Zoning and Site Layout

The layout of the plot (see attached plot diagram) was designed according to our (nascent and growing) knowledge of permaculture/ agroforestry principles. We were also able to draw upon Ayres' experience as a commercial farmer, farm and garden manager, and manager of a medium-scale, industrial composting operation and Marianne's life-long experience of gardening. It has been designed to make full use of climate, aspect, soil quality and our family's needs, interests, passions and skills. The mostly flat surface of Plot 4 with excellent exposure to the Southerly sun and a topsoil depth of 8-12" allow flexibility in the location of growing areas. Humus content will be increased through the addition of generous amounts of compost, worm castings, and mulch. Build up of soil fertility will be taken in stages, focusing initially in key areas of Zone 1, (such as the conservatory and raised beds of the kitchen garden), and continuing with key areas of Zone 2, (such as the herb and chilli polytunnel, annual vegetable beds, and the forest garden). The plot plan provided here is for Plot 4 as marked on the Lammas Tir-y-Gafel plan. The four co-housing plots of the terrace building have been consciously designed by Lammas to facilitate everyday interaction and cooperation between the residents of these plots. As a family with children we are keen to contribute to this approach and our plot layout has been designed with this co-housing ethic in mind.

2.2.1. Zone 1

Zone 1, in permaculture terms, includes the indoor living space. The focal point of this land management plan is the home kitchen, and in particular, the powerful "rocket stove", which will be fuelled by Short Rotation Willow Coppice (SRC) from Zone 4. Zone 1 also includes the conservatory and adjoining kitchen garden. The kitchen garden will occupy a total of 208 square meters running the length of the house beyond the conservatory, with a growing space of approx. 156 sq m (1.5m wide raised beds accessed by .5m paths). The conservatory allows ready access to the non-hardy plants grown within them as well as enhancing passive solar heat gain

for the house. Chillies, tomatoes, apricots, lemons, grapes, figs, and similar exotics and low maintenance tender fruits will be grown in the terrace conservatory subject to space. The kitchen garden (running the length of the house beyond the conservatory) will combine the edible and the ornamental, incorporating fan and cordon fruit trees (apples, pears, plum and cherry) and logan, boison, and wine berries against the boundary fence, edible flowers, herbs and permanent raised beds for kitchen herbs and salad vegetables – tender varieties of lettuce, perpetual spinach, runner and French beans and peas. Two Khaki Campbell ducks will be kept in this garden, with a small duck pond and mobile hut. The ducks will help to keep down slugs and provide eggs and “low-tech” entertainment for the family. Housing them in this garden also affords the ducks protection from predators with far less fencing implications than would be the case if they were on the main plot.

The **field store, workshop, and drying room** (attached to, and sharing a wall with our terrace house) will be used to store tools and materials necessary for care and maintenance of the plot. It will also be large enough to hold straw for mulch, seasoning wood, a small room for drying garlic, chillies, and other produce, and a small workshop space.

2.2.2. Zone 2

Beyond the gate of the kitchen garden lies the **main area of cultivation** – the annual vegetable beds. The main growing area, excluding kitchen garden will have a total area of 2754 sq m (.7 acres), with an estimated total growing area of 2065 sq m (1.5 meter beds and .5 meter paths). This is divided into five fields of roughly 412 sq m and managed so that the garlic is on a ten-year rotation, reducing susceptibility to disease of this key cash crop. In addition to mulches and hand tools, a two-wheeled tractor or rotivator will be used initially, which will be part of the tool share created by the project. Eventually, we hope to do this work with a large pony or horse. We are keen to share responsibility for looking after and working with a pony or horse. The use of horsepower fits well into Lammas’ land management plan. Ample grazing space exists and manure will always be needed. Delivering produce and transporting residents and visitors locally, ploughing and similar land based tasks are all possible uses for a horse. This would include forestry work, where horses have proven to be the best option for negotiating steep, ecologically sensitive slopes such as those found above Afon Gafel in the shared forestry area.

The **herb and chilli polytunnel** has been designed to house 85 sq m of growing space (1.2 meter wide beds and .5m paths), and marks the transition from the main area of cultivation to the forest garden. The polytunnel allows a considerable extension of the growing season, starting off seedlings for the outdoor beds and allowing year round growing of income generating herbs such as parsley, coriander, basil and climate-sensitive chillies, as well as vegetables for home consumption.

The **forest garden** occupies the North North-Western third of Plot 4. The design is meant to maximize edge, the most productive part of a forest garden, and to ensure a sheltered central area, which fully captures sunlight to support and speed the composting process in our vermiculture operation. Plant varieties have been well researched and include a diverse range of fruit and nut trees, berries, herbs, perennial vegetables, oyster, shitake and wood ear mushrooms, and soil-enriching legumes and green manure. The forest garden will require consistent attention but little maintenance. Like the natural forest, it is a largely self-regulating ecosystem.

The intention is to highlight the abundance that can be realised through minimal effort. The forest garden model, once well established, has proven its ability to provide a family a considerable degree of self-sufficiency for seven months of the year or more even in temperate climates, with very high quality nutrition, and even medicinal foods.

The **wormery** (phase one) will consist initially of one, with eventually up to fourteen efficient, continuous vertical flow worm composting stations, housed in a temperature elevating and regulating polytunnel, along with one to three conventional compost turning bins near the entrance. The polytunnel will be placed discretely within the forest garden. Organic matter to feed the worm casting and compost production process will be collected from our home, other smallholdings in Tir-y-Gafel, and ultimately through regular collection in a Community Composting Scheme as outlined in the business plan below. We plan to make these collections by electric milk float charged on-site. The milk float will be housed in a willow bender at the end of Plot 4's drive.

2.2.3. Zone 3

The land common to all four terrace plots includes the **grazing field** East of (below) the terrace building. This land is roughly twelve acres owned in equal common leasehold by the terrace residents. Currently our plan for this land is to continue hiring it out to local farmers/Tir-y-Gafel residents for grazing.

2.2.4. Zone 4

The 9 acre (3.6 ha) Southern shared field will be the **terrace common fuel field**. Below is a brief outline of its purpose and function. Plans for the produce of this field and how it will be utilised are detailed in the Lammas 'Eco-Teras Design Plan' and elsewhere in this plot plan, where applicable to our individual plot.

Heating Fuel

Miscanthus, or 'Elephant Grass' is fast establishing itself as a viable energy crop in Wales. Lammas has chosen to use it for heating the terrace because of its adaptability to mechanization. 3 acres (1.2 ha) will be used to grow Miscanthus, as biofuel to fire the boiler for space and hot water heating.

Cooking Fuel (Short-Rotation Coppice)

Approximately 3 acres (1.2 ha) of SRC Willow will be planted at the top of the common fuel field. It will be harvested by the individual households and stored for 12 months to reduce its moisture content. Yields are estimated at 10 dry tonnes/hectare. The crop is thus designed to produce 12 dry tonnes of SRC Willow (3 tonnes per terrace household). It takes 3 years to reach maturity and is cut on a 3 yearly rotation.

Long-Range Coppice

The 2.5 acre (1 ha) mid-section of the terrace fuel field has been allocated for Long Rotation Coppice. A variety of native species (hazel, ash, oak) of local provenance will be planted as a long-term timber resource for the terrace.

2.3. Visual Impact and Layout

Terrace

A visual impact analysis concluded there will be little if any impact beyond the site, as confirmed by the initial Lammas planning application.

Main Growing Area

The main growing area will be small by contemporary Welsh agricultural standards. Its visual impact will be minimal.

Polytunnels

The polytunnels have been located so as to maximize growing and vermicomposting conditions and accessibility. Their positions between the field store and the existing hedge, and surrounded on four sides by forest garden will minimize visual impact. In this climate, a sheltered growing area is a key element in the viability of a self-sustainable livelihood plan, allowing seedlings to be started early and year-round production and protection of key commercial crops. Having two identical polytunnels relatively close together and a modular system for worm composting will allow us to channel resources appropriately into whichever enterprise – commercial herb production and vermicompost production – needs them as they grow.

Field Store

This structure has been attached to, and shares a wall with the terrace house to reduce building costs, minimize visual impact, and maximizing useful space. The extension itself is between the house and the herb and chilli polytunnel.

Wormery

The series of small structures in the vermiculture polytunnel comprising the wormery has been placed in the forest garden for several reasons, one of which is to keep the wormery out of view. The forest garden, along with the polytunnel will create a microclimate that will aid the composting process and prevent the need for permanent buildings to house the operation. The forest shade prevents the composting stations from overheating; the polytunnel provides a windbreak to prevent excessive cooling and wicking of moisture, and shelter against driving rain. The 2 metre diameter, 1.5 metre tall, octagonal worm composting stations incorporate an efficient, small-footprint design perfect for this scale of processing. Three – 1.5 metre deep by 5 metres wide by 1.5 metre tall, rectangular four-bin compost turners will sit near the entrance of the polytunnel. Except for a bit of wire mesh, both the composting stations and the turning bins are made entirely out of organic materials, meaning they are themselves compostable.

Forest Garden

The forest garden will simply be its beautiful self.

2.4. Land Based Produce & Services:

We plan to provide at least 75% of our household needs from the land after five years through a combination of growing, collecting and processing food, energy and water for our own consumption and through producing goods and services from the land with 'added value', which we can sell in the marketplace or trade for other good and services.

2.4.1. Food

Where plants are grown for food we will seek a range of varieties including a balance between those which are early, mid, and late cropping, those which are heavy croppers and those which are hardy, pest resistant and grown for flavour and rare varietal status.

Vegetables

The kitchen garden will be primarily for early and tender/rare varieties of annual and biannual vegetables, including tender lettuce, cucumber, courgette, carrots, peas, French and runner beans, etc. grown in rotation, with consistent and generous use of compost, castings, and mulches. The sheltered nature of the raised bed garden and use of the polytunnel and conservatory to raise seedlings early should facilitate this and allow full use of the growing season. The main growing area in plot 4 will then be used for the main crop of vegetables – cash crops of garlic, established runner beans and other legumes, brassicas, courgettes, sweetcorn, leek, spinach, beetroot and other root crops, etc.

Fruit

We plan to plant a variety of fruit trees in our forest including apples, pears, plums, and cherries. We are keen to make our own cider from some of this fruit in the future. Within the forest garden orchard, we will plant two Michelin apple trees on M111 Rootstock to complement a planting of one on M26. We are also planning to contribute to the maintenance of a shared cider press.

We plan to locate one of our beehives in the orchard to encourage pollination and provide us with honey. We will grow non-hardy and semi-exotic fruits including apricots, lemons, grapes and figs in the conservatory. We also plan to plant fruit trees and bushes within the hedges and forest garden. These will include elder, sloe, crab apple, raspberries, blackberries, and wineberries, Judas tree (*Cercis Siliquastrum*), silverberry (*Eleagnus x ebbiingei*), creeping Barberry (*Malionia Repens*) and quince. Some of these are already present on the site. The fruit will be eaten seasonally as well as being frozen and made into preserves and wine for our own use. As our experience grows, we hope to experiment with other soft-fruit hybrids.

