Planning application for development of land adjacent to Herbedeg Road, Pontyates, Llanelli, Carmarthenshire, SA15 5UQ.
To be determined under the One Planet Development guidance set out by the Welsh Government in TAN6.

Management Plan

June 2019

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1. Summary

We are Carolyn Moody and Paul Bartlam, a couple who moved to West Wales just over 4 years ago, first to Gorseinon, then to an off grid eco-Community in North Pembrokeshire, and are now living in Pontyates, Carmarthenshire.
Carolyn has a degree in Business Studies and is a Chartered Accountant, currently working part time as a financial systems auditor in the public sector, primarily local government. Paul is a Locum Optical Technician. Both of us have many years experience in growing food and living sustainably, including within a number of off grid land based communities in Wales and in England. We are both Permaculture practitioners and Carolyn obtained her Permaculture Design Certificate in 2011. She is the current Treasurer of Paramaethu Cymru.

We are planning a One Planet Development (OPD) on a 15 acre site on the gentle slope of the Gwendraeth Valley close to both Carway and Pontyates in South Carmarthenshire. The land is easily accessible on foot from both villages and is well served by local bus services. It will be our sole residence.

The land itself is of moderate agricultural quality, and first hand we have found that it is patchy in terms of areas that are already useable in this regard, and those that are not, for example due to poor drainage; however we have successfully planted nearly 90 apple trees, and have grown peas, salad, squash, sunflowers, and chard in a small test bed this year.
A number of areas are also rich in biodiversity, including some priority habitats and species, and these will not be cultivated, simply managed as wildlife habitat.

Our activities will therefore be restricted to only part of the site. As well as a small, Caravan Act compliant dwelling, these will be undertaken within units for storage and food processing, greenhouses, vegetable beds, fruit cages, housing for chickens and geese, orchards, forest garden areas and a small biomass plantation. We intend to grow the majority of our own food and fuel, and create a successful business producing vegetable seeds and selling cider, and fruit and hedgerow wines. Initial plans demonstrate that this will cover our minimum income needs within five years; however surplus vegetables will also be sold and we intend to produce large surpluses particularly of mushrooms, asparagus, rhubarb and sunflowers to add to our main income streams. Over the years, production will be amended to take account of actual demand.
Food and fuel production practices will encourage rather than exclude wildlife, and soil fertility will be built up gradually using natural methods. We will also be managing the site to organic standards and intend to apply for organic certification shortly.

In terms of energy and water, we have a potential grid connection adjacent to the site, so intend to utilise this. Our proposed solar voltaic panels (PV) will feed in far more renewably generated electricity than we will use, so not only will this grid connection enable otherwise wasted energy to be used by the local community, it will also eliminate the additional infrastructure required for an off grid system. Heat energy will be in the form of biomass, the main source of which will be short rotation coppice which will be planted at the beginning of the development. West-Wales weather will provide more than sufficient rainwater for all out water needs and this will be harvested, stored and treated for use throughout the year. The majority of our waste will be assimilated on site.

All of the above will mean we are able to meet the Welsh Government's criteria for a successful One Planet Development of 1.88 global hectares[1] by year 5.
Our overall aim is to create an area where we can both live and work, without having a negative impact on the environment, integrating these elements so that generating income from the land and enhancing biodiversity are not seen as separate activities, but simply part of the way we live.

1 https://gweddill.gov.wales/docs/desh/policy/100722tan6en.pdf para 4.15.1

2. Baseline

2.1 Location, area, boundaries and tenure

The land is jointly owned, freehold, by both of us. It is located on the south slope of the Gwendraeth Valley, the entrance being off Herbedeg Road, approximately half way between the villages of Pontyates and Carway at grid reference SN 474073. The nearest postcodes are SA15 5UQ and SA15 5UR.

The figure below shows a basic satellite image of the land ringed in red.

With an area of approximately 15 acres, it comprises five adjoining areas of pasture and two small copse / woodland areas sloping gently to the north-west. With the exception of the north-east boundary, it is defined by a mature treeline / hedgerow, the remaining side defined by a stream, although the treeline / hedgerow continues along the south-west bank of the stream.

The B4317 runs adjacent to the treeline along part of the north-western boundary, and Herbedeg Road runs adjacent to the treeline along the remaining part of this boundary. The road continues alongside the stream down part of the north-east side, though separated from it by another hedgerow.

Within the boundary, three of the areas of pasture are separated from each other by scrubby gorse hedging and the remaining two areas of pasture are separated by another mature hedgerow / treeline.

2.2 Context / adjacent land uses

A residential property, Ty Newedd, is situated to the north-east of the land, on the opposite bank of the stream.

There is a small travellers' site situated to the north-west, on the opposite side of Herberdeg Road. With the exception of these two properties, and the aforementioned roads, the site is surrounded by agricultural land, woodland and scrub, as can be seen from the satellite image above.

The B4317 links the villages of Pontyates and Carway, with the land being situated halfway between the two. Although slightly outside the two related Local Development Plan boundaries, there are a number of other farms and residences scattered around this area.

2.3 Existing on-site services and access

There are currently no on-site services, although a water main runs alongside the B4317 as it passes the land and an electricity line runs across the northern corner. There is good mobile phone coverage.

There is a single, unimproved access point from Herbedeg Road for both pedestrians and vehicles. There are no public footpaths, bridle paths or other public rights of way onto or over the land

2.4 Physical characteristics

As per the LANDMAP[1] information at Appendix 1, the geological and topographical character of the Pontyates – Tumble area is, *'relatively gentle lower slopes below escarpment of the Cynheidre-Tumble area on the south side of the Gwendraeth Fawr valley. Dominated by Upper Carboniferous 'Coal Measures' mudrocks with some areas of glacial clay*'.

Appendix 2 shows that the land has been classified by the Welsh Government[2] as '3b – moderate agricultural quality', mainly due to its workability in the wet; and Appendix 3 shows that the soil type has been classified by LANDIS[3] as freely draining slightly acid loam, suitable for a range of spring and autumn sown crops.

First hand, we have found the land is quite patchy in terms of drainage, with some areas much dryer than others. We plan to manage this at an overall level by maintaining the traditional drainage ditches bordering the main field and by careful situation of each element of the development according to its need for drier soil; but also to ensure the wetter, more species rich areas are maintained as wildlife habit, as detailed below.

2.5 Biodiversity

As per the LANDMAP information at Appendix 4, the Carmarthen Coalfield area is a, '*Largely improved agricultural landscape with a high proportion of semi-improved neutral and marshy grasslands supporting notable species, particularly the Marsh Fritillary butterfly. The area is also characterised by fields of generally small size with infrequently managed boundaries often supporting mature trees and frequently associated with small woodlands or areas of scrub*'.

The evaluation is deemed to be 'high' in terms of significance and priority habitats, and reference is made to the local Biodiversity Action Plan (BAP) for Carmarthenshire[4]. Here, the land is described as:

- enclosed farmland habit', which includes hedgerows, arable field margins and traditional orchards, and;
- lowland grassland and heathland, which includes lowland dry acid grassland, lowland meadows, purple moor grass and rush pastures and lowland heathland.

The overall vision for the local BAP is to maintain, restore and extend these habitats in the county and the priority species associated with them.

1 https://landmap-maps.naturalresources.wales/
2 http://lle.gov.wales/map#m=-4.2113,51.74394,16&b=europa&l=906;
3 http://www.landis.org.uk/soilscapes/
4 https://www.carmarthenshire.gov.wales/home/council-services/planning/biodiversity/priority-habitats-in-carmarthenshire/#.XQjD2YhKjIU

The Phase 1 Habitat Survey at Appendix 5 undertaken by Matt Sutton Ecology earlier this year shows the following habitats are present:

- semi-improved neutral grassland
- marshy grassland
- hedges with trees
- semi natural broadleaf woodland
- dense scrub.

The survey summary states that:
'The site is botanically-diverse, and contains Biodiversity Action Plan habitats and species. Provided conservation of the marshy and dry grassland can be accommodated within the management plan, there is scope for a development which works with the current ecological interest and enhances it'.

Section 4.2.1 on Land Management demonstrates how this will be done.

2.6 Historic and cultural heritage

As per the LANDMAP information at Appendices 6 and 7, the land straddles two areas: Bryn Brondini,
'*An area of medium sized irregular field enclosures to the south of Pont-iets (Pontyates), with a settlement pattern of dispersed farmsteads and cottages... Most significant archaeological element(s): coal mining, post med settlement and agriculture*';
and Tenerdy,
'*An area characterised by an enclosure pattern of medium sized irregular field boundaries with areas of woodland and a settlement pattern of dispersed farmsteads and cottages... Most significant archaeological element(s): coal mining*'.

Appendix 8 shows that the dominant cultural landscape is categorised as rural, industrial, with significant influences being agricultural, rural settlement and minerals and mining. It is a formal industrial area, renowned for the quality of its anthracite and limestone quarrying.

There are no known architectural features of value on site, though an old air shaft (capped) is present within the wooded copse in the centre of our land, and a derelict plant house relating to the history of coal mining in the area is present on adjacent land.

In terms of living history, the land is bordered by mature hedges which include a number of large oaks, beeches and willows, and these will be managed to ensure long term preservation.

2.7 Existing buildings and structures

There are three existing structures on site:

- Timber stable block, approximately 3.6m x 6m
- Static caravan of standard construction, approximately 3.6 x 7.3m
- Static caravan of standard construction, approximately 3.6 x 11m

All structures were built / added by previous owners a good number of years ago (exact dates unknown) and are currently being used for the storage of agricultural tools and materials.

In addition, a temporary timber and glass potting shed, approximately 2.1m x 2.4m, has been constructed by us within the last few months to enable seeds to be sown and kept undercover during the early spring.

2.8 Landscape

The landscape is typical of its surrounding area in that there are relatively small enclosures of improved agricultural pasture land, bordered by either mature hedgerow / treeline or scrubby gorse and hazel hedgerow. Ditches allow some fields to drain excess water, and run alongside the hedgerows that slope down towards the Gwendraeth Fawr. There are also areas of marshy grassland, that are more species rich, and will be maintained as wildlife habitat.

A stream runs alongside the gorse hedge which separates the two easterly fields before dropping down to form the north-east border of the land, separating it from Ty Newedd and Herbedeg Road. There is a small willow copse to the left of the entrance gate and a larger copse in the centre of the land containing mostly willow and oak.

Although two public roads run alongside the north-east and north-west borders, due to the mature hedgerows, the land cannot be seen for the majority of the year when the trees are in leaf. During the winter months, the site can be partly viewed from some vantage points. Appendix 9 shows the view in both February and June, every few meters along these borders. The main map is an arial view showing each of the numbered locations, with the subsequent numbered pictures showing the winter and summer view from each location. We propose a number of measures to ensure all buildings and structures are hidden during the winter, and these are set out later in the Plan.

Appendix 10 shows the view from Nazareth Road, a residential street across the other side of the valley. Due to the large number of mature trees, and the gentle nature of the valley slope, even in winter, the site cannot be seen from here.

2.9 Past and present land use

Prior to purchase, the site was part of the land owned by the nearby Gelly Gellynog equestrian centre and was used to graze horses, and also to provide winter fodder from the hay that was cut and baled in the summer months.

Currently the land is being cleared of rubbish (silage film, hay netting, old tyres, etc) and prepared for the activities outlined within this Management Plan. Traditional orchards have been planted in the small easterly field, in the top half of the slightly larger adjacent field and in parts of the main north-west facing field. Mulch has been put down in the proposed fruit cage area, some of which is being used as a nursery bed for various soft fruit bushes; and on part of the main vegetable bed area.

