

Planning application

October 2014



Beehives at Rhiw Las, May 2014

One Planet Development consisting of 4 dwellings
Rhiw Las, Abbey Road, Whitland, Carmarthenshire SA34 0LH

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1 Introduction

1.1 About this document and the supporting information

This document contains the information needed to assess our application against the One Planet Development requirements, which are set out in Technical Advice Note 6 (henceforth TAN6) sections 4.15-4.23, and the accompanying One Planet Development Practice Guidance. We have structured this document to use the same section headings as the Practice Guidance, for ease of reference. Further information is provided in supporting documents which have been submitted separately and are listed here:

- A. Site maps and plans
 - A1. Site location plan (1:2500 at A4)
 - A2. Block plan (1:2500 at A4)
 - A3. Landscape design, plots 1 and 2 (1:1000 at A3)
 - A4. Landscape design, plots 3 and 4 (1:1000 at A3)
 - A5. Photomontage showing view from public road
- B. Supporting information for Business and Improvement Plan
 - B1. Detailed business plans
 - B2. Letters of Support and case studies
 - B3. Minimum Needs calculations
 - B4. Phase I Survey report from Biodiversity Solutions
 - B5. Detailed energy requirements
- C. Supporting information for Ecological Footprint Analysis
 - C1. Detailed EFA spreadsheets for all plots
- D. Plans, elevations and information about the proposed buildings
 - D1. Plot 1 buildings (1:100 at A4)
 - D2. Plot 2 buildings (1:100 at A4)
 - D3. Plot 3 buildings (1:100 at A4)
 - D4. Plot 4 buildings (1:100 at A4)
 - D5. Zero Carbon Buildings
- E. Supporting information about travel and transport
 - E1. Design and Access Statement (DAS)
- F. Supporting information about monitoring
 - F1. Template monitoring form
- G. Information from LANDMAP
 - G1. Cultural
 - G2. Geological
 - G3. Habitats
 - G4. Historical
 - G5. Visual and Sensory

1.2 About the applicants

We are a group of four households who want to live more sustainably. The One Planet Development policy offers us a chance to do just that; to “meet our own needs without compromising the ability of future generations to meet their needs”. The four plots will be independent of each other and able to meet all of the OPD requirements in full individually, but there are, of course, many opportunities to share resources and take advantage of economies of scale.

Plot 1: Chris Vernon, Erica Thompson

Plot 2: Silvia Michielon, Wycliffe Tippins, and one child

Plot 3: Stef Balesi, Peni Ediker, and one child

Plot 4: Sarah Grounds, Paul Jennings, and three children

We have formed a private company to manage the common resources: trackways, parking areas, a small amount of common land, and a large agricultural barn. Rhiw Las Limited (company number 08686077), of which all adult residents are Directors and equal shareholders, will be converted into a Cooperative Industrial and Provident Society upon gaining planning permission, to safeguard the common assets and ensure a co-operative membership structure for the future of the development.

2 Management Plan overview

2.1 Summary

The aim of the Management Plan presented here is to ensure that the development at Rhiw Las meets all of the objectives of One Planet Development within 5 years and is able to document and demonstrate this achievement.

To do this, we have first assessed all baseline characteristics of the site, showing the suitability of the site and location for this development, and identifying features that we wish to conserve and enhance. Next we have described the Design Strategy, which sets out the guiding principles and objectives of the development.

A key objective of One Planet Development is that Minimum Needs shall be met from the land: we have assessed our Minimum Needs in line with the OPD Practice Guidance, giving a clear baseline income requirement for each plot, against which the success of the businesses can be measured. We have used Local Government Association figures, along with past experience of cropping at the site, to demonstrate that it will be possible to reach the subsistence target of growing at least 35% of our own food on site. In fact, we expect to exceed this easily; nevertheless, note that we have conservatively budgeted in our Minimum Needs for 30% of food to be bought using land-based income. Thus, at the 5-year review we hope to demonstrate that our Minimum Needs are lower than this conservative estimate.