Nut

On the Southern edge of the main growing area and within the forest garden area we will plant a range of nut trees including hazel, sweet chestnuts and butternuts, and heartnuts.

Foraging

We are all very keen foragers. There is little as gratifying as effortlessly 'finding' wholesome, nutritious food. We will encourage edible, beautiful and biodiverse plants throughout the plot so that foraging can continue to supplement our diet, adding flavour and nutrition distinct from that provided by the cultivated food. We also plan to raise oyster, shitake and wood ear mushrooms on logs for our own consumption.

Sprouting

We've experimented with sprouting for many years and find it is a very inexpensive and highly nutritious year-round food source.

Fish

Whilst Marianne and the kids remain committed vegetarians, Ayres is an avid fish-eater. He is very interested in raising carp or even trout in our large wildlife pond or communal millpond for domestic consumption and possible trade.

2.4.2. Income

Our strategy is to diversify income streams by choosing a couple of low-overhead, low to medium-input, medium to high-yield enterprises. We will begin with minimal capital investment and channel subsequent investment into those enterprises that show the greatest potential for sustainable growth. Whilst several of the crops we plan to cultivate and their associated products may prove to be marketable in the future, initially, the focus will be on two primary income streams, which are covered in detail in the business plan sections below:

- Organic waste disposal and conversion, and associated products
- Organic garlic, herbs, and associated products

Organic Waste Disposal and Conversion

Currently, households throughout Pembrokeshire are encouraged by the local authority to separate garden waste and some other forms of organic materials for weekly collection. Still, the vast majority of this waste enters the landfill. We hope to augment this service for the benefit of both the community and the local authority and put as much of this waste as possible to use in our conversion operation.

We intend to derive a significant portion of our land-based livelihood from organic waste disposal and the conversion of that waste into saleable products – worm casts (fertiliser), compost tea, composting worms, and 'garden variety' compost. In vermiculture (also known as 'vermicomposting' or 'worm composting'), red worms consume the bacteria, fungi, protozoa, and microarthropods, which feed on compost to generate highly concentrated fertiliser called worm castings. Vermiculture is essentially the final step of all the planet's compost processes, natural or supervised. Vermiculture yields and sales value are detailed in the business plan below.

Organic Garlic and Herb Production and 'Value-Added' Products

The flourishing of the local and quality foods market and growing awareness of food miles and carbon/ecological footprinting are beginning to open up market opportunities for sustainable, locally grown produce. In terms of garlic, this represents a significant opportunity within Wales. There is currently a shortage of Welsh grown garlic, for example, with direct delivery box schemes such as Organics To Go currently importing from Scotland as the nearest organic supplier.

A marketing survey carried out in the immediate area by Dr. J. Pickerill of Leicester University identified demand for fresh parsley and a lack of supply. In particular the research identified a lack of year round supply. Our own research suggests this also includes coriander and basil, so these annual herbs will be sold as young potted plants and fresh cut herbs, as well as in added value products. Ensuring a year round supply of parsley and an extended season for basil and coriander will further increase the market niche. This will be possible by using the polytunnel.

2.4.3. Pest & Disease Control

Pest and disease control will be done by natural means, which will also produce greater biodiversity throughout Plot 4 and contribute to the increased diversity of Tir-y-Gafel, in general. Ducks will patrol the kitchen garden and conservatory, eating slugs and snails. Through the construction of hung bamboo nests, strategic placement of leaf piles and bird boxes, the digging of four wildlife/ irrigation ponds, and liberal inoculation of soil with earthworms and compost tea, we will foster increased populations of ladybirds, beetles, frogs, birds, small slug and snail-eating mammals, as well as beneficial bacteria and other microorganisms, fungi, and nematodes. We will also focus on soil health, the result being robust, resilient, and healthy plants. Crops will be rotated, especially the important cash crop of garlic, which will be on a ten-year rotation. One fifth of the main area of cultivation will remain fallow and rotated yearly, thus increasing fertility and halting the spread of disease. Other root, brassica, legume, corn, potato, and leaf crops will also be grown for home use/future sales on a ten year rotation.

Enterprise	Area (** actual growing / bed space)	Description	Business	Home use
Conservatory	20 m ² **	Non-hardy plants Chillies, tomatoes, apricots, lemons, grapes, figs, and similar exotics and low maintenance tender fruits	Chillies for 'value-added' products	Fruit and vegetables
Fenced kitchen garden	156 m ² **	Edible and ornamental plants- fan and cordon fruit trees, berries, edible flowers, herbs, and salad vegetables		Fruit and vegetables
Polytunnel	85 m ² **	Seedlings, extension of the growing season	Herbs and peppers	Tomatoes and other vulnerables
Annual crops	1236 m ² **	Root, brassica, legume, corn, potato, and leaf crops grown on a 10 yr rotation		Vegetables
Organic Garlic	206 m ² **	6 varieties of organic garlic	Market sales	Garlic
Organic Herbs	206 m ² **	Parsley, basil, and coriander	Market sales	Herbs
Fallow land	412 m ² **	Cover crops of green manures rotated yearly	Land of increased fertility	Land of increased fertility
Orchard	517 m ²	Own root apples, pears, hardy plums, and wild cherry		Fresh fruit & preserves
Blueberries	8 m ² **	Exclusive blueberry cultivation area in low pH soil		Fresh fruit
Nut crops	570 m ²	Walnuts & hazels		Nuts
Forest garden	100 m ²	Sub-canopy berries, perennials and herbs		Fresh fruit and herbs

Elderberries and flowers	96 m ²	Separately grown due to being 'bad' companion		Cordial and wine
Ducks	9 m ²	2 Khaki Campbell		Eggs, pest control, fun
Bees	3 m ²	3 hives		Honey, beeswax, mead
Organic Waste Disposal and Conversion	120 m ³	Compost turning bins and vermiculture stations designed to convert waste into fertiliser and topsoil	Waste conversion operation	Fertiliser and topsoil
Field store, Workshop, and Drying room	163 m ²	Straw bale home extension	Drying garlic, chillies, and other produce, production support	Store tools and materials, hold straw for mulch, seasoning wood

Notes on enterprise table: figures for common eco-teras fuel, timber, and craft coppice, grazing meadow and reedbed water treatment are detailed in the 'Eco-teras Design' plan attached to the Lammis planning application.

2.5. Fuel

Once it has become established, in common with all the terrace units, we intend to supply all our heating and cooking fuel needs through a mixture of Miscanthus (Elephant Grass), SRC, traditional LRC and windfall of broadleaf standards, though the bulk of this will come from SRC willow. Recent field trials in South West Wales (<http://www.forestry.gov.uk/zone6site19v.uk/srcsite/INFD-5KUEVR#>) predict an annual harvest of 7-14 dry tonnes per hectare for willow species. Although some hazel coppice will be located in Plot 4, the largest area of SRC will be located in the Southern common fuel field. We estimate that we will require approximately 2.5 tonnes of cooking fuel per year. To allow for seasoning, we have given over 12 cubic meters in the field store to hold up to 6 tonnes of drying wood.

2.6. Water and Drainage

Ffynnon deg, a high quality spring located on the Tir y Gafel site, will provide our drinking and cooking water. As Ffynnon deg currently supplies a bottling plant, this water will only be available to use directly from source from 8pm to 8am. We will store this spring water in a 200 litre (44 gallon) cistern buried in the earth berm bordering the northern wall of the terrace house. This should be sufficient to provide us with sufficient leeway and prevent any disruptions in supply.

As the area has high rainfall, all of our irrigation water needs will come from harvesting rainwater. This will be done through a series of ponds and collection tanks. The polytunnel roofs will both be used for harvesting rainwater to be stored in nearby ponds and tanks made from reclaimed, 300 litre industrial orange juice containers or other appropriate water butts.

The plot is generally well drained, however a site visit on 10/03/07 indicated surface water from water logging over the Westerly edge of the plot below the large millpond. This may be due to unusually heavy rainfall, leakage from the pond, overgrazing (sheep and horses were present), or a combination of these factors. We foresee the possibility of an increase of precipitation in this already wet part of the country due to climate change, and have planned a few features to prepare for this eventuality. We've decided to integrate this natural abundance of water into the plot design with the addition of two large ponds on the Westerly edge of the plot. The ponds will be fed by rainwater and planted with alder to stabilise water logging. These four ponds in total and rainwater storage tanks will provide a back up supply of water for the field scale cash crops. Water demands also will be minimized, as we plan to use mulches extensively and grow cash crops that require little irrigation water, e.g. garlic. Though the availability of water for irrigation is important in the key garlic growing period of April-May, there should be plenty in reserve from Winter at that point.

2.7. Waste

Waste will be minimized by emphasizing the top of the waste hierarchy, namely reduce, refuse, re-use and repair, rather than the more problematic recycle. As a family, much of what draws us to this project is the possibility of living in a way that is virtually waste-free. In the natural world, nothing is wasted, and we hope to emulate that in our own activities. Materials used on the plot will be sourced from post consumer waste where possible (e.g. using reclaimed wood and hessian-backed carpet/cardboard for mulching) and there will be adequate space and time allowed for recycling where this is the most suitable option.

2.8. Energy Use:

We plan to connect into the Tir y Gafel supply of electricity, which will come primarily from the site's water turbine. Whilst research and development of this source are ongoing, it appears very likely to supply up to 28kW to the site. We currently propose to run LED lights, a laptop, a stereo, and a few very low-wattage personal electronics devices, so our needs will be low. We project our household's annual energy consumption to be very near 600kWh per year.

We will encourage shared use of a terrace washing machine and freezer facilities with other co-housing plot residents. This would reduce material consumption (using quality repairable machines and fewer of them, less space required to house them, etc.) and encourage everyday social interaction.

3. Design for dwellings and outbuildings

*"We do not inherit the Earth from our Ancestors;
we borrow it from our Children."
~ attributed to Chief Seattle*

3.1. Main Dwelling

The terrace building is a shared development that is outlined in detail in the 'Eco-Teras Design Plan'. We have designed the interior of the number 4 terrace.

3.2. Field Store, Workshop, and Drying Room

3.2.1. Purpose

The field store will be used to store tools and materials necessary for the care and maintenance of the plot, straw for mulch, and as a store for firewood. The internal drying room will use a small wood stove to dry the garlic to achieve the drying performance of the level recommended by ADAS for commercial garlic production (ADAS, 1986). Chillies will also be dried here. In the Winter, this structure could be used as a sauna. This semi-circular room adjoining and sharing a wall with the terrace house will also contain a small multi-purpose workshop space.

3.2.2. Materials, Construction, and Reversibility

As this is simply an extension of the terrace building, and would be built and 'reversed' with the building as a whole, materials, construction, and reversibility are detailed in the Eco-Teras Design Plan.