2.10 Statutory designations on the site and in the immediate vicinity

There are no statutory designations on site or in the immediate vicinity. The nearest are as follows:

- SSSI – Cwm Clydach, Kidwelly, approximately 4 miles away
- AONB – The Gower
- Conservation Area, Local Nature Reserve, SCA, LOSI – Kidwelly
- Country Park – Pembrey, approximately 5 miles away
- Scheduled monument – Remains of blast furnace at Pont Henri, approximately 2 miles away.
- SPA – Burry Port, approximate 6 miles away.
- Listed Building – Dan y Banc farmhouse and buildings, approximately 300m away

2.11 Existing transport generated by the site and its transport connections.

The site currently generates roughly one return vehicle trip from our current residence and back each day, mileage of approximately 14 miles per week. Although the site is within walking distance from our current residence at Pontyates, a vehicle is needed to transport tools and materials backwards and forwards each day as there is no secure storage on site, and tools are also needed at home.

We also use the services of a local contractor to top the pasture each year to keep it in good agricultural order, who travels a few miles to the site.

The site is well served by local bus services.

- The 197 Llanelli to Carmarthen, via Trimsaran and Carway bus runs along the B4317 and stops at the entrance to Herbedeg Road, approximately 100 yards from the entrance to the site.
- The 195 Llanelli to Carmarthen via Cynheidre and Pontyberem stops in Pontyates, less than a mile away.

The train stations of Kidwelly, Llanelli, and Pembrey and Burry Port are all approximately 6 miles away.

3. Design / Strategy

Our main aim is to create a place where we can live and work in a sustainable and productive way, ensuring the ongoing availability of the land's natural resources for future generations. Key to this is the integration of everything we do on site, to support ourselves both generally, by growing food and fuel, and generating our own energy, and also financially, by extending some of these activities to create a viable, on-site business. This intrinsic link between the two elements reduces the required inputs in terms of labour, facilities and other resources that would be required to set up and run a land based business.
We also see mutually beneficial relationships being created both with our immediate natural environment and with the wider community.

The development will support one household consisting of two people. To this end, facilities will comprise:

- one dwelling
- one unit housing a workshop, general tool storage and seed drying facilities
- one unit housing horticultural materials and tool storage, food processing facilities and volunteer / visitor accommodation
- annual and perennial vegetable beds
- forest garden and orchard areas
- fruit cages
- greenhouses
- biomass growing area
- wood storage
- chicken area
- goose house and pond.

Although supporting and encouraging wildlife and biodiversity will be an integral part of how we do everything on site, there will also be a number of areas which will remain uncultivated wildlife habit, thus protecting local priority species and enabling them to thrive.

The design of the site and location of specific elements is shown in Appendix 11. For sizing purposes, this excludes the majority of uncultivated wildlife area.

We are both permaculture practitioners and will be applying its principles in a practical way by, for example:

- Minimising the need for fossil fuel by maximising human input and harnessing the power of renewables, e.g. by not using heavy machinery traditionally associated with farming, and by generating electricity via solar photo-voltaic panels.
- Ensuring the outputs from each site activity are the inputs for other site activities, e.g mown hay from grassland being used as a mulch for growing areas, and apple pressings from cider making being composted and used to fertilise crops.
- During the set up phase, utilising waste and second hand materials as far as possible, e.g by constructing greenhouses from glass taken from old windows.
- Situating the activities of the site to enable beneficial relationships to be created both with each other, and with their surrounding environment. Appendix 12 shows the beneficial relationships created as a result of alternating greenhouses with fruit / vegetable cages and including an integrated chicken area.
- Ensuring site facilities have multiple functions, e.g. compost bins doubling up as raised beds and visitor facilities being used to store produce ready for sale.

Permaculture design principles employ the use of 'Zoning', ensuring the activities that require the most frequent attention are situated closed to the dwelling (Zone 0).

The table below sets out the activities that will take place within each zone.

Table 1 – Location of elements within each zone

Zone 0	Zone 1	Zone 2	Zone 3	Zone 4
Dwelling	• Food processing • Visitor area • Tool and materials storage • Workshop • Seed drying • Under cover growing • Soft fruit growing • Seed sowing, potting on, etc • Chicken housing	• Outdoor vegetable growing. • Eating apple growing • Forest garden crop growing • Goose housing	• Cooking and cider apple growing • Biomass growing	• Grassland wildlife habitat • Bee keeping

When applied in practice, there are of course other constraints that must be considered. The land was purchased with two static caravans that had already been on-site for a number of years. It made sense to utilise what was already there and to leave them in their original location due to the potential use of fossil fuels, creation of waste materials, demand for new materials and damage to the soil associated with either removing or relocating them. This essentially made our decision for us as to where the majority of our zone 1 activities would take place, and hence where our dwelling would need to be situated. A track had also been put in prior to the site purchase, and there are very specific areas that need to remain wildlife habit, again dictating where certain elements would need to be placed, or conversely avoid.

Appendix 13 shows the proposed timescale for developing the site. This shows that, although work has already started on site, activities have been confined to those of an agricultural nature, not requiring planning permission.

4. Business and Improvement Plan

4.1 Land based activity

4.1.1 Subsistence – food

The following table shows our current household spend per year, using the categories set out in the Ecological Footprint Calculator provided by the Welsh Government[1].

Table 2 – Current annual household spend on food

Food Category	Household Spend	% spend
Meat and meat products	£135.64	4
Poultry and poultry products	£54.40	2
Fish and fish products	£48.23	1
Fruit and vegetables	£1,186.78	35
Oils and fats	£40.72	1
Dairy products	£322.86	10
Grain mill products	£160.95	5
Bread, pastry, biscuits and cake	£232.66	7
Cocoa and confectionery	£148.46	4
Other food products	£376.94	11
Non alcoholic beverages	£120.66	4
Alcoholic beverages	£150.81	4
Eating out	£390.46	12
Total	**£3,369.57**	**100**

The OPD Practice Guidance[2] requires that a minimum of 30% of basic food needs of all occupants are grown / reared on the site, with a further 35% of food needs purchased or bartered using the income or surplus produce from other produce grown / reared on the site. This leaves 35% that can be bought with other income. We intend to grow / rear approximately 50% of our basic food needs on site within 5 years. The table on the next page gives an overview on how this has been estimated.

1 https://gweddill.gov.wales/docs/desh/publications/121115calculatoren.xls

2 https://gweddill.gov.wales/docs/desh/publications/121114oneplanetguideen.pdf

Table 3 – Percentage of food expected to be grown / read on site within 5 years.

Food Category	Grown / Reared On Site?	Barter / Purchase?	Expected % to be grown / reared on site within 5 years.	Expected % to be purchased and related cost p.a.
Meat and meat products	Not within 5 years. We currently have long term plans to introduce grazing livestock once the apple trees are better established.	Yes, bartering with a relative who keeps sheep and goats for meat. A small amount of other meat will still be purchased	2%	2% / £68
Poultry and poultry products	Yes, all the current expenditure is in relation to eggs, rather than poultry meat. We expect to be self sufficient in eggs within five years, but will also be rearing poultry for meat to reduce the amount we consume in the above category.	No	2%	0% / £0
Fish and fish products	No	Yes, but we will reduce the amount we consume	0%	1% / £48
Fruit and vegetables	Yes, we expect to be more or less self sufficient in fruit and vegetables within 5 years by growing and preserving	Yes, a very small amount that we cannot grow ourselves, e.g. soya beans and bananas	33%	2% / £68
Oils and fats	Yes, poultry fat (goose) will be rendered and sunflower seeds pressed.	Yes, a small amount	0.5%	0.5% / £20
Dairy products	No	Yes	0%	10% / £323
Grain mill products	Not within 5 years. We currently have long term plans to experiment with small scale grain growing.	Yes	0%	5% / £161
Bread, pastry, biscuits and cake	No	Yes, but we will reduce the amount we consume	0%	7% / £233
Cocoa and confectionery	No	Yes, but we will reduce the amount we consume	0%	4% / £148

Food Category	Grown / Reared On Site?	Barter / Purchase?	Expected % to be grown / reared on site within 5 years.	Expected % to be purchased and related costs p.a.
Other food products	Yes, preserving our own food will reduce the need to buy preserves, chutneys, mustard, tinned goods, etc	Yes, some items, e.g. sugar, spices and yeast extract will still be purchased	6%	5% / £171
Non alcoholic beverages	Yes, growing herbs for tea and roots for coffee will reduce the need to buy these items.	Yes, a small amount will still be purchased	3%	1% / £30
Alcoholic beverages	Yes	No	4%	0% / £0
Eating out	No	Yes, but we will reduce the amount we consume.	0%	12% / £390
		Total	**50.5%**	**49.5% / £1,660**

The percentages given above are conservative, as they do not take account of our proposed reduction in spend on those categories where we intend to reduce our consumption. This would have the effect of reducing the spend overall, and hence increasing the percentages identified above as being grown / reared on site.

In terms of supporting our estimates above, there are a number of factors to be taken into account. These mainly fall into two categories; the skills, experience and availability of the grower, and the ability of the site to support this level of production.

Skills, experience and availability of the grower

Growing edible crops

We are both skilled growers, having owned allotments for many years, and more recently grown food for large numbers of residents within land based communities both in Devon and Wales. With the exception of very small amounts of potatoes and root veg occasionally bought in the 'hungry gap', we were pretty much self sufficient in fruit and vegetables at our last Community.

Rearing poultry

Carolyn has had many years experience of keeping chickens and ducks for eggs, poultry meat and for new chicks / ducklings. She also was responsible for keeping geese at the last Community.

Food processing / preservation

This was a key part of our activity at our last Community, as there were no fridges or freezers. As a result we are are now adept at storing alliums and root veg, drying beans and other fruits and vegetables, bottling tomatoes, soft fruit and other vegetables, brewing wine, cider and vinegar, fermenting vegetables, smoking and curing meat and vegetables, brining and pickling eggs and vegetables and making cheese and yoghurt. We intend to utilise many of these techniques and have designed specific drying, processing and storage areas into our Plan.

Crop selection

Seeds will be saved from the most vigorous, healthy and high yielding plants in order to produce next year's crop, thereby ensuring that, over time, our seed supply adapts to produce plants which will do the best in our specific growing conditions. Our prior experience of seed saving is limited, so we are currently attending a year long commercial seed production course, run by the Seed Sovereignty Programme[1]. One of the many reasons for choosing greenhouses over polytunnels is that greenhouses can be more easily split into separate areas, enabling seed from a greater number of plant varieties to be saved by preventing unwanted cross-pollination. And being able to grow more varieties means a greater resilience to disease or other crop failure, as more often than not, these instances are specific to (or cause more damage to) a single variety.

In terms of perennial crops such as apple and other fruit trees, varieties have been selected to best suit our geographical area. For example, a number of Welsh varieties of apple tree have been planted; Fredrick, Pertheyre, Viv's Black, Severn Black and Morgan Sweet, with the remainder being tolerant of high rainfall. All are on vigorous M25 rootstocks. In addition, the majority of our initial fruit stocks have been purchased from stocks raised in Wales or the West of England, for example, Welsh Mountain Cider, Welsh Fruit Stocks and and the Agroforestry Research Trust, based in Devon. Again, this will improve the plants' ability to thrive in this area of high rainfall. Similar to seed saving, future stocks will be taken from cuttings of those varieties and plants that do best in our specific conditions.

A forest garden area will also be created, combining numerous perennial plants in varying layers. These will be selected not only as an additional food source, but also for other specific properties, such as fixing nitrogen, accumulating minerals, providing support to other plants, encouraging pollinators, etc. and situated to create beneficial relationships with each other, thereby creating a healthy, self-sustaining eco-system. The edible elements: flowers, berries, nuts, leaves, shoots and roots, provide a much wider range of nutrition to the diet, whilst the diversity and symbiotic relationship between the plants ensures a far greater resilience to pests, disease and adverse weather conditions, than a system of annual vegetable growing.