Each household has prepared a Business Plan for a land-based business which generates income from produce grown or raised on site. These businesses are based on our own existing skills and experience. In preparing these plans, we have taken business advice from a consultant, who has written us a Letter of Support. Plot 1 residents are beekeepers and currently manage ten beehives. They plan to increase their stock to 27 hives over five years, selling honey, beeswax, and bee colonies locally, and to plant an orchard providing nectar for bees and orchard produce for sale. Plot 2 residents have been making artisan cheese and natural remedies for several years, for their own use and as gifts, but are limited by the need to buy in most of the ingredients. They propose to scale up production of cheese by grazing Jersey cows on site, and to grow their own herbal ingredients for natural remedies. Plot 3 residents are professional musicians and forest workers. They both currently work in woodland activities, with expertise in coppicing, woodland management, and forest education. They plan to make use of the woodland on site to produce affordable musical instruments for beginners, in particular Celtic Harps which are a traditional instrument of Wales, and to run Forest School days for small groups. Plot 4 residents have worked in organic growing for over twenty years, and have huge experience both in growing and marketing organic produce in rural areas. They propose to set up a Community Supported Agriculture (CSA) business on site, supplying the local area with regular vegetable boxes by subscription. They have already begun growing on site, and have received a £3000 grant from UnLtd, an organisation which supports enterprises with community benefits.

Sustainable land management is the next key to One Planet Development. Guided by a Biodiversity report obtained from an ecological consultancy, we have set out our vision for the enhancement of the existing habitats and biodiversity along with sustainable productivity of the businesses, showing how the development of the site is of benefit to human and non-human inhabitants as well as the wider countryside.

To demonstrate that we can meet our energy (heating and electricity), water and waste-assimilation requirements on site, we have detailed our use of renewable energy, rainwater harvesting and treatment, and composting and grey-water systems. These use standard technologies such as solar photovoltaic panels and reed beds, so we are able to present numbers based on reliable numerical capacity estimates in the literature.

The foundational goal of One Planet Development is the achievement of a truly One Planet Ecological Footprint. We have monitored our current spending for years and are therefore able to provide accurate current estimates as well as projections of how our Ecological Footprints will decrease when we live on site. For each plot, we have provided both the spreadsheet and a brief explanation of the results and main contributions.

We are proposing to build four modest dwelling houses on site, which will be Zero Carbon buildings in construction and use, and made of local natural materials such as timber, straw, turf and slate. We have taken advice from architects, and used the example set by existing One Planet homes in Wales and beyond, to design four

homes which meet the functional requirements of the residents, satisfy the One Planet design criteria, and are also truly embedded into the landscape at Rhiw Las. The four dwellings are the only structures on site subject to Building Regulations, and have been designed with compliance in mind from the start. An existing agricultural barn on site mitigates some of the need for additional storage buildings on each plot, and is owned and managed by our joint company, Rhiw Las Limited.

We have thoroughly assessed all community impacts. We have identified many ways in which the development at Rhiw Las will be of benefit to the surrounding communities in Llanboidy, Whitland and beyond, and have set out ways in which we will mitigate any negative impacts. Positive community impacts include the provision of healthy local produce, support for the local rural economy, provision of public food processing facilities, promotion of low-carbon transport methods, education and information-sharing, scientific research and documentation, conservation of local biodiversity including pollinator populations, and preservation of the ancient traditional music of Wales.

We have provided a Transport Assessment and Travel Plan detailing how we will seek to minimise traffic impacts on Abbey Road by sharing and combining trips, using bicycles and public transport, and providing incentives for visitors not to arrive by car.

The Design and Access Statement has been prepared in line with the guidance provided by Carmarthenshire Council. It covers environmental sustainability, accessibility, character, community safety, and movement to/from/within the development.

We have set out a detailed timeline of development showing how we will approach the many tasks to be completed in the five years of the set-up phase. We will produce annual monitoring reports to track progress and identify any areas of weakness early on, so that they can be improved. We have provided a template monitoring report covering all of the essential criteria laid out in the OPD Practice Guidance. In the event of failure to achieve the goals, we have described an Exit Strategy to return the land to a solely agricultural use, with equal or improved condition.

We believe that we have provided all the information required by the One Planet Development policy, following our productive conversation at the pre-planning stage. We look forward to continuing to work with Carmarthenshire Council to demonstrate and put into practice the social, economic, and environmental benefits of One Planet Development at Rhiw Las.