3.3. Polytunnels

3.3.1. Purpose

The **herb and chilli polytunnel** has been designed to house 80 sq m of growing space (four beds, 1.25 meter wide and 16 meters long with 0.5m paths between them). The 6m wide by 20m long by 3m high polytunnel will be designed to incorporate a rainwater harvest and storage facility. The total rainwater yield is calculated to be 85cu.m per year. It will be stored in a series of reclaimed water butts located at both ends of the polytunnel, and rainwater overflow will feed a nearby pond. There will be a small pond and rockery in the polytunnel for amphibians and other beneficial predators such as slug eating black beetles.

The **vermiculture polytunnel** (6m wide by 20m long by 3m high) will house the structures of the wormery. The wormery will consist mainly of, what are essentially modified wooden compost bins. Up to fourteen worm composting stations will each measure 1.5 meters tall by 2 meters round. They will house the worms and the site of vermicast production. As the composting stations will reside in the polytunnel, shrubs and vines will be placed around their perimeters, fully utilising the available space. The three - 1.5 metre deep by 5 metres wide by 1.5 metre tall, rectangular

four-bin compost turners will be used as a holding area where organic matter will undergo initial breakdown before being fed to the worms. They will also be used for 'garden variety' compost production. The composting stations and turning bins will be made of organic materials – wood, cob, and burlap – so that with the removal of a bit of wire mesh, the bins would be fully recyclable/compostable. See business plan detailed below.

3.3.2. Materials

Each polytunnel frame will be a tubular galvanized steel construction covered with a thermal, anti-fog 720 gauge (180 micron) polythene, with added UV A and UV B filters. These filters dramatically reduce many fungal diseases, like mildew and botrytis. It also contains an infrared additive designed to reduce the speed at which heat dissipates out through the cover. A thermic cover also helps to scatter light as it enters the polytunnel.

3.3.3. Construction

The polytunnel will be constructed specifically to enable rainwater to be collected. Foundations will be metal anchor plates with no concrete or hard standing.

3.3.4. Reversibility

As a lightweight agricultural structure, the polytunnel will require no foundations and will be highly reversible. Once the polythene membrane has completed its useful life it will be recycled, whilst the frame will be re-used.

4. Business Plan For All Land Based Produce

4.1. Organic Waste Disposal and Conversion

*"It may be doubted whether there are many other animals
which have played so important a role in the history
of the world as these lowly creatures"
~ Charles Darwin.*

Our intention is to use worms to process organic waste from the local area into the products listed below. We will utilise Ayres' past experience as manager of a medium-scale, industrial composting operation. Collection will be made through a proposed Community Compost Scheme by electric milk float charged on-site by hydroelectric power. Appendix 1 'Vermiculture Information Sheet' contains detailed information about the worm composting process and references for production forecast, costing, and income figures listed throughout the vermiculture business plan.

4.1.1. Products

Organic Waste Disposal

We project that within 18 months from start-up we could have the capacity to efficiently turn up to 1.5 tonnes of organic waste into up to 400 kilos of fertile topsoil, weekly. As demand for the removal and proper treatment of organic waste increases, the operation could be expanded to process up to 3 tonnes of organic waste weekly, producing up to a tonne of topsoil weekly with just one to two round trip journeys per

week from Tir-y-Gafel to Glandwr, Hermon, Hebron, and/or Crymych. Reclaimed 25 litre buckets have been sourced at no cost as containers for household collection.

Worm Castings

Castings will be sold by the litre, the industry standard in the UK. 1L is equal to about 1.25kg. Reclaimed sacks will be used whenever possible. A focus on direct sales within the community and bulk sales make this goal more feasible. For the first four years we plan to use the worm castings on the plot itself in order to build up the soil depth and fertility. Once this initial soil conditioning has taken place we plan to set aside 2 tonnes of castings each year as a top-up conditioner for the plot.

Compost Tea

Compost tea will be sold by the litre, also the industry standard. Reclaimed containers will be used whenever possible. A major retailer of compost tea sources their tea bottles from recyclers. We plan to look into this option ourselves.

Composting Worms

Composting worms will be sold by the kilogram. Containers will be breathable bags made from natural materials and bedded with bedding material from their own wormeries. We do not intend to market our worms for bait or as food for other animals.

'Garden Variety' Compost

Compost will be sold in 20L (about 35kg) units. Reclaimed sacks will be used whenever possible.

Topsoil

Diluting worm castings with 'garden variety' compost creates a high-quality, organic topsoil – a quickly-disappearing resource in the UK. We will sell topsoil in bulk to Tir-y-Gafel residents, local gardeners, and smallholders. Pricing will combine our casting and compost rates.

Vermiculture Consultation

We will offer a consultation and system design service. Services will be charged by the hour at relatively low-cost as a means of opening up a market for our worms. We have not included income from this aspect of the enterprise into our business plan, as it may not be considered a 'land-based livelihood'.

4.1.2. Market Research

*"Man - despite his artistic pretensions, his sophistication,
and his many accomplishments - owes his existence to
a six inch layer of topsoil and the fact that it rains."
~ Author Unknown*

There is an exceedingly long list of factors that make organic waste disposal and conversion through vermiculture an attractive and viable option for a land-based livelihood. Primary among these is, of course, the product itself. An organised worm composting operation supports, focuses, and accelerates a process that is the basis of all organic life on the planet – the creation of valuable and ever more rare rich topsoil.

In terms of **environmental sustainability**:

- ⊗ Our vermiculture process will generate zero waste while recycling waste and be a positive contribution to the local ecosystem. Every by-product of the process can either be re-fed into the system for positive gain or marketed on its own as a 'value-added' product, e.g. compost tea, castings, compost, the wormeries and worms. Our process will be odourless, and the end product vermicast will smell like fresh soil.

In terms of **economic sustainability**:

- ⊗ Raw materials for an operation of the size we propose are almost always free, sometimes delivered, and locally obtained. We have established an ongoing relationship with Jeremy Bowen-Rees, director of the Landsker Business Centre in Whitland and the Welsh Assembly representative to the Environmental Goods and Services sector (EGS). We are discussing the grant opportunities now available to businesses engaged in waste management operations.
- ⊗ The initial capital investment will be very low for our operation. Infrastructure investment will occur in direct proportion to both increases in demand for our products and services, and the need to house and utilise our ever-increasing worm population. To control growth, we will simply sell, trade, or give away these valuable composting worms. There will never be any waste.
- ⊗ Intensive physical labour inputs will be relatively high but infrequent. We estimate that a small-scale, non-mechanised operation processing 1.5 - 2 tonnes of waste per week requires three intensive days per week to work the compost and castings, tend the worm habitat, liaise with the public, and do direct sales, and one to three half days for administration and further sales. Ayres and Marianne Gipson will operate and administer the enterprise as a team. Selling in bulk at wholesale prices to Tir-y-Gafel smallholders, local farmers and gardeners, through local garden centres, and through the Tir-y-Gafel 'trading post' would reduce both the daily admin roles, as well as trips required to and from Tir-y-Gafel. Our next steps will be to research wholesale relationships, using the conclusions to update this plan.

In terms of **marketability**:

- ⊗ Worm casts tend to be used as a high quality (and high value) soil conditioner within the horticultural and agricultural sectors, rather than as bulk compost or plant bedding material. We will capitalize on the value for money and sustainability aspects of our products.
- ⊗ For ease of harvest, the vast majority of UK worm farmers sell a 'worm mixture' of the small Redworm (*Eisenia foetida*) and the larger 'Dendra' worm, which can also be sold as bait worms. We will specialise in the *Eisenia foetida*, also known as the 'original' Tiger worm, or Brandling worm. This is a small, voracious, prolific composter highly prized as the best composting worm available. Our research indicates that there are currently no sizable worm farms in the UK offering purebred *Eisenia foetida*. We intend to offer superior value for money within this niche market.
- ⊗ It is clear that the market for the end product has not been saturated. For a number of companies contacted, the demand for their products has exceeded their ability to reliably supply them. Large-scale, municipal facilities are opening all the time, and large private firms are increasingly seeking

subcontractors to produce their worms for them. A large internet retailer may source their worms from a dozen or more farms. As the exact amounts of worms we can reliably produce becomes clear, we will follow up this research with firm trade commitments from retailers.

4.1.3. Customers / Marketing Strategy

Customers

Organic waste disposal is an increasingly serious concern for the EU, UK government, and local authorities. We will begin by creating our Community Interest Company with a clear business plan/proposal to provide services for the local authority.

While thinking globally our focus will primarily be local. Organic waste disposal is, by necessity, a local enterprise. Organic waste will come in concentric circles from our own domestic consumption, then from the smallholdings of Tir-y-Gafel, and inevitably from the village of Glandwr, and perhaps eventually from the Hermon, Hebron, and Crymych areas. Raw materials for the operation are usually freely given, and those who contribute organic waste and/or labour to the operation will periodically be invited to take free worm casts, compost, and worms, as a dividend for their 'investment' in the project.

The finished product will follow the same route – to our own garden, annual beds, polytunnel, and forest garden, and to the other smallholdings of Tir-y-Gafel, turning pasture into fertile farmland. Castings and compost will be used in local gardens and on local farmland, and eventually be distributed as far a field as we've been to collect the raw materials for production. The descendants of worms that double their populations every 30 to 90 days will eventually wiggle their way along this same route and make their way into the wider world, into home gardens and farmers' fields, into small-scale worm composting bins outside of homes, schools, restaurants, public buildings, shops, and potentially any business that produces organic waste – food scraps, garden waste, paper, cardboard, certain manures... The worms will take with them their phenomenal talent of supporting the entire planetary food chain simply by virtue of a very healthy appetite.

Marketing Strategy

Some advice received from Tom French, an experienced commercial 'wormkeeper':

"Worm castings are a low pressure sell, but it is still a good idea to be armed with information. Ads are a good idea for selling castings, but contacting people directly is even better. You need to get out there and start shaking hands. Before long, you will be known as "The Worm Man" in your community. Ads might only generate enough business to pay for the ad, but you will get a few lifelong customers, and you will get referrals from these customers. This helps to get the ball rolling."

This is where, as a marketing tool, the Community Compost Scheme comes into its own.

We propose to establish 'Welsh Wigglers, Organic waste Disposal and Conversion, CIC'. This Community Interest Company will be charged with:

- Implementing the Community Compost Scheme, including:
 - Collection of feedstock (organic waste) for the wormery

- Coordinating publicity for the scheme through outreach and education, e.g. using the time spent on collection runs to also post flyers, speak at schools, and offer product samples
 - Hosting tours of the wormery for local residents and visitors to Tir-y-Gafel
 - Establishing a website which will present information on vermiculture and give local pick-up information (the domain name www.welshwiggers.co.uk has already been secured for this purpose)
- ⊗ Building and maintaining the wormery and overseeing the production and sale of end-product through:
 - Internet inquiries
 - Direct sales on waste collection runs
 - Farmers' markets
 - The Tir-y-Gafel 'Trading Post'
 - ⊗ Performing administrative tasks associated with the activities of the company, including:
 - Applying for additional funding, e.g. through grant and/or lottery funds
 - Keeping accurate records of quantities of organic waste taken and amounts of compost and related products produced
 - ⊗ Care for the 'Welsh Wiggers' herd, the population of which could, within 18 months from set-up and thereafter, consistently number about 900,000 *Eisenia foetida*.