Availability

We currently work a total of 18 hours per week between us, leaving the remainder of the time to set up and run the site. This outside work can be undertaken remotely from anywhere, so will not require any additional commute, and is expected to continue into the five year period. As sales increase over time, the requirement for this paid work will decrease, enabling us to work full time on the site; however we still feel that even with 18 hours per week removed from our availability, the remaining time will be sufficient to implement our plans. At peak times of the year – spring and autumn, we will use volunteers from a recognised organisation such as WWOOF[2] or Workaway[3]. In the first five years, this will be necessary due to the large amount of set up work required, however we still plan to accommodate volunteers after this initial period, as it will provide them with valuable experience in low impact living, in a shared exchange of skills, knowledge and ideas.

Residing on site also means that, in terms of our round the clock availability, it can be run far more effectively, for example:

- Opening and closing greenhouse and polytunnel windows and doors, or moving tender seedlings in and out of sheltered areas when quickly changing weather dictates, sometime several times a day.
- Constant monitoring of when seeds are ready for harvesting at the end of the season, as many seeds can become ready in a matter of hours.

1 https://www.gaiafoundation.org/what-we-do/food-seed-and-climate-change-resilience/seed-sovereignty-uk-ireland-programme/

2 https://wwoof.org.uk/

3 https://www.workaway.info/

- Interacting with livestock on an ongoing basis to ensure that any unusual behaviour that could indicate injury or illness is spotted and treatment administered as soon as possible.
- Ongoing interaction with crops to ensure that any pests or diseases can be quickly identified and treated; particularly important where pesticides and other chemicals are not being used.

Space and growing conditions

The Local Government Association[1] states that a conventional 250 square metre allotment plot will enable 'full self sufficiency in fruit and vegetables' for a family of four. Our proposed growing space for fruit and vegetables is nearly four time this amount, excluding the forest garden areas, perennial vegetable beds and widely spaced apple trees.

Free range chicken egg production yields approximately 300 eggs per bird per year[2]. We currently consume approximately 780 eggs per year, so would theoretically only need three birds to be self-sufficient in eggs. In practice, the number quoted above is likely to relate to birds fed a high protein diet of bought in feed. We will be making the most of crop residues and forage in order to feed our birds, and although this will mean plenty of nutritious food to enable them to thrive, it may not be sufficiently high in protein to give the same egg yield. However, even assuming only a 50% yield, i.e. 150 eggs per bird, still only a very small flock is needed for self-sufficiency. Our planned flock will be much larger than this, and in addition we will be keeping ducks and geese, further supplementing our egg production capabilities.

In terms of fermenting wine and cider, we have already planted 88 apple trees. Together with our large soft fruit cage areas and abundant hedgerows, there is more than enough potential growing space given over to crops that can be made into both alcoholic and non-alcoholic drinks.

Soil and climate

The majority of food growing beds, both indoors and under glass, will be raised, with pathways in between. Initial mulching, rather than rotivating, will enable the soil structure, and hence the network of mycorrhizal fungi to stay intact, helping plant roots to find more nutrients.

Top soil will be removed from the pathways and added to the beds, thereby increasing the depth of the growing space, and allowing better drainage during wetter seasons. A good amount of compost / manure will be used to increase the soil fertility, and home made biochar added to encourage beneficial microbial activity.

Some crop residues will be left in situ to protect the soil over the winter, eliminate the need for soil disturbance, and increase soil fertility as roots compost. Nitrogen fixing green manures will be used as part of the rotation, again to protect the soil and increase fertility.

A good proportion of the growing area will be under glass as we will be building a number of greenhouses. These will be made from the glass from discarded UPVC windows, set into a wooden frame. Growing under cover greatly extends the growing season and protects the crop from extremes of weather. It also creates a more favourable micro climate, enabling a wider variety and greater amount of food to be produced from a finite area.

Pests and diseases

Crops will be rotated to prevent the build up of disease, and techniques such as intercropping practised to deter pests without the need for harmful chemicals.

Raised beds will be constructed from the frames from the aforementioned windows with recycled plastic inserts replacing the glass. These will not rot like a wooden constructed equivalent, so can

1 https://www.local.gov.uk/sites/default/files/documents/place-grow-supplementary--736.pdf

2 Nix. J – Farm Management Pocketbook: 42nd Edition 2012

be dug into the sub-soil to act as a physical barrier against moles, mice and field voles. They will also not harbour as many slugs or snails as moist wood.

Chickens and ducks will be allowed into specific areas at specific times to help control pests. The use of fruit cages, greenhouses and brassica netting also provides physical protection from birds, other mammals such as squirrels, cabbage white butterflies and cabbage root flies.

We are confident that employing these tried and tested techniques, at least 50% of all our basic food needs can be grown or reared on site.

4.1.2 Other income needs

As per the OPD guidance, there will still be certain basic needs which cannot be met from the site and for which a monetary income is required to enable their purchase. For us, our current expenditure, plus projected expenditure in five years is as follows:

Table 4 – Minimum income needs

Category	Current Spend	Projected Spend in 5 Years
Clothes	£130	£130
Travel	£2,260	£2,260
IT / Communications	£444	£444
Council Tax	£1,058	£1,058
Basic Food Needs	£3,370	£506
Current Total	**£7,262**	
Projected Minimum Income Needs in Five Years		**£4,398**

Clothing spend is based on actual expenditure and we do not expect this to change within five years.

Travel spend is based on actual expenditure on public transport (approx. £40), and on the following expenditure on the two vehicles we currently use for general travel and land work, plus an estimate for any repairs and new purchases:

Table 5 – Current household spend on vehicles

Vehicle	Smart For 2	Toyota Hilux	Total
Tax	£30	£250	£280
Insurance			£386
MOT / Service	£131	£245	£376
Petrol / Diesel			£828
Estimated repairs and new purchases			£350
Total			**£2,220**

As part of the above, the majority of our current mileage, and hence petrol costs relate to long distance travel for visiting parents, and we do not expect this to change within five years. There is likely to be a reduction in the amount of short distance travel over the five year period, as the need to travel to shop for basic food needs reduces, as will the need to travel to and from the land,

particularly in the Hilux. Currently, food shopping comprises one trip per week to Carmarthen and back on a Thursday evening to pick up an order from Carmarthen Food, and travel to and from the land amounts to 14 miles per week. Given that this would only reduce the annual expenditure by a small amount, and that the amount added for potential repairs and new purchases is only an estimate, the projected five year total has not been amended for this.

IT / Communications spend is based on actual expenditure of a monthly internet service for £20, and two mobile phones which are £9 and £8 per month. We do not expect this to change within five years.

Council Tax spend is based on a Band A property in Carmarthenshire, averaged for Town and Community Councils. As we cannot know what this will be in five years, we have simply used the same figure.

Current spend on basic food needs has been derived from Table 2 on page 9. The information earlier in this section showed how we have estimated that approximately 50% of our basic food needs will be grown or reared on site within five years. Given that the OPD target for food to be either grown / reared on site, or purchased using the income from produce grown / reared on the site is 65%, the difference between the two is 15%. 15% of our current food spend has therefore been included within our minimum income needs, above.

4.1.3 Enterprise – Income

The on-site enterprises will all be a natural extension of our subsistence activities, thereby utilising the space, facilities and skills that we already have.

The table below shows our main income generating activities and how they will meet our minimum income needs of £4,398. All amounts are net of annual production costs.

Table 6 – Income generated by land based activities

Year	**1**	**2**	**3**	**4**	**5**
Seed production	£288	£577	£865	£1,441	£2,018
Apple juice / cider making			£319	£638	£2,656
Wine making	-£154	-£339	-£31	£490	£756
Hay production	£400	£400	£400	£400	£400
Total	**£534**	**£638**	**£1,553**	**£2,969**	**£5,830**

Seed production
This will be our first main income generating activity. According to the Gaia Foundation, *'whilst there are an increasing number of initiatives addressing issues around food – food poverty, waste, community growing schemes, etc – there was relatively little being done in the UK to protect seed, revive seed knowledge and ensure the availability of good quality, local seed for commercial growers'*[1].

One of the major seed selling companies in West Wales, Real Seeds, is working closely with the

1 https://www.gaiafoundation.org/wp-content/uploads/2017/04/SeedProgramme_revMay2017EDIT.pdf

Gaia Foundation's Seed Sovereignty Programme, as they are currently only able to source a small amount of their stock from Welsh growers. The remainder comes from the the rest of the UK, and abroad. This initiative is currently providing training to growers including crop cultivation and selection, and seed harvesting, processing and storage, to enable more Welsh seed to be commercially produced and sold. It also provides regional mentoring for commercial seed production, including linking the grower up with seed companies, providing support throughout the growing season, connecting growers with other seed producers in their area, and supporting the development of local seed hubs. We are currently part of this programme, and will be attending training sessions throughout 2019. We also plan to be part of the programme's newly established Welsh Seed Hub[1].

Seed will be saved from annual vegetable crops grown both in the outside veg bed area, and from our greenhouses.

The following table shows a timeline for planned construction of each of the growing areas, planned vegetable / seed production and the size of the growing space available each year.

Table 7 – Availability of growing space

Area	**Prior / current year**	**Year 1**	**Year 2**	**Year 3**	**Years 4 & 5**
Veg growing beds x 6	Construction	Production (67 sqm)			
Lean to greenhouse x 1		Construction	Production (33 sqm)		
Veg growing beds x 6		Construction	Production (67 sqm)		
Additional outside growing area		Mulch	Production (170 sqm)		
Lean to greenhouse x 1			Construction	Production (35 sqm)	
Veg growing beds x 6			Construction	Production (67 sqm)	
Additional greenhouses				Construction	Production (332 sqm)
Growing area available / sqm		**67**	**337**	**439**	**771**

The table in Appendix 14 shows the space required to generate £2,000 of income from seed production. Estimated values and requirements have kindly been provided by Real Seeds[2], but crop names and amounts paid per kg or per seed have been removed due to commercial sensitivities. As per the table, the estimated amount paid per square metre varies enormously, and we currently do not know what crops will be required from each seed company. Averages have therefore been provided to demonstrate that, theoretically, we will easily have enough growing space, i.e. 154sqm, to produce sufficient seed to provide £2,000 of income. The full 154sqm requirement will only partly be in addition to the space needed to meet our own basic food needs, as many seed crops can subsequently be eaten after seeds have been harvested, for example tomatoes, squashes and peppers. In addition, many of the plants that would be considered sub-standard for seed production and will therefore be removed during the growing cycle, would be considered perfectly acceptable to eat, or even sell as surplus vegetables, thereby contributing an additional income to the process.

1 https://www.seedsovereignty.info/rare-welsh-oat-varieties-coming-out-of-genebanks-to-be-planted-katie-hastings-tells-us-about-the-exciting-news-coming-from-wales/

2 http://www.realseeds.co.uk/about.html

The table also shows that on average each year, seven seed crops will need to be grown to provide the £2,000 of required income. Increasing the number of crops increases the complexity of the operation, in terms of the undercover growing space required, isolating flowering crops to avoid unwanted cross-pollination, and also for processing and storage of the seed itself.
The direct revenue costs associated with seed production are expected to be minimal as seed companies supply the initial seed free of charge.