2.2 Baseline

Location, area and boundaries

Rhiw Las is located at OS grid reference SN214208 (postcode SA34 0LH), one mile to the south of Llanboidy and three miles to the north of Whitland, in Carmarthenshire. It is adjacent to the county road (Abbey Road).

Rhiw Las is a site of 21.5 acres in total, of which approximately 14 acres are currently pasture and the remainder woodland/scrub. The northern boundary with Pant-y-Groes is defined by an old field boundary (with recent fence) just to the north of a small stream. The eastern boundary is defined by a hedge adjacent to the county road. The southern boundary is defined by a hedge along the trackway and an old hedge boundary (with recent fence) within the woodland. The western boundary is defined by a stream, Nant Colomendy.

Context / adjacent land uses

Pant-y-Groes to the north is a family smallholding.

Baily Mawr at the north-east corner is a residential dwelling house.

To the east and south, the land is bordered by working dairy farms.

To the west, there is an area of steep deciduous woodland.

There are 27 other postal addresses on Abbey Road, including Ivydene Garden Centre, the Roadhouse Cafe, and the old Whitland Abbey.

We note that there is an application in progress (Carmarthenshire: W/29409) for the construction of a single 70m, 500kW wind turbine directly across the valley at Blaencediw, approximately 500m from the proposed dwellings.

Tenure (owner occupier / leasing arrangements)

Until 2013 Rhiw Las was a single site occupied by the previous owners, who ran a smallholding business producing organic meat products. In 2013 the site was split into four freehold plots of approximately five acres each, plus one smaller plot consisting of the barn and trackways. The four five-acre plots are now owned by four households independently, and the fifth plot is held by Rhiw Las Limited. This management company has been set up for the purpose of holding and maintaining common facilities for the group of dwellings, and to make the planning application.

Existing on-site services and access

The site has a mains water connection but no electricity or telephone, although an electricity line passes through the top pastures. There is a single access point from the county road (Abbey Road) on the eastern boundary. This has been recently moved and widened by the previous owners, who have also laid a trackway from the entrance to the barn and descending below the barn for access to the lower slopes. Pedestrian access is along the same trackways.

Physical: Geology, topography and soils (including agricultural land classification).

The underlying geology of the site is:

“Tetragraptus Beds - Mudstone. Sedimentary Bedrock formed approximately 470 to 485 million years ago in the Ordovician Period. Local environment previously

dominated by deep seas. These rocks were formed in deep seas from infrequent slurries of shallow water sediments which were then redeposited as graded beds." (British Geological Survey: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>) The agricultural land classification according to DEFRA¹ is Grade 3-4 and the soil type identified by Landis² is "Freely draining acid loamy soils over rock". Although there is a pronounced slope to most of the site, previous uses have included cereal growing both on large (the whole field) and small scales. This gives us high confidence that the site is suitable for the agricultural and horticultural uses we propose. The soil depth is greatest on the flat ground in the middle of the site.

Biodiversity: Broad habitats present and records of important flora and fauna

LANDMAP habitat evaluation³ indicates that the land is included in the Gronw-Fenni Valleys, classified 'mosaic' and estimated to be of high value. This habitat consists primarily of semi-natural broadleaved woodland (45%) and improved grassland (29%). Lowland Mixed Deciduous Woodland is identified by LANDMAP as a Biodiversity Action Plan priority habitat. Management recommendations below refer to the Carmarthenshire Local Biodiversity Action Plan⁴. Habitats identified for encouragement include Hedgerows, Arable field margins, Traditional orchards, Ponds. The vision is for Carmarthenshire to "maintain, restore, and extend these habitats".

A Biodiversity report has been prepared by Matt Sutton of Biodiversity Solutions, an ecological consultancy based in Haverfordwest. It is provided separately as document B4. The only significant habitat on site is a small area of semi-improved grassland. We intend to increase the area of semi- and un-improved grassland by following the recommended management practices⁵. The report also identifies the presence of some priority species such as badgers and (possibly) otters, and provides recommendations for their conservation. The report concludes that "*a sensitive 'one planet' development with care for the existing habitats and species, and a desire to create opportunities for new ones, would be a positive step for this somewhat degraded agricultural land.*"

Cultural Heritage: Any known sites of cultural importance including below ground archaeological sites, earthworks and ruins, and living history, such as hedgerows marking important historic boundaries on the site and in the immediate vicinity.