4.1.4. Packaging / Sales

All Welsh Wiggler vermiculture products will be packaged in a range of sizes and will all include the Welsh Wiggers and Lammas logo. The casts and composts will theoretically have an indefinite shelf life, but teas are most effective when used within a week or so of production. The worms likewise will have an estimated shelf life of a week, if packaged properly.

Direct Sales

We estimate that about 30% of our sales will be direct. These will be to Lammas smallholders, friends, and households on the collection routes

Trading Post Sales

We will advertise our products in the trading post and will keep a limited stock available for sale there. We estimate that we will sell about 15% through this outlet. Due to the shelf life involved, some products will need to be checked and renewed every few days.

Market stall Sales

We will participate in the Lammas Market Stall and plan to sell our vermiculture products there. We estimate that we would sell about 20% through this outlet.

Internet Sales – Lammas website, Welsh Wiggers website

We anticipate that this will be one of our biggest marketing tools and expect to sell 35% of our products (particularly worms) through this outlet. The natural packaging will be carefully designed to keep the worms alive and comfortable during transit.

4.1.5. Production Forecast

We realise that organic waste material is the fuel for our operation, and the specific amounts we are able to collect will determine the amount of end product. However, based on the research detailed in Appendix 1, we do not foresee a shortage in the organic waste available for processing. Research is ongoing into the exact amounts of organic waste currently available for collection in the area of Glandwr and surrounding communities and the best methods for storage and collection. Sources for the calculations below are detailed in Appendix 1.

We have forecasted the volume of end product based on our capacity to process organic waste in terms of:

- 1) Expected worm populations and their processing turnover time
- 2) Our ability to physically collect, transport, and hand-process a given volume of organic matter
- 3) Having the space required to house the worms (composting surface area), store a single collection vehicle, and create a staging area sufficient for the volume of raw organic waste we hope to collect

Stage One involves the collection of organic waste. According to Steve of Steve's Electrics in Pontyclun near Cardiff (www.steveselectrics.moonfruit.com), a milk float capable of hauling three tonnes on a single charge between Crymych, Hebron, Hermon, and Glandwr is easily obtainable within our budget of £2000.

The Milk Float will maximise use of power from the hydro turbine at times when it is least required by the rest of the community, namely in the middle of the night. If it comes to pass that there is not enough electricity during a time, then we will use the Landrover and trailer operated by Dawn and Ant of plot 5.

We've designed a processing system that begins with one, up to three – four-bin compost turning units with a total volume of 33.75 cubic meters. As soon as waste is placed into the turning bins, the organic matter begins to shrink in volume due to the metabolic processes and proliferation of trillions of trillions of microorganisms and the evaporation of moisture. The matter will be turned like regular compost for about a week, after which time it will be ready for the consumption of the composting worms.

Stage Two involves the feeding and propagation of the worm 'herd'. Roughly one pound of worms will thrive in one square foot of compost. Each worm composting station contains 35 sq ft of compost, equalling 35 lbs or 16 kg of worms. A kilo of worms consists of roughly 4,000 *Eisenia foetida*, our composting worm of choice, meaning each composting station will have a maximum population of about 64,000 worms, multiplied by 14 stations, equals a constant herd population of about 896,000 worms.

Stage Three is harvest. Our research shows that this number of worms will convert between 780 kg and 1.6 tonnes of organic matter into between 118 kg and 400 kg of organic worm castings per week. Given fifty-two weekly collections per year, that is up to 80 tonnes of waste and up to 20 tonnes of casts per year.

Our conservative 5th year income calculations assume a constant population of 600,000 worms doubling in population every three months. We estimate they will convert 788 kg of organic waste into 158 kg of worm casts, weekly with a surplus of 2,400,000 or approximately 600 kg of *Eisenia foetida* per

year and 1200 kg of 'garden variety' compost. Compost tea will be produced as and when there is time and demand, at the very least for our own use.

The average household in the UK produces 0.49 tonnes of organic (compostable) waste per year, 9.4 kg per week. This means that we are going to need to gather compost from 84 houses (or equivalent) per week in order to collect 788 kg tonnes a week. The Crymych electoral district, has 436 households. Therefore if we were to collect from households alone, 19% of households in the immediate area (assuming we operated within the Crymych district would need to cooperate in the scheme. We are however planning to collect large amounts of waste from farms, schools, restaurants, and other businesses. For the purposes of this business plan however, we will quantify collection rates on a per-household rate.

Production forecast notes: all calculations in this forecast were performed based on the formulas and information sources outlined in Appendix 1 of this plot management plan.

Growth of business over time

	Year 1	Year 2	Year 3	Year 4	Year 5
Number of households served	Own/Tir-y-Gafel	10	30	50	84
Volume- Waste processed per week	Own/Tir-y-Gafel	94 kg	282 kg	470 kg	788 kg
Volume- Waste processed per year	Own/Tir-y-Gafel	4.9 tonnes	14.7 tonnes	24.4 tonnes	41 tonnes
Produce- Worm castings per year	Own/Tir-y-Gafel	980 kg	2.9 tonnes	4.9 tonnes	8.2 tonnes
Produce- Composting worms per yr	Own/Tir-y-Gafel	60 kg	200 kg	350 kg	600 kg
Produce- Garden compost per year	Own/Tir-y-Gafel	125 kg	450 kg	750 kg	1.2 tonnes

4.1.6. Costings

<u>Set up Costs</u>	
Item	Cost pa
CIC set-up	100
Composting worms (bulk) @ £20/kg	80
Loading, turning, and carting tools	150
Worm composting stations @ £40 each	560
Compost turning bins @ £30 each	90
Polytunnel	1600
Refurb. milk float & accessories	2000
Total	4580

<u>Annual Costs</u>

Item	Cost pa
Web hosting	36
Broken tools	40
Vehicle, tax, insurance, MOT, maintenance	500
Packaging and presentation	500
Promotional leaflets, cards, info sheets, etc.	60
Transport (other than collection vehicle)	100
Market costs (1/2)	200
10% of set-up costs	458
Total	1894

Set-up notes: set-up costs include projected capital investment to create a wormery consisting of 14 worm composting stations and 3, four-bin compost turning units. This is the largest operation currently envisioned for Plot 4. To build this will take 1-3 years depending on our needs and market demand. The quote for the price of milk float comes from Steve of Steve's Electrics in Pontyclun near Cardiff. 10% of set up costs will be removed from profits to replace initial capital invested from year 3 onwards.

4.1.7. Income

<u>Income (year 5)</u>			
Item	Unit Cost	Quantity pa	Income pa
Worm castings	£1/1Litre	6560 L	3968
Compost tea	£3/Litre	160 L	480
Composting worms	£20/kg	600 kg	9600
Garden variety' compost	£1/20L	685L	27
		Income	14075
		Expenditure	1894
		Profit	12181

Income notes: Unit costs shown are wholesale prices, which reflect our desire to reduce labour hours and keep costs low by selling in bulk and to retailers. We've reduced the figures for quantity and income from castings, compost, and worms, per annum by 20% to account for our intended 'dividend' to those who 'invest' by contributing to the Community Compost Scheme. In addition all the worm castings up to year 4 and the first 2 tonnes of annual worm casting harvest thereafter are for use on the plot.

Business Year	Income	Running costs	Profit
Year 3	3707	1894	1813
Year 4	6107	1894	4213
Year 5	14075	1894	12181

4.1.8. Finance

The set up costs for this business will be covered entirely by our current savings. As a Community Interest Company in the Environmental Goods and Services sector, it is clear that Welsh Wigglers will be able to apply for grants, etc. Research is well underway into how such funding is obtained, and we have begun a working relationship with the Welsh Assembly representative to the Environmental Goods and Services sector.

4.1.9. Cash Flow (years 2 -5)

Year 2	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Receipts (sales)													
Worm castings													
Compost tea	20	40	70	80	100	100	60					10	480
Composting worms	78	90	104	108	112	98	84	77	62	40	45	62	960
Garden compost	5	6					4	5	3			4	27
Total	103	136	174	188	212	198	148	82	65	40	45	76	1467
Expenditure													
Web hosting				18						18			36
Broken tools					20				20				40
Vehicle costs					300			200					500
Packaging	250						250						500
Promotion			30						30				60
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
Total	265	30	60	48	335	15	280	245	95	33	15	15	1436
Monthly Profit	-162	106	114	140	-123	183	-132	-163	-30	7	30	30	30

Year 3	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Receipts (sales)													
Worm castings												10	480
Compost tea	20	40	70	80	100	100	60						
Composting worms	260	300	346	360	373	326	280	258	207	133	149	208	3200
Garden compost	5	6					4	5	3			4	27
Total	285	346	416	440	473	426	344	263	210	133	149	222	3707
Expenditure													
Web hosting				18						18			36
Broken tools					20				20				40
Vehicle costs					300			200					500
Packaging	250						250						500
Promotion			30						30				60
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
10% of set-up costs												458	458
Total	265	30	60	48	335	15	280	245	95	33	15	473	1894
Monthly Profit	20	316	356	392	138	411	64	18	115	100	134	-251	1813

Year 4	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Receipts (sales)													
Worm castings													
Compost tea	20	40	70	80	100	100	60					10	480
Composting worms	455	525	606	630	653	571	490	452	362	234	260	362	5600
Garden compost	5	6					4	5	3			4	27
Total	480	571	676	710	753	671	554	457	365	234	260	376	6107
Expenditure													
Web hosting				18						18			36
Broken tools					20				20				40
Vehicle costs					300			200					500
Packaging	250						250						500
Promotion			30						30				60
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
10% of set-up costs												458	458
Total	265	30	60	48	335	15	280	245	95	33	15	473	1894
Monthly Profit	215	541	616	662	418	656	274	212	270	201	245	-97	4213

Year 5	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Receipts (sales)													
Worm castings	569	490	474	298	169	169	207	289	257	158	415	473	3968
Compost tea	20	40	70	80	100	100	60					10	480
Composting worms	780	900	1040	1080	1120	980	840	775	620	400	445	620	9600
Garden compost	5	6					4	5	3			4	27
Total	1374	1436	1584	1458	1389	1249	1111	1069	880	558	860	1107	14075
Expenditure													
Web hosting				18						18			36
Broken tools					20				20				40
Vehicle costs					300			200					500
Packaging	250						250						500
Promotion			30						30				60
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
10% of set-up costs												458	458
Total	265	30	60	48	335	15	280	245	95	33	15	473	1894
Monthly Profit	1109	1406	1524	1410	1054	1234	831	824	785	525	845	634	12181

*"Soil is a resource, a living, breathing entity that, if treated properly, will maintain itself. It's our lifeline for survival. When it has finally been depleted, the human population will disappear... Project your imagination into the soil below you next time you go into the garden. Think with compassion of the life that exists there. Think, the drama, the sexuality, the harvesting, the work that carries on ceaselessly. Think about the meaning of being a steward for the earth."
~ Marjorie Harris, In the Garden, 1995*

4.2. Garlic, parsley, coriander, basil, chillies and associated products

4.2.1. Garlic

A range of garlic varieties will be grown for their early availability, diversity of flavour and storage abilities, including Albigensian, Early Purple, Purple Wight, Wight Solent, Elephant and Purple Moldovan. These are specialty cultivars have been chosen for their 'niche' potential and proven ability to grow in the UK climate. They have been sourced from the UK's most successful garlic producer, The Garlic Farm, Newchurch Isle of Wight.