The table also shows the requirement for each crop in terms of undercover growing space. This is needed not just for the growing of tender plants such as tomatoes and chillies, but also bringing outdoor plants, such as chard and some brassicas in over the winter, as these are biennials, so will not set seed until the following year. Growing for seed requires a lot more undercover growing space than simply growing for vegetable production per se. Our plan to construct five separate greenhouses means that not only will we have the amount of space required, but also that each area can be used for a different crop, dramatically reducing the risk of unwanted cross-pollination. This will allow us to maximise our flexibility when negotiating with seed companies in terms of which seeds will be produced. The fact that they are greenhouses, and therefore framed with timber, rather than the metal tubes of polytunnels, means that various temporary partitions can be created, to further reduce the risk; and glass, rather than plastic, better aids the transmission of sunlight, allowing maximum warmth when seeds are drying on the plants at the end of the season. In addition, opening windows can be added where needed to improve ventilation and minimise damp, again to ensure a dry seed crop.

In relation to processing and storage, facilities will be created within one of the structures (static caravans) already present on site, which is dry and has good air flow.

We therefore feel that seven different seed crops could easily be accommodated within 5 years, and the table below shows the proposed timeline for this:

Table 8 – Expansion of seed production

Year	**1**	**2**	**3**	**4**	**5**
Growing space available / sqm (from Table 7)	67	337	439	771	771
Number of seed crops proposed	1	2	3	5	7
Growing space required / sqm	22	44	67	111	156
Expected income	**£288.25**	**£576.50**	**£864.75**	**£1,441.25**	**£2,017.75**

Cider and wine production
Our second main income generating activity will be the production of alcoholic drinks, namely cider, and fruit and hedgerow wine.

To this end, 88 apple trees have already been planted. These were selected to best suit our geographical area, i.e. high rainfall, and all are on vigorous M25 rootstocks which give the best natural resilience against disease and tough conditions. They have been purchased from stocks raised in Wales at high altitude, and have been able to withstand the recent stormy weather without the need for staking, encouraging strong root growth.

Most apple trees produce fruit in their third or fourth year, with dwarfing rootstocks fruiting earlier than standards. As we have chosen to use standard M25 rootstock to give maximum vigour and disease resistance in our local wet conditions, it is likely they will fruit later, in possibly their fifth

year. The trees were a mixture of two and three years old when purchased, so are expected to fruit in year three of the management plan, taking into account the disruption caused by transplanting.

The expected yield from a site planted on standard rootstock is approximately 10 tons per acre after around 14 years, assuming 60 trees per acre, and 1 ton of apples yields around 120 gallons of juice[1]. If this is done as a 'per tree' calculation, after 14 years, each tree will yield 90 litres of juice.

Appendix 15 shows how this looks for the period covered by the Management Plan, with production expected to start in year three, with a yield of 880 litres. The majority of this will be made into cider, so will not be available for sale for another two years.

In terms of wine production, a large number of soft fruit bushes and canes are already being looked after in our nursery bed, and will be transplanted to the main fruit cage area at the end of the season, once the area has finished being mulched. As with the apple trees, both stocks and stockists have been selected to ensure we have plants best suited to our local conditions, with many having been raised from cuttings taken from mature, vigorous and healthy plants grown in our previous Community in West Wales.

These will be underplanted with herbs and other ground cover and companion plants, including nitrogen fixers and mineral accumulators that can be cut and left as a natural mulch. This, along with other natural mulches, e.g. wood chip, will help prevent the grass from re-establishing, encourage beneficial wildlife and provide nutrients. In short, the environment created will ensure the plants are vigorous and healthy, and hence yields are maximised.

An established blackcurrant or gooseberry bush can yield up to 4.5kg of fruit per bush, redcurrants, 3.6kg and raspberries, 500g of fruit from 1 cane, depending on variety[2]. We are not expecting our bushes to be fully established within 5 years, and the table in Appendix 16 shows how this looks for the period of the Management Plan. The table also shows the direct revenue costs involved and sets out the assumptions behind the figures used. Production is expected to start in year 2, however related income will not be realised for a further 2 years whilst the wine matures.

Due to the time lag both in terms of growth, and hence yield of the plant, and the maturation of the wine, maximum profitability of £1.5k will not be achieved until year 9, however by year 5 a small profit will be achieved.

As well as cultivated fruit wine, hedgerow, flower and leaf wines will also be produced: blackberry, hawthorn, gorse, sloe, dandelion, elderflower, nettle, oak leaf and bramble tip. Care will be taken to ensure sufficient flowers and berries remain on the plant for birds and insects to forage, but given the proliferation of these species on our site, the amount of ingredient required to produce the amount of wine planned would likely be a tiny percentage of that available.

If made naturally, these wines require additional ingredients, including lemons and raisins, to provide the balance of acid, body, tannins, etc needed to make good wine, so we will be growing lemon trees and grape vines in our greenhouses. Due to the short time period covered by the Management Plan however, these will not be sufficiently mature to be taken into account.

Again, income will not be realised until two years following production whilst the wine matures, however the plants are already well established, so production can be commenced in year 1. The table in Appendix 16 shows how this looks for the period of the Management Plan, plus the annual production costs involved and the assumptions behind the figures used.

1 Bleasdale. B – How to Grow Apples and Make Cider (2011)

2 https://www.rhs.org.uk/advice/grow-your-own/fruit

Licensing of both alcohol production and sales has also been considered. We will need to apply for a wine producer's licence, plus, as we will be selling both directly to the public, and to other retailers, we will need a personal licence and will also need to register for the Alcohol Wholesale Registration Scheme. Carolyn has previously held an on-licence and is a member of the British Institute of Innkeeping (BII). Although she holds the BII National Licensee's Certificate, this was obtained before the latest Licensing Act was passed in 2003, so is no longer accredited. She therefore intends to sit the newer BII Level II examination certificate in the near future.

In terms of excise duty, this has been factored into the costs for wine production set out in Appendix 16.

As we will be making less than 7,000 litres of cider, no duty is required to be paid, nor will a licence be required for production or selling wholesale, however we will need to apply for an exemption from registration.

Hay production
We have this year, sold some of the hay that was cut and baled, to the contractor we currently use to keep the pasture in good agricultural order. After taking account of the related costs, this amounted to £400 (41 large bales at £20 per bale, less the costs of production).

4.1.4 Other income streams
We have only provided detailed projected income figures for our the main business areas, and have demonstrated that these meet our minimum income needs of £4,398, plus a buffer of just over £1,400 (approximately 32%). In addition, we have a number of other proposed activities which are likely to generate additional revenue. These all relate to the activities that are being undertaken anyway, both income generating and subsistence, maximising the potential income generating capacity of the site without much additional work or additional facilities being required:

Vegetables
At some times of the year there are likely to be surplus vegetables, particularly due to the large number of plants raised for seed production, and these will be sold as and when available. These include a number of perennial crops, for example asparagus and rhubarb for which large surpluses will be grown. Both these crops are currently being raised from seed to keep both the cost and the environmental impact low, and will be planted out within the perennial beds surrounding the main veg bed area once sufficiently mature.

Soft fruit
The calculations undertaken in relation to wine making assume only half the yield from the bushes and canes is made into wine, the other half will be eaten as is comes, made into jam, flavoured vinegar, syrup, etc, with the surplus being sold.

Top fruit
We have chosen to grow an interesting selection of apple trees, from those with very dark red fruit and pink flesh, to sweet dessert apples, Welsh apples, stripy apples, russets, and even those whose seeds rattle when shaken. A variety of the most interesting and tasty dessert apples will be sold as they are, not only to bring in income, but to encourage people to try something different than what would normally be available commercially, and hence support the growing of local and interesting species. Those that do not sell will be juiced, thereby minimising waste.

Mushrooms
Utilising Paul's experience in growing mushrooms at our previous Community, we will be growing mushrooms on cut logs and woodchip, not only for our own consumption, but for sale. Proposed

species include shitake, oyster, wine cap and chicken of the woods, and we will sell both as fresh mushrooms and as dried. Hedgerow management on some parts of the site will provide the substrate and both grain spawn and dowels will be purchased for inoculation.

Flowers
We will be growing a large quantity of different types of sunflowers to encourage beneficial insects, provide a seed crop for sale, a forage crop for chickens, and to process into oil. We will also sell bunches of cut sunflowers, and again, waste will be minimised as those that do not sell will be processed.

Seedlings
The growing process inevitably results in more seedlings being produced than are ultimately planted out, and we plan to sell the surplus of the most popular types: tomatoes, lettuce, peas and beans, courgette, etc at our local farmers' market in Pontyates.

As time goes by, we will get to know the demand for certain products, and the related return on the time spent, and pick, pack, process and market accordingly.

In regard to anticipated sales outlets, we have been purchasing food on a weekly basis for the last year from Carmarthen Food[1]. Local producers add their products to the website for purchase on weekly basis, and customers travel to the food hub in Carmarthen on a Thursday evening for pick up. New producers are not only welcome but actively encouraged. The initiative links local producers with local buyers, and also means that producers need only list products that are available that week, and only pick, pack and transport what has been ordered during the previous week. By utilising the hub, we do not necessary need continuity of supply, so could sell the other produce above, as and when available.

A similar initiative, the Hwb Bwyd Twyi[2], operates from Llandeilo, and this will also be an outlet for us. It is part of the Open Food Network[3], which enables food producers to create an online shop, collect payments, and sell through other shops on the platform. The Hwb is a community initiative that operates through the network, and has brought together producers in the local area to create a virtual farmers' market, with a number of weekly pickup points around the Llandeilo area.

In addition, there are regular farmers' markets throughout the County: Carmarthen, St Clears, Llandeilo and Pontyberem, plus the monthly farmers' market in Pontyates which we currently frequent.

In terms of both seed production and fruit growing, we are planning on becoming organically certified. Our growing methods are already in line with organic principles, so it makes commercial sense to become officially registered and hence have access to additional markets.
For example, our nearest box scheme is run from Banc Organics[4] at Bancffosfelen, and an informal discussion with them found they would be interested in selling our produce, but preferably once we are certified. There are also other seed companies such as the Seed Co-operative[5], who are involved with the Seed Sovereignty Programme, who are looking for new suppliers, but will only purchase seed that is organically certified. In regard to cider, we are not aware of any organic cider currently produced in South-West Wales.

1 https://carmarthenfood.com/
2 https://hwbbwydtywi.co.uk/
3 https://about.openfoodnetwork.org.uk/
4 http://www.bancorganics.co.uk/
5 https://seedcooperative.org.uk/

4.2 Land Management

4.2.1 Biodiversity

The baseline set out previously, describes the current situation in terms of landscape and biodiversity. More detail can be seen in the Phase 1 Habitat Survey in Appendix 5.
The survey includes a number of recommendations, and our proposed actions are as follows:

Table 9 – Biodiversity: planned action

Species / Area	Recommendation	Planned Action
Bats	Boundary hedges should be retained as mature trees, and recently cleared growth out from the hedge base should be allowed to re-establish where possible.	Boundary hedges will be retained as mature trees. Base growth was cleared with a view to allowing new growth to re-establish and will only be removed (and allowed to regrow) where it encroaches on the species rich grassland.
	Cladding of the existing caravans could make them attractive to roosting pipistrelle bats.	Caravans are currently being clad in locally sourced timber.
Birds	The presence of birds of conservation concern, most notably willow tit, should be considered in any vegetation clearance work. Cutting should avoid the bird breeding season (early March to end of August).	All cutting to date has avoided this period, and this will continue to be observed. Brash will be left in piles over the winter period to provide shelter for wildlife. This will also decrease the foot traffic on the field margins during the wettest part of the year, minimising damage.
	Hedgerow trees with splits or cavities should be retained where possible, and the gorse thicket between fields 2 and 3 retained but perhaps coppiced on rotation.	Split trees will be maintained. The gorse thicket will be retained. It will be coppiced (on rotation) should it significantly encroach on to the high quality grassland of field 2.
Hedges	The mature trees on the hedge-banks here are of ecological interest, and standard hedging recommendations, such as those sometimes imposed by agri-environment schemes, should not be applied.	Standard hedging recommendations, e.g. laying, will not be applied to the mature trees on the hedge banks. Firewood coppicing will be restricted to young trees and new areas of short rotation coppice will be planted away from areas currently rich in biodiversity.