LANDMAP shows that the site is part of the Trelech Historic Landscape, which is a "very large area of hamlets and dispersed farms, including some large holdings, in a landscape of irregular fields [...] Woodland on the steep, deeply incised valley sides is characteristic".

There are no known sites of cultural importance at this location. Maps from around 1890 show the field divided into three smaller fields as was common before the

¹<https://uwe.maps.arcgis.com/apps/StorytellingTextLegend/index.html?appid=f33513363f6c4cfd96e683df79f34a02>

²<https://www.landis.org.uk/soilscapes/>

³<http://test.landmap.ccw.gov.uk/Map2.aspx?GridRef=SN214208>

⁴<http://www.carmarthenshirebiodiversity.co.uk/>

⁵<http://www.carmarthenshirebiodiversity.co.uk/attachments/article/53/neutgrass.pdf>

advent of highly mechanised agriculture. We plan to reintroduce many hedgerows to recreate this historic pattern of land use, but there does not appear to be a particular significance to the exact locations.

There is a Scheduled Ancient Monument across the road in the grounds of Lan Farm. This is a Medieval Enclosure. As it is over the ridge of the hill from Rhiw Las (the road between Rhiw Las and Lan Farm runs approximately along the top of the ridge), it would not be affected in any way.

Existing buildings and structures on the site, their rough date (if known), and their main construction materials.

The following buildings are present on site:

1. Agricultural barn, 45' x 75', erected in 2008 by previous owner (details available in Carmarthenshire planning application W/17835: permission granted). The barn has a timber frame and metal roof, and is set into the slope of the land.
2. Polytunnel, dimensions, erected in 2008 by previous owner (details available in Carmarthenshire planning application W/19064: permitted development). The polytunnel has a metal frame and polythene (plastic) covering.
3. Cattle crush, two large pig sheds, five pig arks, two chicken runs, one tool shed. All constructed in metal and/or wood by the previous owner within the last seven years.

Landscape: Landscape features on the site and in the immediate vicinity (such as hedgerows, scrub, woodland and shelter belts), and of key views into the site from public vantage points (roads, lanes and public rights of way).

The main landscape features on site are:

- Deciduous woodland in the two valleys on the north and south edges of the site;
- Stream (Nant Colomendy) at the western boundary in the base of the main valley;
- Scrub areas above the stream;
- Boundary hedgerows to the east and south;
- Willow shelter belt in central field, planted by previous owners
- Willow screening around barn, planted by previous owners.

Some of the woodland at Rhiw Las is part of the Ancient Woodlands Inventory⁶. This is classed as "Restored Ancient Woodland (category 2)", although it contains a large proportion of non-native sycamore. The woodland listed in this inventory is the steepest north-facing slopes of Plot 4's woodland (just below the Baily Mawr dwelling), and the area of large trees around the valley on the south edge of the site (belonging to Plots 1 and 2).

⁶ http://data.gov.uk/data/map-preview?url=http%3A%2F%2Finspire.wales.gov.uk%2Fmaps%2FProtected_sites%2Fwms%3Frequest%3DgetCapabilities&url=http%3A%2F%2Finspire.wales.gov.uk%2Fmaps%2FProtected_sites%2Fwms%3Fservice%3DWMs%26request%3DgetCapabilities%26version%3D1.3&n=53.713851677385684&w=-5.981692120396881&e=-2.459718541132296&s=51.11917335285617

There is no view into the site from any point along Abbey Road, due to the large hedgerow at the boundary and the screening around the entrance. A picture showing the view from inside the entrance is provided separately as document A5. There is a public right of way through the woods on the other side of the valley, although this is rarely used.

Past and present land use.

Before 2007 the site was part of a larger farm holding and was used for grass and cereal crops⁷. From 2007-2012 the land was used as a smallholding by the previous owners, who erected the large timber barn, lived on site in a static caravan and produced high quality organic meat (beef and pork) for a local market. Approximately 20 cows were kept on the upper pastures in rotation with cereal fodder. Approximately 12 pigs were kept on the lower slopes. A small area around the polytunnel was used as a garden, and has been planted with vegetables, soft fruit, and some small trees.