Wild garlic (*Allium ursinum* ~ Ramsons) will be sold as seed stock from June-December. The leaves, flowers, and bulbs can be used for culinary and medicinal purposes. We have sourced a plentiful supply of bulbs at no cost to us.

Spring baby garlic will be sold as fresh cut greens in April and May. This product line provides an opportunity to gain added value from small, out-graded garlic bulbs. It also enables us to produce fresh greens in April and May when these are in short supply and further extends our garlic range. Spring baby garlic greens are rapidly becoming an acknowledged delicacy and are in short supply.

Green garlic will be sold as freshly lifted whole plants in May and June, adding another dimension to the range. Green garlic is also in short supply and increasingly sought after for its more subtle flavours.

Dried and smoked garlic will be sold from late May-February.

4.2.2. Parsley, Basil, and Coriander

We will grow two varieties of **parsley**:

- 'Frise Vert Fonce' Parsley – curly leaved and bred to have long stalks that hold the leaves clear of the soil
- 'Gigante di Napoli' Parsley – large flat-leaved parsley with dark green leaves and a good flavour

We will grow two varieties of **basil**:

- 'Finissimo' Basil – a neat round bush with tiny leaves which have a lovely strong basil scent and flavour
- 'Genovese' Basil – medium-sized sweet basil from Genoa

The **coriander** used will be *Coriandrum sativum* selected by the Real Seed Company for fresh leaves rather than for seed. This selection is slow to bolt and produces bushy plants. It grows well outdoors from late spring through into summer. By sowing in the polytunnel in early spring and autumn we will have fresh herbs virtually all year round.

4.2.3. Value-Added Products / Chillies

Pesto, pastes, and oils will be made using the health and safety certified community hub kitchen facilities. We will make roasted garlic and garlic chilli paste, garlic and garlic chilli oils, as well as traditional Italian and spicy (chilli) pesto. Pastes and pestos will be sold in units of 180g, oils in 250mL bottles.

A medium **chilli** – 'Westlandse Lange Rode' – will be used for most value-added products, such as oils and pastes. This is a traditional big, long red chilli from The Netherlands. It has been grown in Europe for a long time, and this particular strain has been selected and improved for northern conditions. We will also sell surplus quantities of this chilli, both fresh and dry in the marketplace.

All varieties of parsley, basil, coriander, and chilli will be sourced as non-hybrid, heirloom seed from the Real Seed Company in Newport, Pembrokeshire.

4.2.4. Market Research

Despite significant research effort in the 1980s-1990s from ADAS and others, garlic production in the UK generally and Wales specifically has never really taken off (ADAS report, 1999). This is particularly true when one considers organic garlic production in Wales, of which there is currently very little supply. Whilst an ADAS sponsored report in 1996 found that the growing conditions in Wales are suitable for garlic production, this potential has not been realized, in large part due to the flooding of the market with cheap imports from China. Garlic planting and harvesting in particular requires considerable labour inputs and do not lend themselves to mechanization and mass production (one study estimated 1700 hours/Ha). This means that even large-scale European producers cannot compete with imports from China where labour costs are far lower. However, garlic production is viable if developed as part of a low impact livelihood in which living costs are reduced and the all important labour component is located on-site, reducing travel time and costs. Drying and storage is an important part of the garlic business, so considerable thought has been given to these aspects. Based on the experience of the UK's most successful garlic producer, The Garlic Farm, Newchurch Isle of Wight, a ten-year rotation has been designed, reducing the risk of attack from pests and disease.

The flourishing of the local and quality foods market and growing awareness of food miles and carbon/ecological footprinting are beginning to open up market opportunities for sustainable, locally grown produce. In terms of garlic, this represents a significant opportunity within Wales. There is currently a shortage of Welsh grown garlic, for example, with direct delivery box schemes such as Organics To Go currently importing from Scotland as the nearest organic supplier.

A marketing survey carried out in the immediate area by Dr. J. Pickerill of Leicester University identified demand for fresh parsley and a lack of supply. In particular the research identified a lack of year round supply. Our own research suggests this also includes coriander and basil, so these annual herbs will be sold as young potted plants and fresh cut herbs, as well as in added value products. Ensuring a year round supply of parsley and an extended season for basil and coriander will further increase the market niche. This will be possible by using the polytunnel.

4.2.5. Customers / Marketing Strategy

A range of marketing strategies will be employed for the various products. Fresh produce will be primarily sold at the Lammas stalls held at local farmers' markets in the surrounding area as far as Carmarthen. Produce will also be sold through the local box scheme run by Chris and Matthew and to local shops. The relatively long shelf life, especially for garlic, will allow us to take advantage of a wide range of opportunities including possible mail order sales and sales to visitors of the Tir y Gafel 'Trading Post'. The Lammas website in particular offers considerable opportunities for the sale of, for example, 'garlic packs' for home growing as there are a large number of visitors to the site already. Interest in the website and the products offered thereon is likely to increase as the project acquires planning permission and begins to develop. The Lammas label will be on all the produce and all products will be 'certified organic' by the Soil Association, again helping to build sales and customer loyalty.

4.2.6. Production Forecast

Garlic

Yield: 7,500kg / ha (~30 bulbs / kg) *

* a very conservative estimate determined by averaging various reports, including the CALU Garlic Production Guide, June 2007. (CALU is the Development Centre for horticulture, biomass, novel crops, farm woodlands and novel livestock in Wales.) We also acquired information from the ADAS report cited above. Herb production information was also available through the CALU Field Grown Herbs Production Guide, September 2006.

Year 5

Crop	Area	Yield	Product
Ransoms	40 m ²	~ 400 plants (vigorous self-propagator)	Mainly seeds (leaves, flowers, and bulbs also have culinary and medicinal uses)
Garlic	206 m ²	150 kg / 4500 bulbs	Fresh, dried, and smoked bulbs, roasted garlic & garlic chilli paste, garlic & garlic chilli oils
Parsley & Coriander	< 206 m ²	1000 plants	Bunches
Basil (polytunnel)	40 m ²	200 plants	Bunches, pesto
Chilli (polytunnel)	20 m ²	20 kg of fruits	Fresh & dried chillies, Garlic chilli paste, garlic chilli oil

Production notes: values for mass production of parsley and coriander are based on a seasonal growing period, which does not take into account the extension of the growing season allowed by the polytunnel. Sorces for

4.2.7. Costings

<u>Set up Costs</u>	
Item	Cost
Soil Assoc. certification (group)	40
Re-usable mulch membrane	400
Part polytunnel/propagation costs (~3/4)	1875
Field house construction (1/2)	1000
Tools and share of rotivator	300
Seed garlic – 20kg @ £10/kg	200
Herb and chilli seed	100
Garlic dryer and store	300
Total	4215

<u>Annual Costs</u>	
Item	Cost pa
Soil Assoc. certification (group)	100
Seed	225
Packaging and presentation	200
Outsourced ingredients	175
Promotional leaflets, cards, info sheets, etc.	40
Transport	100
Market costs (1/2)	200
10% of start-up costs	422
Total	1462

Costings notes: the figures are generous to allow margins for comfort and will be less if Lammas purchases in bulk particularly for items such as packaging containers. Furthermore, we intend to operate a rigorous sustainability policy throughout the business, so we will encourage the re-use of bottles and jars, for example, with a deposit offered on all packaging. Illustrative prices to show how group purchasing will reduce unit cost and increase profit margins: 100 x 110ml jars = £28.00, 100 x 280ml = £48.00, 500 x 280ml = £128, 1000 x = £230 (<http://www.jbconline.co.uk/acatalog/212ml -.html>).

4.2.8. Pricing

Item	Unit	Standard price (non-organic)	Our price**
Wild garlic (Ramsons)	100 seeds	1.35	1.50
Spring baby garlic	1 bunch	Rarely available	1.00
Green garlic	1 bulb	.75	.75
Dried garlic	1 bulb	.35 -.50	.75
Smoked garlic	1 bulb	1.25	1.00
Roasted garlic paste & Garlic chilli paste	165g jar	2.50	3.50
Garlic oil & garlic chilli oil	250mL bottle	8.25	6.50
Fresh herb bunches	1 bunch	.75	1.00

Pesto, spicy pesto	180g jar	3.00	3.50
Fresh chillies	100g	3.50	3.50
Dried chillies	100g	12.00	12.00

** reflects retail market prices, and does not take into account probable wholesales to local retailers and/or box schemes, such as Organics to Go, etc.

Pricing notes: the 'our price' values attached to these products have been underestimated to allow a margin of comfort. For example, UK grown mail order Organic Garlic Pack of 2 = £1.75 (<http://www.goodnessdirect.co.uk/cgi-local/frameset/detail/F11004.htm>), compared with non-organic, quality garlic single bulbs:

Large = £1.00 medium = £0.80.

(<http://www.thegarlicfarm.co.uk/shopgarlic.asp?catid=5&cat=Garlic+Bulbs&pcatid=14>)

Supermarket bulbs generally sell for between £0.35 and £0.75, whilst 250ml garlic oil sells for £8.25

(http://www.oilandmore.co.uk/shop/product/A_L_Olivier_Fresh_Garlic_Oil/).