Species / Area	Recommendation	Planned Action
Marshy grassland	Re-introduction of grazing would be traditional management to maintain this habitat, but the low numbers of animals may be impractical to keep on a small-scale. The planting of fruit trees across Fields 1, 2 and 3 may limit grazing options here, but the larger Field 4 may be able to accommodate grazing. This could be with a small number of ponies in spring and/or autumn; grazing should avoid the wetter winter months when poaching would damage the swards, and ideally avoid the summer months so that plants are able to flower and seed. If maintained by mowing, the grassland should ideally be mown and collected rather than topped; this will prevent the build-up of a mulch which would suppress smaller plant species.	We intend to introduce grazing livestock once the apple trees are sufficiently mature, however this will be outside the 5 year period of this initial management plan. Although there are no trees on field 4, as grazing would need to be restricted to spring and autumn, this is an option we're not able to pursue as the livestock could not be accommodated elsewhere on site during the summer and winter. The grassland will therefore be mown and collected. Some will then be sold, and some used as additional fertility for our horticultural activities on field 1.
	Occasional cutting of scrub may be required to slow natural progression towards willow woodland.	This will be done if required when the fields are mown, and the scrub chipped and used for mulch or paths for the horticultural activities on field 1.
Semi-improved neutral grassland	The grassland in Field 2 is of high quality, and the planting and mulching of fruit trees here will lead to deterioration of the grassland quality through shading and nutrient enrichment. Some or all trees should be relocated.	These will be relocated to the bottom of field 1 once dormant at the end of the season.
	The drier swards should continue to be cut or grazed to maintain their wildflowers. Ongoing management should be in the form of traditional late hay-cutting and/or light grazing. As with the marshy grassland, any grazing should be focussed on April and/or late summer / early autumn.	Hay will be cut, rather than grazed (see above), late in the year, removed, and used for horticultural activities in field 1.
	Herbicides should be avoided; there should be no inputs of fertiliser, and applications of lime or manure should be restricted.	No herbicides, fertiliser, lime, manure, or other inputs will be used.
	The knapweed-rich grassland in Field 5 will be of value to foraging bees, and mowing should ideally be after the knapweed has flowered in August.	Bee hives will be situated in field 5. The grassland will be mown and collected in September, and will be used as additional fertility for our horticultural activities on field 1.

Species / Area	Recommendation	Planned Action
General promotion of biodiversity	Key to the current proposal will be implementation of a sensitive conservation grazing or mowing regime, and the avoidance of horticultural activities on the botanically-rich grassland areas. The focus of building and growing activities on Field 1 will impact on lower-quality areas of habitat, and this could be compensated for by managing Fields 2, 4 and 5 to a 'nature reserve' standard.	Horticultural activity will be focussed in field 1, with fields 2, 4 and 5 managed to a 'nature reserve' standard.
	A small, shallow pond could be created on the lower edge of Field 1, or the lower edge of Field 3 if the richer marshy-grassland in the north-west corner is avoided. Spoil should be removed and used away from areas of botanically-rich habitat.	A small, shallow pond will be created on the lower edge of field 3, away from the north west corner. Spoil will be used in field 1, away from areas of botanically rich habitat.

Our prosed biodiversity strategy is therefore two-fold. Firstly to ensuring our food production methods and income generating activities encourage, rather than exclude wildlife. This has been touched on throughout the Management Plan, but can be summarised as follows:

- Increase microbial activity and therefore the diversity of other life in the soil by using methods such as no dig, and the addition of organic matter and biochar.
- Encourage beneficial wildlife including pollinators and natural predators, and using physical barriers against pests, thereby avoiding the use of chemical sprays that reduce biodiversity.
- Growing sufficient food to provide forage to wildlife as well as for ourselves, for example soft fruit for greenfinches.
- Allowing many crops to run to flower and then seed after we have harvested sufficient food, for example brassica flowers for bees.
- Planting numerous companion species in with food crops to encourage a greater variety of wildlife.
- Growing perennial crops, including a forest garden area, not only to provide a more diverse range of plants, but also to act as cover and forage for wildlife during leaner months.
- Planting apple trees providing spring pollen for bees and other insects.
- Creating a pond, both to encourage beneficial wildlife, for example toads, but also to increase the diversity of habitats already on site.
- Increasing the number of honey bees on site by situating bee hives in an area particularly rich in wild flowers, including knapweed.

We recognise, however that agricultural activities and residing on site will inevitably result in the detriment of some particular habitats and species. The second part of our strategy is therefore to set aside those specific areas of the site that are currently rich in biodiversity, particularly in regard to priority species. These will be managed as wildlife habitat, as detailed in the table above, mitigating our impact in some of the more cultivated areas and thereby increasing the biodiversity of the site as a whole. This proposed strategy is supported by the conclusion of the Habitat Survey, which states that:

The site is botanically-diverse, and contains Biodiversity Action Plan habitats and species. Provided conservation of the marshy and dry grassland can be accommodated within the management plan, there is scope for a development which works with the current ecological

interest and enhances it.

Although at first glance, the two strands of the land management strategy seem quite separate, the areas set aside for wildlife habitat will still be productive in terms of supporting the development as a whole without there being a negative impact, for example cut hay will either be sold, or used to add fertility to horticultural activities, and boundary hedges provide hawthorn, sloe, elder, blackberries and gorse for winemaking. Proper management of such wildlife habitat provides little in the way of incentive for a traditional farmer or horse owner, however the principles of One Planet Development allow such habitats to be a useful resource, providing an incentive for proper management, and hence conservation for future generations. We welcome the opportunity to work closely with the Council's Biodiversity Officer to ensure this effectively achieved.

4.2.2 Landscape

In terms of the public view of the site, photos at Appendix 9 show the proposed site development is not visible in the summer, however during the winter it is visible from points 1 and 2. Evergreen screening will therefore be planted along the north west boundary, as shown on the site plan in Appendix 11. Species will be selected carefully to ensure multiple functions are performed, for example Elaeagnus Ebbingei is not only an evergreen hedging plant, it also fixes nitrogen in the soil and provides flowers and fruit for bees and other wildlife. Native species such as holly, which also provide food for birds and small mammals, and gorse which is already prolific on site, will also be used.

On the south-east side of the evergreen screening will be the main short rotation coppice area for biomass harvest, thereby providing further screening of the proposed dwelling site, and any horticultural activities taking place. There is no public view of the site from the south, ensuring that solar panels will remain unseen.

Finally, photo number 6 shows the visibility of the top corner of one of the static caravans in February. Additional screening cannot be planted here as the unit is already against the hedgerow, however both caravans are currently being clad, so will blend into the landscape far more effectively than is currently the case.

4.3 Energy and Water

4.3.1 Minimisation of consumption and re-use

This will be the first priority of the the site. Having previously lived completely off grid for both energy and water for a number of years, we are used to minimising our consumption of these resources; habits we have kept since moving here. For the Development, this will be done in the following ways:

Electrical Energy

As mentioned in section 4.1.1, we are experienced in preserving food without chilling or freezing, and consequently have not used fridges or freezers for the last few years. We do not have a washing machine and do not propose using any of these appliances once one site.
Very low energy LED light bulbs will be fitted as well as other highly efficient appliances. We do not use gas, and currently have an electric oven to cook meals and an electric shower. A wood burning stove will replace these on site, negating the need to cook the majority of food, or heat water using electricity.

Heating

We have chosen to have a small dwelling and locate our food processing facilities elsewhere, thereby minimising the area of living space that would need to be heated. In addition, the dwelling will be highly insulated, minimising the loss of heat to the outside. It will be south facing, with large bifold doors, maximising the amount of solar gain, particularly in the winter. Directly behind the glass will be a large block of thermal mass (supporting the table top), which will absorb heat when sunny, and release it slowly during the night.

Where additional heat is required, it will be used to perform multiple tasks to enable the greatest use to be obtained from the smallest amount of energy. For example, when the wood burning stove is lit for heat, not only will it be used to cook a meal, but stove top kettles will then be used to heat water and kept in flasks overnight to provide water for tea and coffee for breakfast; and slow cooked food will be left in the oven overnight using the latent heat once the fire has died down.

In addition, wood will be thoroughly seasoned before use to ensure that the maximum amount of energy can be obtained from the minimum amount of material.

Water

We propose using a composting, rather than a traditional flush toilet, and will not have a bath on site. In addition, we only use natural toiletries and washing up liquids so grey water can easily be treated with the use of a small trench arch system before being gradually dispersed. We try and minimise our water use in numerous other ways, and since having had a meter put in over a year ago, our average consumption of water has been just under 30 litres per person per day, compared with a UK average of 150 litres per person per day[1].

No gas or other fossil fuels will be used for home based domestic purposes.

For non-domestic, and land based purposes, energy and water requirements will be minimised as follows:

1 https://www.dwrcymru.com/en/Education/Secondary/Water-efficiency.aspx

Table 10 – Use and minimisation of energy and water

Activity	Energy	Water
Construction of raised beds, greenhouses, etc and installation of processing facilities.	Both hand tools and power tools are used as appropriate. We currently use 18v cordless power tools, charged at home via electricity. These are generally less powerful than corded equivalents, so use less energy.	None required
Ongoing maintenance of the site: pasture topping, scrub clearance, etc	Both hand tools, e.g. scythes, and power tools are used as appropriate. We use a combination of 18v cordless power tools, and a small number of items fuelled by petrol, e.g. chainsaw. Use of these items will be kept to a minimum. The larger wildlife reserve areas will be mown by a contractor as we are not able to house grazing animals all year round.	None required
Growing crops	Some very early sowings of tomatoes, peppers and chillies will require heat. This will be provided via a low wattage soil warming cable.	Crops grown undercover will require watering. Drip feed tubing will be used to deliver it to crops as this takes the water directly to the plants' roots and minimises evaporation. This not only reduces the amount of water used, but also discourages surface weeds and moisture loving pests. Seedlings will require watering. Large watering trays will be used for this purpose enabling plants to take only what they need, with no run off. In the Welsh climate, it is not anticipated that any crops grown outdoors will require watering; however green manures and mulches will be used to minimise evaporation during dry periods.
Seed production	None	Small amounts of water may be needed to extract seed from pulp, for example tomatoes. This will be utilised to water crops after use.

Activity	Energy	Water
Juice, wine and cidermaking.	A commercial scratter (pulper) will be used, powered by electricity, plus an electric juice pasteuriser. Equipment will be sterilised using water boiled on a small wood burner to be installed in the food processing areas within one of the static caravans. Excess heat will be utilised by the adjacent greenhouse.	Water will be required both for initial washing of fruit, for washing and sterilising equipment, and in winemaking. Water used to wash and sterilise will be utilised to water crops after use.
Mushroom growing	Nothing significant	Nothing significant

4.3.2 Sourcing
All energy and water for domestic purposes will come from on-site renewable sources via the following means:

Energy from the sun.
Electricity will come from a solar PV array located on the south side of the dwelling, and we are planning on generating sufficient electricity for our own needs from this system. However off grid systems require a fair amount of infrastructure over and above that used to simply generate the electricity, as it must then be stored and converted. This includes large lead acid batteries and an inverter, all of which involve the extraction and processing of metals and minerals using processes which are highly detrimental to the environment. As there is a grid connection very close to us, it makes sense to utilise the grid infrastructure already in place as opposed to purchasing, maintaining, repairing and potentially replacing new equipment. In addition, we plan to produce far more electricity than we use, particularly in the summer, so this will allow us to export surplus energy to the grid for the local community to use.