At present only the area around the polytunnel and three ¼ acre fields in the north-east corner are in regular use for growing. In addition, an area of fruit tree rootstock has been planted and grafted, with the intention of transplanting these to the upper field as a Traditional Orchard upon gaining planning permission.

Statutory Designations on the site and in the immediate vicinity:

There are no statutory designations on site or in the immediate vicinity.

The nearest SSSI is Pont-y-Fenni Quarry and Road Cutting, between Whitland and St Clears.

The nearest SAC and SPA is Carmarthen Bay.

The nearest Conservation Area is in Llanboidy, about 1 mile to the north.

Existing transport generated by the site and its transport connections.

Until 2012 the previous owners lived on site in a caravan, generating the usual transport requirements of a rural dwelling house.

From 2013 to present, the site has generated around two journeys per day as Paul Jennings (plot holder, Plot 4) has been growing vegetables in the polytunnel, requiring daily attention. In addition, journeys associated with land management, plot division, and the planning application have also been generated.

⁷ See previous satellite images on Bing Maps and Google Earth.

2.3 Design/strategy

The site and plots have been designed according to the following principles:

- Maximising the productive use of the site, within ecological limits
- Minimising “waste” by designing systems which use one by-product (eg manure) as another input (eg fertiliser).
- Embedded in the local community
- Embedded in the landscape
- Providing diverse habitats for indigenous flora and fauna
- Labour-intensive, not fossil-fuel-intensive
- Having positive social, economic and environmental benefits

The overall distribution of land uses and activities on the site and how they link and interrelate.

See the Landscape Design (provided separately as documents A3 and A4) for details.

The land uses on site will include:

- 4 dwelling houses;
- Existing woodland brought into management for firewood, biodiversity, and a low volume of timber;
- A total of over 3 acres additional coppice woodland;
- Horticulture areas managed for organic fruit and vegetable production for on-site consumption;
- Within these horticulture areas, polytunnels/greenhouses for season extension and care of tender crops and winter salads;
- Over 3 acres of traditional orchard (plots 1 and 3);
- Apiary sites for approximately 30 bee hives;
- 2 acres of grazing meadow for three cows, managed on a strip-grazing rotation (plot 2);
- 2 acres of mixed organic horticulture (salads, vegetables and fruit) (plot 4).

These activities are closely inter-related. The design of each plot is set out according to the Permaculture Design strategy, which optimises both productive capacity and biodiversity, so that all elements of the design perform multiple functions in the site ecosystem. Human input is at the centre of the Permaculture Design strategy and as such the areas closest to the dwelling houses are the most intensively farmed, with progressively lower-maintenance areas further away.

Specific linkages include:

- Use of livestock and human manure to produce compost and replenish soil fertility, eliminating any need for fossil fuel-derived fertilisers.
- Joint ownership and use of the existing agricultural building, which will serve a variety of purposes including workshop, storage space, shelter, and potentially in the longer term could be re-fitted for additional specific uses.
- Within-site barter between plots for specific produce, such as Plot 2 producing milk for the other households.
- Wax from the bee hives will be used in production of natural remedies.
- Hedgerows between the plots will benefit both plot holders (production of fruit and nuts) and local biodiversity.

The number of households that will be accommodated, the ability of the site to sustain them, and the need for them to work the land or otherwise contribute to the running of the site.

4 households will be accommodated on site. We have produced designs and business plans that indicate that each household will be able to provide for its own basic needs (including dependant children) with the 5 acre plots that have been allocated. Hours of labour required will vary over time but are equivalent to more than one fulltime job per household. As set out in the business plans, each plot has at least two businesses with the exception of Plot 4 who will run a larger-scale Community Supported Agriculture scheme.

The mechanisms for the overall management of the site – both activities and the responsibility of residents for these.

Management of the common facilities (barn, trackways, etc) will be managed via the management company Rhiw Las Limited, which we have set up in order to hold these assets jointly. All adult residents are Directors and equal shareholders of the company. A service charge is levied by the company upon members for use of the common facilities. Upon gaining planning permission, Rhiw Las Limited will be converted to a Co-operative Industrial and Provident Society (IPS) in order to safeguard the common assets and ensure that they remain managed by the community of households. All plots will continue to be required to be members and shareholders, and to participate in the decision-making process and contribute to the upkeep of the common areas.