4.2.9. Income

Income (year 5)			
Item	Unit Cost	Quantity pa	Income pa
Wild garlic (Ramsons)	£1.50/100 seeds	200	300
Spring baby garlic	£1/1 bunch	200	200
Green garlic	£0.75/1 bulb	200	150
Dried garlic	£0.75/1 bulb	1000	750
Smoked garlic	£1/1 bulb	400	400
Roasted garlic paste & Garlic chilli paste	£3.50/165g jar	100	350
Garlic oil & garlic chilli oil	£6.50/250mL	50	325
Fresh herb bunches	£1/1 bunch	500	500
Pesto, spicy pesto	£3.50/180g jar	150	525
Fresh chillies	£3.50/100g	3 kg	105
Dried chillies	£12/100g	2 kg	240
		Income	3845
		Expenditure	1462
		Profit	2383

Income notes: we will begin the business with a reserve of savings sufficient to see us through the first two years, starting this enterprise in year 3, having mulched and prepared the land for 2 years. We will work slowly up to the targets for production, reaching full power in year 5. We predict that by the time we are up and running with the garlic, herbs, and chillies, the vermiculture enterprise will be established enough to both provide a steady complementary income stream, as well as materials we need for this additional business, such as compost and fertilizer

The various value-added product lines will be developed to ensure a regular supply of cash to supplement the more seasonal products. Bottled, jarred and preserved products, for example, will provide an on-going, year round supply, whilst some of the fresh products have been chosen for the longevity, notably the wild garlic seed

and dried garlic and chillies. Discrepancies between the amount of produce we are able to grow and the amount sold at market allow for us to take full advantage of probable wholesale opportunities, as well as use our own produce as ingredients for the value-added products.

Business Year	Income	Running costs	Profit
Year 3	1375	1162	213
Year 4	2292	1312	980
Year 5	3845	1462	2383

4.2.10. Finance

The set up costs for this business will be covered entirely by our current savings. Our approach to creating a sustainable, low impact livelihood will emphasise simplicity by keeping costs down. The approach is also to start small and with fewer costs and to allow the business to grow slowly and organically. Equally, if this enterprise shows promise, the product lines will inevitably expand to include more 'value added' goods. These are not included here, as they will likely not commence until after the five-year target for meeting 75% of our household needs.

4.2.11. Cash Flow (years 3-5)

Year 3	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Income (sales)													
Wild garlic (Ramsons)			12	16.5	18	21	16.5	12	10.5				106.5
Spring baby garlic	36	36											72
Green garlic		27	27										54
Dried garlic		19.5	23.25	27	30.75	33.75	30.75	30.75	27	23.25	23.25		269.3
Smoked garlic							25.06	28.64	32.22	28.64	28.64		143.2
Roasted garlic paste								13	14	7	5	5	44
Garlic chili paste		14	17.5	17.5	14	14	7						84
Garlic oil & garlic chili oil	6.5	6.5	6.5					13	19.5	19.5	19.5	13	104
Fresh bunches	20	25	30	34	29	16	14					11	179
Pesto, spicy pesto	14	17.5	17.5	21	17.5	17.5	14	14	17.5	11.5	11.5	11.5	185
Fresh chilis	3.5	7	10.5	10.5	7								38.5
Dried chilis						12	12	24	24	12	12		96
Total	80	152.5	144.3	126.5	116.3	114.3	119.3	135.4	144.7	101.9	99.89	40.5	1375
Expenditure													
Soil Assoc. group cert								100					100
Seed					135				75				210
Packaging		50					50						100
Ingredients	25					50			25				100
Promotion											40		40
Transport	5	5	5	5	5	5	5	10	10	5	5	5	70
Market costs (1/2)	10	10	10	10	10	10	10	10	10	10	10	10	120
10% of set-up costs												422	422
Total	40	65	15	15	150	65	65	120	120	15	55	437	1162
Monthly Profit	40	87.5	129.3	111.5	-33.8	49.25	54.31	15.39	24.72	86.89	44.89	-397	213.5

Year 4	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Income (sales)													
Wild garlic (Ramsons)			21	27	30	36	27	21	18				180
Spring baby garlic	60	60											120
Green garlic		45	45										90
Dried garlic		33	39	45	51	57	51	51	45	39	39		450
Smoked garlic							42	48	54	48	48		240
Roasted garlic paste								21	24	12	9	9	75
Garlic chili paste		21	27	30	24	21	12						135
Garlic oil & garlic chili oil	15	15	15					27	33	36	30	24	195
Fresh bunches	33	42	51	57	48	27	24					18	300
Pesto, spicy pesto	27	30	33	33	30	27	24	27	30	15	18	21	315
Fresh chilis	6	12	18	15	12								63
Dried chilis						24	27	30	27	21			129
Total	141	258	249	207	195	192	207	225	231	171	144	72	2292
Expenditure													
Soil Assoc. group cert								100					100
Seed					150				75				225
Packaging		50					50						100
Ingredients	25					50			50				125
Promotion											40		40
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
10% of set-up costs												422	422
Total	40	80	30	30	165	65	80	145	170	15	55	437	1312
Monthly Profit	101	178	219	177	30	127	127	80	61	156	89	-365	980

Year 5	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Income (sales)													
Wild garlic (Ramsons)			35	45	50	60	45	35	30				300
Spring baby garlic	100	100											200
Green garlic		75	75										150
Dried garlic		55	65	75	85	95	85	85	75	65	65		750
Smoked garlic							70	80	90	80	80		400
Roasted garlic paste								35	40	20	15	15	125
Garlic chili paste		35	45	50	40	35	20						225
Garlic oil & garlic chili oil	25	25	25					45	55	60	50	40	325
Fresh bunches	55	70	85	95	80	45	40					30	500
Pesto, spicy pesto	45	50	55	55	50	45	40	45	50	25	30	35	525
Fresh chilis	10	20	30	25	20								105
Dried chilis						40	45	50	45	35	25		240
Total	235	430	415	345	325	320	345	375	385	285	265	120	3845
Expenditure													
Soil Assoc. group cert								100					100
Seed					150				75				225
Packaging		100					100						200
Ingredients	50					75			50				175
Promotion											40		40
Transport	5	10	10	10	5	5	10	15	15	5	5	5	100
Market costs (1/2)	10	20	20	20	10	10	20	30	30	10	10	10	200
10% of set-up costs												422	422
Total	65	130	30	30	165	90	130	145	170	15	55	437	1462
Monthly Profit	170	300	385	315	160	230	215	230	215	270	210	<317>	2383

5. Household's Basic Needs

Commodity	Quantities	Value / Cost (£ pa)
Heating ~ solar, Summer	600 kWh @ 15p/kWh (6mo.)	90
Fuel for heating ~ Winter	3.5t Miscanthus @ £50/t	175
Fuel for cooking	2.5t Willow, etc. @ £90/t	225
Spring water & sewerage	68,000L @ £2.61/m ³	177
Food	2 adults, 2 children	5500
Clothing	(£150 x 2) + (£100 x 2)	500
Electricity	600 kWh Hydro & Solar @ 15p/kWh	90
Household maintenance		500
Council tax		500
Home insurance		500
Transport		1500
Communication		480
Rent/services		1000
Total		11,147

Notes on household needs: many of these figures are based on current expenses. Due consideration has been given to the obvious change of overall lifestyle. Our savings are substantial, and we expect that total start-up costs for household and land-based enterprise, as well as a cash reserve to carry us through the first few years of the establishment period will be covered entirely by savings, family investment, and Ayres' continuing market-based income (see 'other sources of income').

6. Land Based Produce

Food

Item	Current spending			Final % Home Produced	Produce value from plot				
	Weekly	Monthly	Annual		Year 1	Year 2	Year 3	Year 4	Year 5
Fresh Food									
Vegetables	40.00		2080	100%		277	1248	2080	2080
Fruit	20.00		1040	80%			42	128	632
Eggs	3.90		203	40%	81	81	81	81	81
Milk	6.00		218						
Butter	2.90		151	50%	76	76	76	76	76
Yoghurt	1.50		78	100%	78	78	78	78	78
Cheese	7.50		390	40%			98	156	156
Fish		4.50	54						
Dry Food									
Herbs and Spices		9.00	108	70%		24	54	76	76

Breadmaking	7.00	84							
Sugar / Chocolate	12.00	144							
Dried Fruit	5.00	60	50% [1]		10	25	30		
Nuts and Seeds	4.00	48	80% [2]					24	
Drinks / Juices	20.00	240	80% [3]		89	192	192		
Cereals	15.00	180							
Rice / Pasta	20.00	240							
Beans / Pulses	5.50	66	50% [4]		21	33	33		
Preserved tomatoes	7.50	90	80%		20	42	72	72	
Total	81.80	109.50	5474		235	556	1839	2997	3530
[1] Dried fruit from orchard, conservatory, forest garden and polytunnel									
[2] Sunflower seeds, butternuts, hearnuts, chestnuts, hazlenuts									
[3] Fruit juices / cordials and wine from forest garden and hedgerow									
[4] Chickpeas, haricot beans outsourced									

Total Produce		Value (£ pa)		
		Year 3	Year 4	Year 5
Heating ~ solar, Summer	600 kWh @ 15p/kWh (6 mo.)	90	90	90
Fuel for heating ~ Winter	3.5t Miscanthus @ £50/t	86	86	86
Fuel for cooking	2.5t Willow, etc. @ £90/t	225	225	225
Water & sewerage	68,000L @ £2.61/m3	177	177	177
Electricity	600 kWh H & S @ 15p/kWh	90	90	90
Household DIY		250	250	250
Food		1839	2997	3530
Grazing rent		90	90	90
Vermiculture profit		1813	4671	12181
Garlic & herb profit		213	980	2383
Smallholding Running Costs	Seed, lime, mulch, duck feed, tool repair etc.	-1500	-1500	-1500
Total		3373	8156	17602

7. Percentage Calculation

	Year 3	Year 4	Year 5
Value of needs	11,147	11,147	11,147
Value of produce	3,373	8,156	17,602
% of needs met off land	34%	73%	160%

8. Positive Contribution

*"The body repeats the landscape.
They are the source of each other and create each other."
~ Meridel Le Sueur*

If the process of researching, writing, re-writing, and re-writing this land management plan has revealed anything it is the immensity of the challenges – physical, mental, and perhaps emotional – that face everyone involved in bringing this, now minutely detailed vision, to fruition. We are also now, more than ever, convinced of the economic viability and environmental sustainability of this vision. We bring to this project a broad range of skills, life experience, and perspectives, foremost of which is the strong desire to affirm the intrinsic value of human stewardship in the life of the planet, through this project.

Having already lived as a family in intentional community, we are aware of the challenges presented by co-housing and come equipped with tools for clarifying language and the roles of relationship, resolving conflict, and fostering understanding amongst differing points of view. We are very eager to share in childcare and explore co-education. We look forward to contributing to the tool share, car share, and labour pool.

As native urban and suburban dwellers, we are very aware of, and are preparing for the steep learning curve ahead. Our education has already begun in earnest in the fields of permaculture, agroforestry, vermiculture, woodland management, and sustainable building. We hope to provide an enthusiastic and able source of ever-more skilled labour for the detailed design and building phases of the project. Ayres has over the past few years done extensive research into the legal and power-sharing structures of Co-operative and Community Interest enterprises, and he is eager to be involved with the establishment of a marketing co-operative for the shared benefit of the smallholdings of Tir-y-Gafel.