We have already purchased five, 255w solar panels, giving a total of 1,275w. As per the Met Office, the average number of sunshine hours for the year in Carmarthen (our nearest weather station) are 1,552[1], giving annual electricity production of 1,979kWh.

Our current domestic electricity use is around 120kWh per month, or 1,440kWh per year, so at our current domestic consumption levels, which are expected to decrease without the electric cooker, we will be producing a surplus of 37%. This is expected to more than cover our additional non-domestic / land based requirements, but this will be monitored closely, and an additional solar panel added if it does not.

Although surplus energy will be exported to the grid during much of the year, there will be times, e.g. at night and during the winter, when we will be using electricity from the grid. Careful planning and close monitoring will therefore be required to ensure that this is minimised. For example, only undertaking activities that require a fair bit of energy when we are producing sufficient electricity, i.e charging batteries, scratting apples, pasturing juice; and using wind up torches when visiting the bathroom at night.

Hot water in the summer will come from solar thermal panels. As per CAT, around 1sqm of panel will generate sufficient hot water for the needs of one person in the summer[2], so the additional roof

1 https://www.metoffice.gov.uk/public/weather/climate/gchzjb39w
2 https://www.cat.org.uk/info-resources/free-information-service/energy/solar-water-heating/

space needed for the two of us, will be minimal.

When juice, cider or wine making, water used for sterilising and pasteurising will be preheated using solar thermal energy, thereby minimising the amount of wood and electricity needed to raise its temperature to that required.

Energy from wood

A multi-functional wood burner will be used which will heat the house and provide hot water in the winter, and provide heat for cooking and baking all year round. Limiting the size of the house, and not having a bath means that a relatively small amount of heat will be required to keep it warm and provide sufficient hot water in winter. As a result, only a relatively small wood-burner will be needed, enabling it to be used year round for cooking without the house overheating.

We currently heat our house with a wood burner, and this also provides hot water for the following day's hot drinks and washing up via the use of stove top kettles and flasks. Based on our current use of wood, we estimate that we will need approximately 4 tonnes of dry biomass each year if it is also to be used for all hot water in the winter and cooking all year round. As a 'sanity check' we have compared this requirement to other OPD management plans, and the assumption seems reasonable.

Approximately 6,000sqm of short rotation coppice willow, ideally suited to our damp conditions, will be planted in the coming season. It can be cut every 2-5 years depending on diameter of biomass required and once established an area of this size can be expected to yield between 3 and 7.2 oven dried tonnes per year[1].

Additional sources of biomass in priority order as follows:

- Numerous new trees, mainly willow and sycamore, have self seeded over the past decade or so and are now encroaching on the grassland.
- Gorse and hazel thickets can be coppiced on a 3 year rotation.
- Dead and damaged limbs can be taken from the two small areas of broadleaf woodland encouraging more light and therefore new growth.
- Shelter belts, screening and canopy species crops within the forest garden area can start to be pollarded / coppiced from year 5.

Small diameter wood, created as a result of the above processes, and off cuts from construction will be used to feed the additional small wood burner to be installed in one of the static caravans. This will result in quick, hot burns, enabling food and drink processing to take place without large amounts of excess heat being created.

Water

Rainwater will be harvested from all roofs, and in the case of domestic water, filtered and treated using an additional UV filter. As per the Met Office, the average annual rainfall in Carmarthen (our nearest weather station) is 1,323mm[2].

The table on the next page shows how much domestic water this would provide should all this water be harvested from the roof of the proposed dwelling.

1 https://www.forestresearch.gov.uk/tools-and-resources/biomass-energy-resources/fuel/energy-crops/short-rotation-coppice/

2 https://www.metoffice.gov.uk/public/weather/climate/gchzjb39w

Table 11 – Availability of rainwater for domestic consumption

Size of dwelling roof	72.5 sqm
Annual rainfall	1.323 m
Total amount of harvestable water	95.92 cubic meters
Equivalent to	**95,917 litres**
Current daily consumption	30 litres
Equivalent annual consumption	**10,950 litres**

This shows there will be more than sufficient rainwater for our domestic needs. Even in the driest part of the year, June, when average rainfall falls to 70.5cm. This is still the equivalent of 170 litres per day if a similar calculation were to be applied. We feel that storage capacity of 2,000 litres (a little over 2 months supply) would therefore be sufficient. Storage tanks will be insulated, constructed from an opaque material and located behind the house, shielding it from warmth and sunlight and therefore minimising the growth of algae and other organisms. Particulate filters will be used in conjunction with a UV filter located inside the dwelling. This will not only remove particles and kill bacterial pathogens, but also to ensure these organisms are not 'shaded' by the particles, and hence not properly exposed to the UV light. There are a number of companies who supply high quality 'whole solution' systems where mains water is unavailable.

In terms of non-domestic / land based needs, if rainwater is harvested from the roofs of all undercover growing spaces, it is anticipated that the average annual rainfall will again be more than sufficient. However, the majority of this will be needed during the driest months. Large capacity storage will therefore be required. This will be in the form of second hand intermediate bulk containers (IBCs) which are readily available. Each holds 1,000 litres, so overall storage capacity can simply be added to, should the need arise.

Other energy
Small amounts of petrol will be required to power the non-domestic machinery used on site, e.g. chainsaw. Here, the use of such items will be minimised, for example by using alternatives where appropriate, e.g. the battery powered chainsaw, or bow saw.

4.4 Waste assimilation

As with energy and water, the first priority is waste minimisation, and this will be greatly assisted if the majority of food needs are obtained directly from site. Waste is also minimised due to the overall design of the site and the activities taking place within it. Output from one activity (what could be considered 'waste') becomes a useful input for another.
As an example:

- Willow is coppiced for biomass, however the brash is too small to be useful in this way. It is therefore chipped and used as pathways round the raised beds to suppress weeds and prevent them becoming too muddy in the winter.
- After a few years, the chip has broken down so will cease to be useful in this way. It is therefore added to the compost piles providing a helpful element in the composting process.
- Compost is added to the raised beds to add fertility to the soil, helping crops to grow. At the end of the season, there are crops that have gone to seed or are considered unpleasant for human consumption.
- Some of these are fed to chickens, who then produce manure. The chickens are encouraged to forage around the willow coppice areas, whilst dropping their manure.
- Nutrients from the manure are broken down by microbes and washed into the soil where they are taken up by the trees.

The example shows how, by utilising the waste from each activity in this way, the site as a whole functions as a self-sustaining circular system, minimising both the waste leaving the site, and the elements that must be bought in as part of a more common linear system. Thus reducing the overall environmental impact of the Development.

The following shows how specific categories of waste will be minimised and assimilated on site:

Domestic food waste
As is currently the case, uncooked domestic food waste will be composted and used on the growing areas. Raw and cooked meat waste (skin, bones, etc) will be burnt, and the ash composted. We have no other cooked food waste.

Non-domestic food and other organic waste
Small amounts of apple pulp and berry and flower residues (pre-fermentation) will be used to feed poultry. The remainder will be be composted.
Crop and seed production residues will be fed to animals where possible, with the remainder being composted.
Brash from biomass processing will be chipped and used for paths. Rotten wood will be used in the base of each 'compost tractor' bed. Here, the 'hugelkultur[1]' method will be utilised, whereby decaying wood debris and other compostable biomass plant material is used to hold moisture and build fertility.
Hay from mown fields that is not sold will be used as a mulch in growing areas, with the remainder added to compost heaps.

Human faeces and urine
Composting toilets will be used which will separate faeces from urine. Urine will be used both on compost heaps and diluted for use directly on forest garden areas and comfrey beds. Faeces will be left to break down naturally in the composting chamber. This composting process is allowed to continue for a further two years, after which the human pathogens will have been killed. The resulting compost is safe and free from odour and will be used on the fruit trees and bushes.

1 https://www.permaculture.co.uk/articles/many-benefits-hugelkultur

As there are no flush toilets, there will be no 'black water' to dispose of.

Grey water
Clean grey water, i.e. that has been used simply to sterilise equipment and has no food or soap residues, will be added to water being stored before being used to water crops.
Grey water that has food but no soap residues. e.g from washing vegetables, will be added to compost heaps.
Grey water that has soap residues, e.g. from washing up, showers, etc will be treated using a trench arch system[1] before being returned to the land. This will be directed through the forest garden area, away from the stream and where there is plenty of vegetation to absorb any excess. Due to our use of only ecological washing up liquid and soap, the water could, theoretically be used to directly water non-food crops; however the timing of grey water discharge is unlikely to match that of the crops' water requirements, and due to the amount of detritus potentially present within it, it could not be added to the water being stored to irrigate crops at it may block pipes and filters.
We therefore feel a trench arch system is suitable, as there will be no black water going through it, and the amount of grey water that will be treated is only very small; estimated at approx 15 litres per day. This has been calculated taking our current daily sewerage use, 27 litres, and reducing it for the fact that we will not have a flush toilet, and that a percentage of the grey water identified above, will not go through the trench arch.

Packaging and paper
We currently generate very little in the way of packaging and paper waste. All cardboard and paper is either used as mulch, composted or used to light the the wood burner, and our current purchasing and reusing habits, for example buying in bulk, reusing plastic containers and tetra paks as plant pots, reusing glass bottles and jars for home preserved food and drinks, and repurposing old clothes into dishcloths and patchwork items, leave only very small amounts of packaging to be recycled. Clothes and household items are generally purchased from charity shops, and hence come unpackaged.

Livestock manure
This will be minimal as during the first 5 years, the only livestock will be poultry. Animals will be encouraged to roam in specific areas at specific times of the year with the use of temporary fencing. This will not only help clear ground, but also keep pests down and ensure areas are manured where additional fertility is needed. Soiled bedding will be added to compost heaps.

1 https://www.cat.org.uk/info-resources/free-information-service/water-and-sanitation/sewage-treatment/

5. Zero Carbon Buildings

The OPD Guidance states that, '*All One Planet Developments should share the aspirations set out by the Welsh Government to achieve development that is of 'zero carbon' status in terms of construction and use*', and that, '*In practice the requirements for the zero carbon standard for construction are found mainly in the Code for Sustainable Homes (CSH) and for use in a revised Part L of the Building Regulations*.

None of our buildings – domestic or ancillary, are subject to building regulations; however we will still be complying with the spirit of the guidance in terms of zero carbon in construction and use and will also need to comply with the CSH in respect of Category 3 - materials.

5.1 Domestic

Our proposed dwelling meets the legal definition of a caravan due to both its small size and the fact that it will be built in two parts, with each part connected on site.
It has been designed by Mark Waghorn Architects, a local business based in Llandeilo and uses the British Standard BS:3632 for Park Homes as the basis of its design[1]. Whilst technically being a caravan the design still conforms to, and exceeds, building regulations with regards to the levels of insulation and thermal performance required for a new dwelling.

Appendix 17 shows the floor plans for the proposed dwelling, and 18 shows its elevations. In summary it comprises a combined living room and kitchen area, two bedrooms, a bathroom, study area and larder cold store. Excluding the small add on larder, it measures 12m long by 5.8m wide, by 4.8m high. The caravan is designed to use adjustable feet similar to scaffolding poles that will sit on minimal pad foundations, raising it off the ground and thereby minimising the needs for extensive use of non-environmentally friendly damp proofing materials.