The mechanism by which the occupiers have an interest in the land where the development involves members of more than one family.

All plotholders own the freehold of their own marked plots. In addition, all plotholders own a share of Rhiw Las Limited, the management company which owns the barn and trackways.

The outline programme for the development of the site

2014: General maintenance of site; consultation with neighbours and potential customers; planting trees and perennial crops; preparation and submission of planning application.

2015: Earthworks and landscaping; most residents move onto site in temporary accommodation; foundations and drainage laid in winter for construction to begin in summer; completion of Annual Monitoring Form.

2016: Structural completion of most dwellings (roofs on and buildings watertight); growing areas are expanded; completion of Annual Monitoring Form.

2017: Food production expanding at a greater rate; half-way to the full subsistence requirement; small livestock introduced; re-assessment of biodiversity and Management Plans; success of the businesses will be monitored; first harvest from the short rotation coppice; completion of Annual Monitoring Form.

2018: Continued expansion of food growing - some plots will have achieved the subsistence requirement already; businesses making improvements in areas of weakness and reacting to opportunities that arise; completion of Annual Monitoring Form.

2019: All dwellings and ancillary buildings complete and screening banks well-established, so that the buildings are embedded into the landscape; food production on site contributes at least 35% of residents' food needs (probably a great deal more); land-based businesses generate income to cover all of the identified Minimum Needs; production of 5-year Monitoring Report.

2020 onwards: Monitoring will continue to ensure that residents meet the requirements of One Planet Development, living a productive land-based lifestyle with a very low Ecological Footprint and contributing to the local rural economy and community in Llanboidy, Whitland and Carmarthenshire. A revised Management Plan will be produced every 5 years, to ensure the ongoing development of the site in line with the goals of One Planet Development, and to share the knowledge and experience generated at Rhiw Las with other such sites across Wales.

Construction methods

The environmental impact of construction will be minimised in the following ways:

- No heavy machinery would be on site during wet periods when the soil is waterlogged, and in general the use of heavy machinery would be avoided except for initial landscaping work.
- Most of the construction on site will be done by hand, with the use of manual labour, hand tools, and small power tools rather than large machinery. This will minimise both noise and carbon dioxide emissions.
- Residents will live on site in temporary accommodation during construction work, reducing the need for additional vehicle journeys associated with commuting to the site during this period.
- Seasonal work allows for flexibility to accommodate landscape sensitivity, for example, to avoid trampling of soils in wet periods.
- Use of locally-sourced natural materials as required by the OPD policy.
- Bulk orders of small items (nails, etc) will be co-ordinated between the 4 plots to reduce costs, which will also reduce traffic impact associated with deliveries.

3 Business and Improvement Plan

3.1 Land-based activity

3.1.1 Minimum Needs

Table 1 shows our calculation of the minimum needs of each household, using the five categories as set out in TAN6 and the OPD Practice Guidance. These calculations are described in more detail in the separate document B3.

	Plot 1 (2)	Plot 2 (2+1)	Plot 3 (2+1)	Plot 4 (2+3)	Total
Additional food	792.00	921.00	1242.00	1560.00	4,515.00
Clothing	561.67	499.18	750.00	600.00	2,411.85
IT/ communications	360.00	331.00	650.00	420.00	1,761.00
Travel	1360.00	694.00	1720.00	1820.00	5,594.00
Council Tax	841.81	841.81	841.81	841.81	3,367.24
Total	£3,915.48	£3,286.99	£5,203.81	£5,241.81	£17,648.09

Table 1: Projected (year 5) minimum annual income needs of each household at Rhiw Las.

Additional food is calculated based on 30% of total food needs; detail provided in supporting document B3. This is a high estimate and in practice it is likely that the site will generate much more than the required 35% of food needs by year 5, so this is a very conservative figure.

Clothing and IT/communications are based on current household spend.

Travel is based on detailed projections given in supporting document B3.

Council Tax is based on 2014 Carmarthenshire figures for Llanboidy, Band A.

The final row shows the amount of land-based income required to be produced by each household.