Ayres is also very keen to implement the Community Compost Scheme as one means of establishing a beneficial and benevolent co-existence with the residents of Glandwr and the wider community. Regular waste collections will provide an opportunity for meeting and becoming familiar with people in the area. Our hope is that eventually there will be many local visits to Tir-y-Gafel. Our smallholding is designed as an inviting space and a demonstrable model of land-based livelihood. Public access will be encouraged where appropriate, and tours of the forest garden, wormery, and growing areas will be on offer.

Perhaps our most tangible contribution to the project and to the cause of land-based livelihood will be the fostering of land fertility. We hope to not only produce many metric tonnes of topsoil per year, but also inspire and educate people about soil ecology through tours and workshops. Volunteers will always be welcomed.

The Gipsons have much to offer the community of Tir-y-Gafel. Within Marianne's experience as a commercial gardener, business manager, office manager, administrator, editor, sustainability educator, and devoted mother of two, Ayres' experience as a farmer, farm and garden manager, business owner, manager, and administrator, US Marine Corps and Army sergeant, team supervisor, Japanese translator, bodyworker, teacher, group facilitator, and counsellor, Mirelle and Ellion's abundant charm and stunning good looks lie the abilities to lead, follow and follow through, organise, educate, and achieve.

9. Transport

We have budgeted into our potential costs the purchase and maintenance of a family car but have no immediate plans to purchase one. In our current urban life we walk,

bike, and regularly use public transport. For the brief time that we owned our own car, we preferred the train for long journeys and see no reason for that to change. Should we purchase a car for the establishment phase of the project we will ensure that the car is:

- ⊗ Suitable for running on vegetable oil or biodiesel, and we will only use those fuels
- ⊗ Immediately made available for use in the community carsharing scheme
- ⊗ Sold at the earliest opportunity when it becomes superfluous to our needs for establishing the smallholding (year three) and not required for community carsharing

Waste collection runs will be made by electric milk float (one to two return journeys per week). These journeys may also be used to visit local schools, meet with prospective clients, and offer product samples. Group journeys will undoubtedly be made for school runs, some outings and shopping trips, delivering produce and trips to farmers' markets via the community minibus or carshare.

Family outings may on occasion require the car; we estimate once a month. Family shopping trips will be minimised by our own growing self-sufficiency; we estimate twice per month. Emergencies or urgent situations may require up to three additional journeys per month.

Given the information listed above we estimate generating very few additional journeys per month over and above those planned by the wider project.

10. Functional Need Essay

This essay is meant to give an idea of what a typical day might be like during each of the four seasons. The year represented occurs after the smallholding has been fully established (year three to five). One of our primary objections in creating our sustenance at home is the accompanying time at home that self-sufficiency allows (demands!). We are looking for a blend of work, play, and family time, and will seek to blur the distinctions as much as possible. Integral to the vermiculture business plan is the availability of 24 hour, on-site monitoring of the worms' living conditions. Unhappy worms will simply wriggle away, and a significant portion of the 'herd' can be lost in a short period of time if conditions vary too far from optimal. We expect the great deal of interest expressed in the project so far to manifest as volunteers and visitors to assist, as needed, in the routine tasks of the smallholding. All visitors to our smallholding will be required to bring:

- ⊗ Chocolate (the good stuff only, please)
- ⊗ Work clothes and wellies

Gloves and tools will happily be provided.

10.1. Winter

Waking up, lighting the fire for breakfast, greet the children when they wake, get the kids involved in letting the ducks out, feeding them, checking for eggs and checking their health and pen. Marianne then gets the children ready for the day. Ayres walks the smallholding checking for rain or wind damage, listing tasks for the day by priority. Then we breakfast and coordinate the day amongst the family, see Mirelle

off to school, make the school run when it is our turn, then turn to the never-ending stream of administrative tasks.

Marianne and Ellion spend a couple of days a week in the Winter preparing the annual beds and polytunnel for planting (weeding and mulching), pruning fruit trees and bushes, potting up cuttings, and checking the vegetable store for damage. Other days, they attend the toddler group at Mirelle's school or participate in shared childcare/co-education with other families in the community.

Garlic is planted (Sep-Feb) or Ayres goes to the coppice area to coppice wood (Nov-Mar). As the coppice is a communal area shared between the four terrace units Ayres works closely with other terrace residents in managing it, organizing group working sessions and sharing our knowledge of the coppice, how it is developing and the changing bio-diversity it supports. Having an ecologist in the terrace group (Leander) is highly beneficial in this regard. In inclement weather, the family work together in the hub certified kitchen, making oils, sauces, pastes, and preserves from seasonal produce including garlic, chillies, and herbs.

Before nightfall, Ayres checks the smallholding for anything needing to be secured in the event of stormy weather. We may call in on neighbours to request or offer help in repairing any storm damage in the coming days. Early sunset signals the end of the working day and the beginning of focused family time. We have dinner, read stories, play games, and spend time with other families in the community. Winter is a good time to host visitors.

10.2. Spring

The morning walk includes checking for slug damage and general plant health in the kitchen garden, before returning home for breakfast. Anyone who is available works in the garden for few days a week. We plant in the raised beds, some annual beds and in the polytunnel and conservatories, watering and ventilating, also mulching, weeding and general maintenance. If neighbours need help with their young livestock, we are only walking distance away and on hand and to assist.

The annual herbs require careful maintenance and on-going attention throughout the year as there is a continuous cycle of sowing seeds, caring for seedlings, pricking out, harvesting, marketing and adding value. The garlic will need to be watered during the growth period (Mar-May).

Ponds and waterways need cleaning. As always, there are administrative tasks that need attending to. Living on-site will enable us to take turns with childcare (our family, as well as others in the community), coordinate tasks in the moment, nip out for a bit of planting or watering...

10.3. Summer

We are busy harvesting and drying the garlic(May-Sept). Microbial activity will be peaking by this time of year, so the worms need close monitoring and an ample supply of feed. Vermicast and compost are bagged for sale and stored in the field house. Ayres takes over for Jasmine (plot 7) running the Lammas market stall.

The family are in the annual beds every day planting out, weeding, watering, checking for pests and diseases and harvesting. The polytunnel is full to bursting and needs constant attention – watering, ventilation and weeding.

After an early evening meal, we take advantage of the late sun by doing some light tasks, such as pruning or weeding in the kitchen garden or working with others in the terrace to tend the forest garden or shared vegetable plot. Families share childcare enabling all adults more time to focus on working the land.

10.4. Autumn

On organic waste collection days, Ayres makes sure the first stages of the turning bins are clear for fresh organic matter. Any organic matter that is ready is fed to the worms in each of the composting stations. Weights are estimated and logged to track disposal rates. The milk float is loaded with empty collection bins, as well as a few bags of castings and fresh compost tea as samples or for direct sales. The morning and mid-day are spent on collection. The collection run may be a good time for school visits or meeting with potential clients. Home and break for late lunch/snack, then to the float for the afternoon to unload collections and sort into the turning bins. The worms need constant attention to their food and water levels but little maintenance. Castings are harvested on the days that feed is loaded.

Ayres is busily bagging compost and castings as microbial activity begins to decline. Surplus worms are harvested and traded or used to inoculate local compost heaps. Garlic needs planting (Sep-Feb), and the family sows winter greens, winter salads, and green manures. We clear beds, mulch, stake, and perform general maintenance in the beds and forest garden.

The harvest is in! Garlic requires drying or smoking and storing. Space needs to be made to store produce for winter. The family will spend several hours a week storing, bottling, and preserving much of the harvest for home consumption.

Notes on functional need: garlic production is labour intensive (up to 1700 hours/Ha) and has key periods such as watering during the growth period (March-May), harvesting and drying (May-Sept) and planting (Sept-Feb) when it will be important to live as closely as possible to the crop in order to keep the margins positive. Indeed, as noted above, based on research by ADAS and others it appears that the labour demands and associated marginal returns are what currently limit the expansion of garlic production in Wales, rather than climate and soil. It is essential that the crop is readily accessible so that tasks may be done whenever time is available to nip out to the field. Living on-site will allow for spontaneous labour.

11. Implementation Timescales

Initial establishment of the smallholding will occur in phases over the first five years.

11.1. Phase One ~ now to planning permission

- ⊗ Build a small-scale version of the continuous vertical flow wormery described above, and purchase our first 500g of *Eisenia foetida*; we will experiment with and evaluate the system and make appropriate design changes.

- ⊗ Continue research into Community Compost Schemes, funding options, and set-up of a Community Interest Company.
- ⊗ Enroll in a permaculture design course.
- ⊗ Periodically revise the plot plan based on our continuing education in permaculture, agroforestry, vermiculture, woodland management, and sustainable building.

11.2. Within 6 months from permission

- ⊗ Plant soft fruit bushes and trees including orchard, forest garden, coppice and hedges. Planting will be done in the dormant period (Nov-Feb) and beyond this period there will be regular visits to ensure the mulches are intact and the plantings not being overgrown with weeds. These visits will also tie in with sessions helping to build the terrace. We will work with Simon, the Lammas Volunteer coordinator to organise work parties and courses. During this period we will also source materials for the field house and polytunnel and set out the initial mulches for the first field scale beds and what will become the polytunnel in the main plot. This will include the addition of manure sourced locally and eventually, worm castings to increase fertility.
- ⊗ Move the family to Pembrokeshire, perhaps first to rented accommodation then to an insulated yurt on Plot 4. Set-up polytunnel and yurt adjacent. Part of the polytunnel will serve as a part-time living space. Begin planting food crops inside.
- ⊗ Begin construction of the first few structures of the wormery. Establish firm commitments for supplies of organic waste material. Begin publicising the Community Compost Scheme. Purchase collection vehicle.

11.3. 18 months

- ⊗ Complete construction of the field house using volunteer/student labour, dig ponds, and install rainwater catchment systems. Assist other building projects in the eco-village, both as an educational tool, as well as 'payment' for consultation and labour for the terrace and field house group build.
- ⊗ Expand the wormery as 'herd' population and organic waste supplies increase.
- ⊗ Add manure and more mulch to main plot beds and complete any perennial plantings needed, e.g. where plants have not taken or gaps emerge.

11.4. 24 months

- ⊗ Finish the interior of our new home. Build the beds of the conservatory and kitchen garden. Help plant the communal forest garden and establish beds for the shared garden.

- ☉ Plant first crops in the main field. Begin initial planting of cash crops using a broad variety and small number of each cultivar to determine ideal selections.

11.5. 36 months

- ☉ Introduce ducks to kitchen garden. Begin coppicing first SRC area. Plant the chosen varieties of main cash crops. Realise first profits from vermiculture.

11.6. 48 months

- ☉ Harvest, process, and sell first full cash crop harvest.

11.7. 60 months

- ☉ Realise first profits from cash crops.