The following table shows the materials used and the ratings under the BRE Green Guide 2008[2] (as required by the CSH) or their nearest equivalent:

Table 12 – Construction materials used in the dwelling

Element	Material	Nearest Green Guide Material and Associated Rating	Source
Frame – walls and roof	Timber frame	Canadian cedar weatherboarding, OSB/3 sheathing, timber frame with insulation, vapour control layer, plasterboard on battens, paint Rating: A+	We are planning on using a local timber mill who also sources their wood locally.
External walls	Timber cladding using something like larch, douglas fir or cedar which will weather to a silver grey, blending in with the local, historic vernacular of Welsh stone.		

1 https://www.mwd.wales/modularhomes-opph
2 https://www.bregroup.com/greenguide/ggselectelement.jsp?buildingType=Housing

Element	Material	Nearest Green Guide Material and Associated Rating	Source
Roof	Recycled, corrugated or box profile steel or zinc sheeting. These materials are both highly durable, and are frequently used locally on agricultural buildings. They are also easily reusable / recyclable at the end of their life, should the need arise.	North side: Timber trussed rafters and joists with insulation, OSB/3 deck, breather membrane, standing seam organic coated steel sheet. Rating: A+ South side: Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and integrated photovoltaic roof tiles. Rating A+	Where available, from a local supplier.
Internal walls	There are a number of environmentally superior alternatives to standard OSB (particle boarding), for example Smartply[3], which is made from locally sourced, FSC certified, forest thinnings that has no formaldehyde added during manufacture.	Timber stud, OSB/3 facing, paint A+	
Floor	Recycled hardwood floorboards	Solid hardwood flooring (14mm) with underlay. A+	Second hand and locally sourced.
Insulation – walls, ceiling, roof and floor.	The design as it stands uses Warmcel[4] recycled newspaper insulation; however new, natural, environmentally friendly products regularly come to market, so when the time comes we may select an alternative should there be one with better insulative properties. Wood fibre insulation boarding, for example Pavatex[5], will be used where more appropriate, for example in the roof due to the surface angle.	Dry blown recycled cellulose insulation - density 24kg/m³ A+ Corkboard insulation - density 120kg/m³ A	From a local supplier, preferably using material that originates locally, should this be available.

3 https://mdfosb.com/en/smartply/about
4 https://www.warmcel.co.uk/warmcel/
5 http://www.pavatex.com/en/advantages/

Element	Material	Nearest Green Guide Material and Associated Rating	Source
Windows and doors	Timber frame and double glazed	Durable hardwood window, double glazed, water based stain (non-TWAS) A+	Second hand and locally sourced.
Fixtures and fittings	Various	N/A	Second hand where possible, otherwise sourced from local builder's merchants.
Internal finishes	Natural products, for example lime / clay based plasters and paints with natural pigments.	N/A	From a local supplier

A small larder (1.7m by 1.7m) will be attached to the north side of the dwelling. This will be unheated and uninsulated and will act as the cold store / root cellar for vegetables throughout the winter.

In addition, a wood-store will run the width of the dwelling on the east side. This will be insufficient for all our wood storage needs, however in order to minimise the number of additional structures built, wood will be left in a number of temporary storage areas tucked away around the site.

5.2 Ancillary

Ancillary dwellings comprise the following:

Static caravan (Unit 1) – 3.6m by 11m
This was brought on site prior to our purchase of the land and has been in place for a number of years. It will be used for three main activities:

- storage of horticultural tools and equipment
- wine and juice making in the small kitchen, plus storage of wine and cider making consumables (demi-johns, bottles, etc) and bottled wine and cider awaiting sale.
  Having a separate, smaller kitchen means these activities can be kept separate from those in the domestic kitchen, and the larger house stove does not need to be on just to boil water / simmer ingredients. Although there is currently a gas stove in the static, there is no gas connected and it is in a poor state of repair. This will be replaced with a small wood burner, thereby using less wood and prevent damp in the house caused by simmering water.
- A small bedroom has been left for volunteers / visitors, and there is a lounge area which will be used as a day room where visitors and volunteers can gather, discuss plans, have lunch and hot drinks, shelter from poor weather in muddy boots and wet clothing, etc, as it is unlikely there will be room in the dwelling to do this. There is also a toilet area, however this currently has a normal flush toilet and there is no water supply or sewerage connected. It will therefore be removed and replaced with a compost toilet.

A second static caravan (Unit 2) – 3.6m by 8.5m
This was brought on site prior to our purchase of the land and has been in place for a number of years. It will be used for two main activities:

- General tool and equipment storage and workshop area. This will also include an area for storing construction and repair materials that need to be kept dry, for example timber.
- Processing, drying and storage of seed. This activity must be undertaken in a dry and well ventilated area, so will be located away from any kitchens or bathrooms.

A small lean to area will also be added to the end of this caravan to store and use larger pieces of equipment, for example the cider press and chipper.

Both caravans are currently unsightly, but will be clad in the same timber as the dwelling, enabling them to better blend in with the local vernacular. This will be sourced from locally grown timber via a local sawmill

Both caravans will also support lean to greenhouses, utilising the structures that already exist. Plans and elevations for both can be seen in Appendices 19 and 20.

An additional structure comprising three greenhouses, supporting three fruit cages, will also be built, again utilising the same walls for multiple purposes thereby minimising the materials required. Elevations can be seen on Appendix 21.

Greenhouses will be constructed from glass salvaged from second hand windows. We are currently working with a local glazing company, taking glass from windows they replace in the course of their work, reducing the cost and environmental impact of their disposal. However, we are aware that structures made from salvaged materials can look unsightly, so will be constructing the frame from locally sourced timber, thereby ensuring a uniform look.

Although care has been taken with the design of all the structures to ensure they blend in with the local landscape as far as possible, and are not unsightly, neither the dwelling, nor the ancillary structures are visible from the public road during the summer, and the planned evergreen screening will ensure this is also the case during the winter.

In terms of zero carbon in use, we fully intend all our activities to be minimal, if not zero carbon in nature, and this has been described in detail in the previous energy section.

Should the dwelling need to be removed as part of the exit strategy set out in section 9.2, this can be done with minimal environmental impact by decoupling and removing it from site for use as a house elsewhere. Alternatively, it could be stripped down on site and the materials sold (e.g. solar panels and roofing sheets); reused (e.g. doors and windows); recycled (e.g. metal fixings) or composted (e.g. cladding).

6. Community Impact Assessment

We have lived in Pontyates since April 2018 and are already active participants in the local community. Paul volunteers in the local library and Carolyn attends Welsh classes in the Welfare Hall. We use the local pub, laundry, garage and restaurant and intend to carry on doing so should our OPD application succeed as these will be our nearest facilities and will still be within walking distance.

We use the Pontyates farmers' market once a month and our weekly shop comes from 'Carmarthen Food' which sources from local growers and producers. Again, we intend to keep supporting these local producers in the future as we will still by buying things such as bread and dairy products which cannot be grown on site.

We are also members of Landworkers Alliance Cymru[1] and the Welsh Seed Hub, and Carolyn is the Treasurer for Parameathu Cymru[2], so we already have involvement with our local community of growers too.

In relation to our proposed development, we are friendly with our nearest neighbours: those at the travellers' site across the road, and at the adjacent house on Herbedeg Road, and all are supportive of our plans.

Once up and running, we will be supplying produce locally. This will benefit the community by offering tasty, healthy, fairly priced produce that has low food miles. This will not only help reduce the ecological footprints of other residents, but will help to champion locally grown food, encouraging them to try more local varieties and seek out other local producers. However we have been careful to pursue a strategy which is not in direct competition with existing local producers. For example, Pontyates Farmers Market does not currently sell any apple juice, cider, wine, mushrooms, asparagus or rhubarb.

Our nearest locally grown vegetable producer is Banc Organics, located a few miles away in Bancffosfelen. They run a CSA box scheme, and are also one of the suppliers to Carmarthen Food. An initial discussion with them found that they also source produce from other local suppliers and they would be interested in working with us to supply our organic cider.

We will also host regular open days, both to inform and educate in terms of the benefits of low impact living, for example by being one of the hosts on the One Planet Council's Annual Open Week; but also just to let people see what's going on in their local area. This will include a local 'apple day', where residents can come and use our pulper and press to juice their own apples.

Open days will also be held for other local producers, to enable ideas and knowledge to be shared. These are currently being organised by the Landworkers Alliance, so once up and running we will become part of this 'open days' network.

Our surplus electricity will be fed into the grid, thereby enabling those who draw energy from the local supply network to access a renewable supply.

Longer term we would like to explore options around firstly providing facilities for other growers to come and process seed, either for saving themselves or for sale generally, thereby helping to improve the sovereignty of the seed available in Wales; and secondly for providing land which could be used for local allotments, should there by such a demand. However, both these plans are

1 https://landworkersalliance.org.uk/

2 https://wales.permaculture.org.uk/

outside the scope of this 5 year management plan, so will not be explored in detail until a later date.

The negative impact of having people visit the site is the additional traffic that is likely to be caused. However our location will mitigate much of this as we are within walking distance of two villages, Carway and Pontyates, and the Carmarthen to Llanelli bus stops within a couple of hundred yards from our gate, making the site easy to get to without having to drive. These two options will be be encouraged when advertising events, as will lift sharing where visitors are part of a network such and the Landworkers Alliance and may be coming from slightly further afield.

The other negative impact would be a visual one, and this will be mitigated with the use of evergreen screening.

7. Transport Assessment and Travel Plan

7.1 Baseline

The site is well served by local bus services.

- The 197 Llanelli to Carmarthen, via Trimsaran and Carway bus runs along the B4317 and stops at the entrance to Herbedeg Road, approximately 100 yards from the entrance to the site.
- The 195 Llanelli to Carmarthen via Cynheidre and Pontyberem stops in Pontyates, less than a mile away.

In addition, the train stations of Kidwelly, Llanelli, and Pembrey and Burry Port are all an easy cycle ride away - approximately 6 miles.

As per the baseline for the site set out earlier in the Plan, the site currently generates roughly one return vehicle trip from our current residence in Pontyates and back each day, mileage of approximately 14 miles per week.

As per the baseline for travel spend set out earlier in the Plan, the majority of our current mileage relates to long distance travel for visiting parents. Regular short term mileage mainly relates to a weekly trip by car to Carmarthen on a Thursday evening to pick up an order from Carmarthen Food, plus ad-hoc trips around South-West Wales to visit friends as well as visiting other smallholdings, OPD sites, etc for educational purposes.

In addition, Carolyn travels to Devon once every couple of months for work. The cost of this is reimbursed by her employer, so has been excluded from our minimum income needs calculation.

7.2 Assessment and minimisation

OPD Guidance states that the Development should achieve a significant reduction in transport impacts from all activities on site in comparison to what would be the 'norm' for such activities. It is difficult to find information on what would be the 'norm' for such activities. The most recent data for Wales was published in 2013 and showed that in terms of personal travel, average number trips per week taken in this Country was 20 per week, with 70% of these being taken by car[1].

The following table identifies each transport generating element of the proposed development, evaluates its impact and sets out our plan to minimise the impact. This shows how, overall the Development will achieve the required reduction in comparison to the norm, particularly in relation to commuting.

Table 13 – Impact and minimisation of site traffic

Element	Impact Evaluation	Plan to ensure this is below the norm
Residents – Purchase of additional food needs and other goods	1 trip every week to Carmarthen by car to pick up fresh additional food needs from Carmarthen Food.	Growing a large quantity of food ourselves means that the requirement to purchase off site is reduced. Nevertheless, we will still make regular orders through Carmarthen Food, as we believe in supporting local producers. Although this will not significantly reduce the number of trips we make to Carmarthen, buying from local producers will reduce the transport impact of additional food we buy.