3.1.2 Subsistence

As presented in our Minimum Needs assessment (provided separately as document B3), fruit and vegetables represent nearly half of the current food spend of residents. Therefore **self-sufficiency in fruit and veg alone would suffice to meet the requirements of the policy** (with some other food bought using land-based income to make up the 65% target). However, we plan to go a great deal further than this by also producing dairy products, eggs, poultry, honey, a small amount of meat and fish, experimental cereal production, and foraging wild foods on site. Once growing space is up and running and livestock are on site, we expect easily to exceed the minimum target of 35% grown/raised on site and 30% from land-based income. This is possible because residents are already experienced in

self-sufficiency and have considerable expertise in growing. Paul Jennings (Plot 4) has worked in organic horticulture for many years and the Community Supported Agriculture scheme of course aspires to produce the vegetable requirements for many additional families off site as well as for Plot 4 residents.

Soil Improvement & Fertility

Subsistence at Rhiw Las will grow from “soil first” gardening, that is to say soil management which builds soil fertility and resilience. This will be achieved through a combination of techniques:

1. Addition of organic matter from composted animal manure;
2. The use of green manures both in rotation with and alongside vegetable crops;
3. The inclusion of livestock in vegetable and cereal rotations;
4. The use of fertility building leys and permanent agroforestry polycultures.
5. Reincorporation of crop residues in situ, providing protection for the soil.
6. The use of woodland resources as soil improvers: wood chips; rotten wood in “hugelkultur” beds & the possible employment of biochar.

Fertility will be drawn for home gardens from an area at least equal in size to those gardens. Over time this balance may shift as in-garden green manures and livestock rotation bring about a long term increase in garden “self-fertility”.

Whilst tillage and even light machinery might be used in the early stages of subsistence development, in the medium term the home gardens of Rhiw Las will move towards no-dig or minimal dig systems. Under no-dig conditions “soil first” gardening creates a soil which becomes a long term carbon sink as well as high in fertility and biodiversity.

Vegetables & Herbs

It was once widely said, that all of the vegetable needs of a family of four in the UK could be met from a garden of 300 square yards or about 1/12th of an acre. This figure is supported by the Local Government Association’s recommendations for allotment sizing⁸, in which a full plot of 250 square metres is stated to “*enable full self-sufficiency in fruit and veg*”.

Growing in deep beds (double dug and never trodden on) is reckoned to quadruple the productivity of a piece of land so that an area of around 10 square metres should be able to produce 90-180kg/year of vegetables. The latest advice calls for an adult to eat 7 portions of fresh fruit and vegetables a day, or 700g; that is 255.5kg/year. Assuming that 182.5 kg of that will come from vegetables rather than fruit, it would take a little over two deep beds (conservative yield estimates) to provide for one adult’s annual needs. Even without the benefits of these deep beds, the area available to each plot is more than sufficient.

⁸ See [A Place to Grow](#), document produced by the Local Government Association, February 2010, page 7.

There will be a variety of home gardens at Rhiw Las, some with deep beds and some laid out in more traditional fashion perhaps, we can say though, that home gardens of between 40 square metres (most intensive for households of two adults) and 300 square metres should provide the vast majority of vegetables and herbs needed by the site dwellers. The area dedicated to vegetables by each plot is shown on the site overview drawing.

At Rhiw Las there will also be protected cropping areas (polytunnels, conservatories and greenhouses) as well traditional home gardens, ensuring a long cropping season with winter salads and heat loving summer crops.

Within 5 years Rhiw Las will be self-reliant in fresh vegetables and herbs; gardens will demonstrate a good range of organic techniques raising both the quality and quantity of yields and benefitting both the health of gardeners and local biodiversity.

As noted above, this in itself would be sufficient to meet the Minimum Needs requirements, but we plan to go beyond these requirements in the following ways:

Eggs & Dairy

Good laying hens will lay between 250-300 eggs a year each. Even with only 4 hens a family of 4 will have a surplus of fresh eggs. Using chickens in the garden and feeding them on green kitchen waste allows them to be kept without grain or bought-in feed. Free range hens in small flocks will forage for their protein and their diet can be supplemented with easily grown comfrey (up to 10% of a chicken's diet) which is high in micro-nutrients.