12. Additional Sources Of Income

For the past nine years, Ayres has made a good living as an extensively trained and highly skilled therapist and teacher. He would like to continue this work indefinitely, but he feels clear that the vast majority of our sustenance should and will be tied to the land. Ayres' bodywork practice in Bath and London currently pays him about £25 - £35/hour. Ayres is keen to set up a day or two of sessions, fortnightly and twice annual weekend workshops in the local area. Travel will be by minibus and public transport or coordinated carshare. Ayres will travel by minibus and train to Bath and/or London for one weekend every five to six weeks (Ayres already does this from Bath to London). A well-established connection to the marketplace will provide additional income during the implementation phases of the project. By year 5, the majority of the practice will be in the local area, eliminating the need for extensive travel. Ayres will publicise 'tours' and workshops through his already existing websites and client and student database.

13. Set-Up Costs

Item	Implementation Timescale	Amount
Lammas planning app fee	now to permission	750
Temp accomodation ~ rented, yurt	within 6 months of permission	4500
Auto (if necessary) includes all fees	within 6 months of permission	6500
Part polytunnel /propogation (1/4)	within 6 months of permission	625
Tree, bush, and plant stock	within 6 months of permission	1900
Seed	within 6 months of permission	420
Liming, tilling, mulches	within 6 months of permission	1200
Leasehold	within 10 months of permission	30000
Field store (1/2)	within 18 months of permission	1000
Terrace building (including gardens, fencing, duck pond, trampoline...)	within 24 months of permission	50000
Ducks and housing	within 36 months of permission	30
Total		96925

Set-up notes: our savings are substantial, and we expect that total start-up costs for household and land-based enterprise, as well as a cash reserve to carry us through the first few years of the establishment period will be covered entirely by savings, family investment, and Ayres' continuing market-based income (see 'other sources of income').

Enterprise	Amount
Household	96925
Organic Waste Disposal and Conversion	4580
Garlic, herbs, and associated products	4215
Total	105720

14. Current Residence

We currently reside in Bath. Marianne spent a great deal of her childhood in Pembrokeshire, as it is where her mother grew up and where her grandmother has lived for the past 60 years.

15. Welsh Language

As a former linguist and translator for the US military, Ayres is especially keen to study Welsh. We feel that the compulsory Welsh language programs in our children's education will greatly benefit us all.

Appendix 1 Vermiculture Information Sheet

1. Product Information

Worm Castings

Vermiculture is not, as many believe, simply an alternative method of composting. 'Garden variety' compost is wonderful for the soil, but once it is spread on the earth it still needs to be digested by the existing soil before it can be of any real benefit to the plant.

Vermicomposting is essentially the final phase of all composting processes, whereby 'garden variety' compost, which is full of compost microorganisms is turned into soil dominated by soil microorganisms. Vermicompost contains eight times as many microorganisms as the organic matter fed to the worms. Unlike 'garden variety' compost, the nutrients in vermicompost are immediately available to the plants. Worm castings are as plant-ready as you can possibly achieve in a composting system - over 60 micro-nutrients and trace minerals along with high numbers of beneficial microbes and bacteria. When compared with actual soil, worm casts contain:

- 5 times more nitrogen;
- 7 times more phosphorus;
- 1.5 times the calcium;
- 11 times more potassium;
- 3 times more exchangeable magnesium.

"Within a single 10 milligram earthworm cast there are several billion bacteria of perhaps 500 to several thousand species, comprising of about 90% of the weight of the cast. Another 5% is composed of fungi, nematodes and other critters, plus tiny bits of decomposing matter that worms have eaten." Kelly Slocum, vermiculture expert.

The casts are also rich in humic acids, which condition the soil, have a perfect pH balance, and have plant growth factors similar to those found in seaweed. Unlike other compost, worm castings also contain worm mucous, which keeps nutrients from washing away with the first watering.

Compost Tea

Compost tea is a liquid solution made by extracting beneficial microbes from compost or worm castings. The tea is made by 'steeping' compost in a solution of water and unsulphured molasses. Instead of using heat, the water is aerated for 2-3 days using an ordinary aquarium pump. The resulting liquid is then sprayed onto soil or directly onto plants. The benefits of compost tea include direct nutrition: a source of foliar (leaf) and soil organic nutrients and micronutrients for easy plant absorption. There are also microbial benefits that occur in the soil itself: compost tea combats disease-causing microbes (the beneficial bacteria, fungi, and microorganisms feed on pests and harmful fungi), degrades toxic materials, produces plant growth hormones, mineralizes available nutrients in the soil, fixes nitrogen, and prevents pathogens from infecting plants.

Composting Worms

Earthworms are hermaphroditic - that is, each worm is both male and female and each can produce eggs and fertilise the eggs produced by another worm. Under

perfect conditions a mature breeder will produce an egg capsule every 7 to 10 days, each containing over 1 dozen hatchlings. Development takes 14-21 days and, once hatched, the newly-emerged worms reach maturity in approximately four to six weeks, meaning that it is possible for the worm population to double each month.

In theory, 1 kilo of worms could increase to 1,000 kilos (approximately two million worms) in a year! In practice, the growth rate is probably half to a third that rate. Still, this rate of reproduction combined with the fact that happy worms can live 10 – 15 years means that we will quickly have a surplus of composting worms for sale or trade.

'Garden Variety' Compost

The wormery will include one, with eventually up to three, four-bin turning units for preparation of the worm feed, as well as conventional composting. Compost will continue to be produced in conventional ways in the event that more organic matter is collected than can be fed to the worms. This 'garden variety' compost can be used to dilute the worm castings to cover larger areas of land.

Vermiculture Consultation

As residents of the local and wider community become acquainted with the presence of the Community Compost Scheme collection vehicle taking kitchen scraps, garden waste, cardboard, paper, etc. from their local restaurants, schools, and neighbours, they may become curious about this practice of 'worm farming'. This is the perfect time to offer tips, services, and samples that would help them improve their own home compost production. Organisations and businesses may, from time to time, need to consult about their own organic waste disposal.

2. Addressing Environmental Issues

Topsoil is being lost both globally and in the UK at a staggering rate. Small to medium-scale, locally focused vermiculture projects like the one we are proposing directly and effectively addresses this issue. The end product is certifiably 'Organic' and is of immediate use to the plant.

Gardening hobbyists, as well as professional horticulturists are increasingly seeking an **alternative to harmful synthetic fertilisers** as more data comes to light about the environmental degradation such chemicals are causing.

Initial research indicates that the **disposal of organic waste is a serious concern** for the UK government. Organic materials, such as kitchen scraps and garden waste, when dumped in landfill sites impose burdens on the environment out of all proportion to their volume. As they break down, because air is excluded, they generate large quantities of toxic leachate and also methane, a 'greenhouse' gas far more potent than carbon dioxide. Composting organic waste avoids these problems, turns a 'waste' product to a much-needed resource, and is in principle a far more sustainable procedure. Our vermicomposting process will reduce the volume of organic waste materials up to 80%.

Almost a third of our domestic waste could go straight onto the compost heap, but 27 million tonnes of organic waste end up in landfill sites every year. In May 2007 Defra set new, higher targets of recycling and composting 40% of household waste by 2010. Also in 2010, the current landfill tax of £24/tonne will double to £48/tonne.

The Landfill Directive aims to improve standards of landfill use across Europe, by setting specific requirements for the design, operation and aftercare of landfills, and for the types of waste that can be accepted at landfill sites. The Directive requires a substantial reduction in the amount of biodegradable municipal waste (BMW) being landfilled. Targets:

* by 2010 to reduce BMW sent to landfill to 75% (by weight) of that produced in 1995

* by 2013 to reduce BMW sent to landfill to 50% (by weight) of that produced in 1995

* by 2020 to reduce BMW sent to landfill to 35% (by weight) of that produced in 1995

This means that Local Authorities need to reduce the amount of green and kitchen waste going into householders bins. We are eager to assist the achievement of that goal. We believe that the long-term solution to this problem will come from the creation and support of a network of local, small to medium-scale operations like ours.

3. Calculations

1 lb happy worms in **1 sq ft** compost **x 35 sq ft** per composting station = **35 lbs = 16 kg** worms.

16 kg worms **x 4000** *Eisenia foetida* per kilo = **64,000** per station **x 14** stations = **896,000** worms.

896k x .33/month = 296k mo. surplus worms / **4000 = 74 kg x 12 mo. = 888 kg** worms/year.

* Based on the conservative assumption that worm populations will double every three to four months, we could go from a 'seed herd' of 16,000 (4kg) to our target population of 896,000 (224kg) in about 18 months.

Worms eat between 50% and 100% of their body weight per week. (Some exuberant sources say 100% a day!) For the purposes of forecasting, we use 75% of body weight per week. Sources vary as to how much vermicomposting reduces the volume of organic matter. Our research shows that the figure is anywhere from a 50% to 85% reduction, depending on the efficiency of, and length of time allowed for the conversion process. In our calculations, we assume a 75% reduction in volume in order to give us plenty of leeway to meet our cast production targets.

4. Resources

Worm Breeders:

Tom French, Acme Worm Farm

<http://www.acmewormfarm.com/index.html>

Steve, Tallywhacker Farm

<http://www.tallywackerfarm.co.uk/worms.htm>

British Worm Breeders
<http://www.britishwormbreeders.co.uk/>

Vermiculture, and other Organisations:

Community Composting Network
<http://www.communitycompost.org/>

Earthworm Digest
<http://www.worndigest.org/>

Community Composting in Pembrokeshire, PLANED
http://www.recyclepemps.co.uk/content.asp?nav=9,11&parent_directory_id=2&id=1032&language=

Waste and Recycling Services, Pembrokeshire County Council
http://www.pembrokeshire.gov.uk/content.asp?nav=107,559&parent_directory_id=646

Articles & Academic Research:

"Vermicomposting", the US military sustainability library, October, 2003
http://www.p2sustainabilitylibrary.mil/P2_Opportunity_Handbook/7_II_A_1.html

"Food Waste Composting", The University of Georgia College of Agricultural and Environmental Sciences, June, 2000
<http://pubs.caes.uga.edu/caespubs/pubcd/B1189.htm>

"Vermicomposting", Good Earth
http://www.goodearthrosecare.com/articles/composting_worm.php

"Compost Tea", Fine Gardening
<http://www.taunton.com/finegardening/how-to/articles/brewing-compost-tea.aspx>

"The Vermicomposting Industry", The Worm Research Centre
<http://wormresearchcentre.co.uk/vermicomposting.html>

"Notes on Compost Teas", US National Sustainable Agricultural Service
<http://www.attra.org/attra-pub/compost-tea-notes.html>

"Zero Waste in Wales", Friends of the earth Cymru, December, 2003

Vermicomposting Retailers:

Wiggly Wigglers
<http://www.wigglywigglers.co.uk>

Original Organics
<http://www.originalorganics.co.uk/>

Vermisell
<http://www.vermisell.co.uk/index.htm>