1 https://gov.wales/personal-travel-2012

Element	Impact Evaluation	Plan to ensure this is below the norm
Residents – Purchase of additional food needs and other goods	1 delivery every couple of months of other groceries (lentils, sugar, etc)	We will purchase infrequently and in bulk to minimise the number of trips made, and will use the bus for trips to Carmarthen or Llanelli where feasible (approx 20%). The site is located on a main road adjacent to another residence, so deliveries and post can be delivered without needing to detour from main routes.
	1 trip every couple of months by public transport or car to either Carmarthen or Llanelli to purchase second hand household items / clothes, should they be needed.	
	Estimated no. private trips by car each year = 55	
Residents – Visits to and from friends and family	3 trips per year to London to visit parents (no change from current practice).	We will use public transport or car share for making visits where feasible (approx 20%), and encourage friends and family to do the same when visiting us (assume 10%).
	1 trip every month to visit friends.	
	1 trip every month for friends and family to visit us.	
	Estimated no. private trips by car each year = 24	
Residents - Commuting	The current need to travel to and from site each day will cease, resulting in a reduction of annual miles travelled of approximately 600 (taking into account days when we do not travel to the site).	
	Although Carolyn's part time work, and hence the requirement to travel to Devon will continue into the initial 5 year period. It is anticipated that after the site is up and running, the need for external work, and hence to commute, will reduce, resulting in a reduction of annual miles travelled of approximately 2,000.	
	Estimated no. private trips by car each year = 0	
Residents – Other travel	1 trip every month to undertake an educational / volunteer visit to another smallholding / OPD site.	We will use public transport or car share for making visits where feasible (approx 20%).
	2 trips per week for other purposes, e.g. accessing services such as the doctors' surgery, volunteering at the library and attending Welsh classes.	The site is sufficiently close to Pontyates to enable us to still access local services on foot.
	Estimated no. private trips by car each year = 10	
Business - Sales	It is likely that 1-2 round trips by car per week will be required to deliver produce to retail outlets (Carmarthen Food, Hwb Bwyd Twyi, Banc Organics)	Selling to outlets where other products are already sold rather than individual customers minimises the need for numerous trips to be made. Selected outlets are all within 20 miles of the site, minimising the number of miles travelled. Trips can be combined, e.g. delivering produce to Carmarthen Food will be done at the same time as picking up our personal food order. Much of our produce can be sent to the retail outlet by post, i.e. seeds. Our local post office is in walking distance.
	1 trip per month to Pontyates Farmers' Market.	
	Estimated no. private trips by car each year = 78	

Element	Impact Evaluation	Plan to ensure this is below the norm
Business - Deliveries	1 delivery every couple of months.	Orders will be placed infrequently and in bulk to minimise the number of trips made. We have ensured there is adequate storage when designing the site to accommodate large orders of bottles, pots, ingredients, etc. Currently, such deliveries are made to our residence in Pontyates, as the proposed OPD site does not have an address, and an additional trip is then required to transport them to site. This additional trip will not be required once we are resident on site.
		Estimated no. trips by private vehicle each year = 6
Business – Other transport	1 visit per year by a contractor for fields to be mown and baled.	The contractor we use is local, thereby minimising the distance travelled to get to us.
		Estimated no. trips by private vehicle each year = 1
Visitors – Volunteers	1 visit per month via WWOOF or Workaway.	Volunteers will be encouraged to use public transport, and we will offer a pick up service from the nearby train stations to enable this (assume 50%). Bicycles will be available for volunteers to use during their stay. We don't feel that our OPD itself will generate additional travel in this area, as volunteers would simply travel to another similar site if ours did not exist.
	2 visits per year (8 people per visit) from local volunteers through Paramaethu Sir Gar, our local Permaculture Group.	The use of public transport will be encouraged and lift shares organised (assume 50%).
		Estimated no. private trips by car each year = 96
Visitors – Open days	3 per year with a total of between 10 and 20 visitors per event.	The use of public transport will be encouraged and lift shares organised (assume 50%). Parking limitations will be made clear so where events are attended by members of the immediate community, e.g. apple day, walking to site will be encouraged (assume 20%). Should apple day become popular, we will liaise with Pontyates Farmers' Market with a view to holding it there, where parking is more extensive and people may well be making the trip anyway for the market.
		Estimated no. private trips by car each year = 31
		Total estimated no. trips made by private vehicle each year = 683. This includes those of residents, the business and visitors.

7.3 Strategy

Our overall travel strategy is three-fold, firstly to minimise the need to travel, secondly to reduce the number of miles travelled when it is needed, and thirdly to favour low carbon modes of transport.

The first is primarily achieved by the nature of the development itself as residents will eventually work full time on site, thereby eliminating the need to commute. This in itself reduces the number of trips by 240 (5 trips each week for 48 working weeks).
In addition, combining trips allows the number to be reduced as does selling and delivering produce

to an intermediary, rather than to individual customers.
Where groups of people will be visiting the site, car shares will be organised.

In order to reduce the number of miles travelled, our focus is on ensuring our business is as locally focussed as possible, minimising both the distance travelled to our retail outlets, but also selecting outlets whose focus is selling to the local community, rather than more further afield.

Reducing both the number and the distance of journeys travelled is not only key to the environmental sustainability of the business, but also its financial sustainability, due to the ever increasing cost of fuel. Although not a low carbon form of transport per se, we currently own a Smart car, which gives excellent miles to the gallon due to not having rear seats, and this will be used for the majority of our private car use.

In terms of favouring low carbon forms of transport, we will use public transport where feasible, and will encourage visitors to do the same. This will be done by making clear on any advertising that reducing high carbon forms of transport is integral to our Development, and that volunteers who choose this option will be given priority over those who do not.

8. Ecological Footprint Analysis

As per the OPD guidance, An Ecological Footprint Analysis (EFA) is a 'snapshot' indicator which demonstrates the human demand on the finite biological resources of our planet, expressed as the per person area of land individuals or populations require to resource their way of life.

At the time the guidance was produced, the current Welsh average was over 5 global hectares (gha) per capita. For a successful OPD, this should be below 1.88 global hectares.

Appendix 22 shows the EFA both pre application, for the Development on first habitation, and at year 5. A summary, and explanation of the main changes at each stage is as follows:

Table 14 – Explanation of a reduced ecological footprint

Year	Footprint	Comment
Pre application	3.06 gha	The majority of figures are based on current spend, i.e. utility bills and expenditure records relating to the previous year. Nearly 39% of this relates to consumption of fruit and vegetables, with the next highest contributor being petrol / diesel use at 10%.
Year 1 – First habitation	2.27 gha	There is a reduction in electricity consumption and an increase in the use of biomass as a result of wood now being the primary fuel for cooking. Mortgage costs and the cost of current water supply are eliminated as the OPD becomes our sole residence. Capital costs relating to the grid connection, installation of domestic water infrastructure and construction of the dwelling (estimated at approx. £60k in total) are spread over the subsequent 30 years. Fruit and vegetable costs are reduced as the size of the productive areas of our plot increase and we start to grow our own food.
Year 5	1.38 gha	The amount of biomass used increases as food processing facilities are installed and used. Mileage and related fuel consumption is reduced as the work commute is no longer required. Food costs decrease further as productive plot size increases, as do seed costs as we are able to save seed from previous harvests.

This clearly demonstrates we will be able to meet the requirement of 1.88 gha per capita by year 5.

Although the EFA only applies to our domestic and subsistence activities, it is difficult to separate these from activities relating to the on site business due to the integrated nature of the two. With clear record keeping, over time this will become easier and more accurate. Currently, where there is uncertainty, amounts have been included in the EFA to ensure out footprint has been over, rather than under estimated.

Although specifically excluded from the EFA, the development will have a positive impact on other peoples' footprints by supplying low input foods to the local community. It will also contribute to the Welsh Seed Sovereignty Programme, enabling more of the seed sold in Wales to be grown in Wales. In addition, being grid connected for electricity allows surplus renewable energy generated on site to be exported to the grid and be used by others.

In terms of negative impacts, these mainly result from the additional travel from visitors. The Travel Plan at table 13 sets out how this impact will be minimised and it is hoped that many of our visitors will be inspired and encouraged to reduce their own impact on the planet as a direct result of visiting our Development.

There may also be other negative impacts as a result of the on-site business: purchase of ingredients, installation of facilities, energy used in processing, travel to suppliers, etc. This is likely to be the same for anyone starting up a business, the difference being that every aspect of what we will be doing will be undertaken with the least amount of ecological impact as is feasible, for example:

- Ingredients will be grown by ourselves if possible, and if not, organically and sustainably produced, and purchased from local growers and suppliers.
- Facilities will be housed in structures already on site, minimising the amount of construction materials used.
- Energy used will be from renewable sources, mainly from wood grown on site, with electricity generated from the sun.
- Water used will be from harvested rainwater.
- We will only sell to local suppliers and combine trips to suppliers where possible.

9. Phasing, Monitoring and Exit Strategy

9.1 Phasing and monitoring

Appendix 13 shows the timescale for site development. We have not listed activities that will take place annually once the site is up and running, such as mowing and baling hay, and processing wood.

Monitoring will be submitted in line with the OPD Guidance. This is also shown in the timeline in Appendix 13. Year 2 of our Management Plan will be the year we complete construction of our dwelling, so for monitoring purposes, this is deemed to be the year of first habitation.

The annual monitoring report will indicate progress against the targets set out in the OPD guidance relating to land based activities, land management, energy and water, waste, zero carbon buildings, community impact and travel. A template has been produced by the One Planet Council, ensuring all essential and contributory criteria, as set out in the OPD Guidance, are covered, and a copy of this is included at Appendix 23.

It will also identify any emerging problems (see exit strategy below) and measures to remedy them; and provide clear evidence that the residential use continues to be clearly linked to the management of the land.

9.2 Exit Strategy

Should there be a failure to achieve one or more of the essential characteristics of One Planet Development in the open countryside over a period of two years without instituting clear measures to address the identified problems, our exit strategy will need to be invoked.

This will mainly comprise removal of the residential dwelling, as described in section 5.2. Other structures that are already agricultural in nature could be used by other people wishing to set up a land based enterprise growing local produce without living on site. Structures that are not already agricultural in use (workshop, food processing facilities and visitor accommodation) will be made so by removing the facilities contained within, thus returning them to useful agricultural storage as they are now.

The land itself will be left in a better, and more productive condition then it is now as there will be additional plantings, an orchard, pond area, managed wildlife habitat, raised bed growing areas and forest garden, all contributing to the richer more fertile soil and increased biodiversity of the site.

It is hoped, however that the exit strategy will not be needed, and deviations from the Management Plan will be monitored closely and prompt corrective action taken. Monitoring will be in the form of yellow and red cards, with yellow cards being defined as follows:

- Failure to increase the amount of basic food needs grown / reared on site towards targets set out in the Management Plan
- Failure to increase the amount of income derived from on site enterprises towards targets set out in the Management Plan
- Reduction in overall biodiversity against the baseline identified in the Management Plan
- Failure to produce from renewable sources and feed in more electricity than is used from the grid.
- Failure to implement the Travel Plan in relation to the on site business and visitors.
- Failure to reduce our ecological footprint towards targets set out in the EFA.

A red card is considered to be:

- three or more yellow cards at one time
- failure to take appropriate action in relation to any yellow card before the next monitoring report.
- Failure to meet the ecological footprint target set out within the OPD guidance by year 5.
- Failure to meet the essential monitoring criteria set out within the OPD guidance by year 5.

Should a yellow or red card be identified, details will be set out in the annual monitoring report, together with a plan for prompt and appropriate remedial action.

Should there be two consecutive red cards for the same issue, this will constitute a failure to achieve one or more of the essential characteristics of One Planet Development, and the exit strategy will be invoked.