One of the business plans at Rhiw Las involves micro-dairying (plot 2), and this activity will supply all of the on-site dairy needs via barter of land-based produce.

Fruit & Nuts

Although top fruit and nut trees will be planted at Rhiw Las early on in the development of the project, in the nature of these crops yields will begin to be taken only at the very end of the first five years of the project. Plot 1 residents have already grafted a number of apple trees onto precocious rootstocks and expect to gain a useful yield by Year 5, which will continue to increase beyond that point.

Soft fruit will also be planted on all of the plots and it is reasonable to expect that in year two or three Rhiw Las will be self-reliant in all soft fruits and rhubarb.

Cereals

In practice, due to the low cost price of grains and grain products, it makes sense to buy rather than grow grain products (likely in bulk) and leave it as part of the 30% of food needs that are not provided directly from the site. This is recognised in the policy, which notes that Wales may not prove ideal for cereal growing. However, cereals have been grown at Rhiw Las in recent years both as a conventional large-scale arable crop and more recently by the previous owner to feed livestock. A family of four might provide for its flour needs from as little as $\frac{1}{4}$ of an acre of wheat; rye and oats on small plots may prove practical despite lower yields, and suffer less in wetter years than wheat.

Small scale cereal growing makes good use of land and combined with clover leys and reincorporation of some or all straw residue is a soil-building system. At least one of the plots at Rhiw Las has plans for experimental small-scale cereal growing.

Fish

Rearing edible fish in ponds has a long history in Britain and whilst the yields from fishponds stocked with carp are not likely to be huge, ponds will play an important part in the development of the landscape at Rhiw Las. Aquatic environments can be highly productive and along with fish for the table, there are many novel cropping plants that will be used at Rhiw Las, including reedmace amongst others.

Wild Food

Rhiw Las benefits from the presence of a wide range of wild foods, including nettles, dandelions, hedge garlic, hawthorn, elder, blackberries, cleavers, chickweed and many more. Seasonally, wild foods will make an important contribution to the subsistence of Rhiw Las dwellers and the ongoing management of the site will increase rather than decrease their availability.

Storage, Season Extension & Preservation

From midsummer to the end of winter, living from the land in the British climate is relatively easy. There is a very good range of seasonal vegetables to be had from the garden and soft fruit through to all of the top fruit coming into season in bountiful succession. The chief problem then becomes one of storage for the lean time of year, in the spring.

The problems we will face at Rhiw Las will be mitigated to a great extent by the availability of protected cropping, but storage will be still be of vital importance. Root crops will be clamped and later cellared; crops like onions and garlic will be dried and stored away; many crops will be bottled and some pickled. Building design for sustainability will reflect the storage and preservation needs of subsistence in a temperate climate.

Cheese-making, pickling eggs and smoking of fish for example are all storage strategies. It may prove possible to use drying techniques as well, weather and equipment permitting.

At Rhiw Las, a wide range of season extending techniques, storage methods and preservation will be employed; in short, a combination of traditional practices and modern innovations.

Timescales & Labour Requirement

Russian Government statistics from 1999 show that nearly 40% of the country's vegetables were grown in the gardens of dachas. In other products, including honey and dairy, the figure was even higher. With a short growing season of 110 days on average and with around 2.5 hours work a day during that period, Russians contributed enormously to a high level of national food self-reliance. It must also be noted that dachas have traditionally been worked by people who have also had other full-time work and have had to travel to their dachas daily.

At Rhiw Las, subsistence will be achieved in close harmony with land-based businesses, in some cases will prove virtually inseparable from those enterprises. Nonetheless, if we estimate 3 hours of work per day on subsistence per plot at Rhiw Las during a longer growing season and by people who will be working and living full time on site, the policy target will prove readily attainable.

3.1.3 Land-based businesses

Business plans for each of the plots are laid out in detail below and in Supporting Document B1 (additional business plan details). We have also provided a Letter of Support from business consultant Maurice McCartney, who has worked with us to improve our plans (Supporting Document B2a). Evidence of the demand for high quality Forest School provision in Carmarthenshire, and Peni's qualification for this work, is provided by the Letter of Support from Carmarthenshire Forest School (Supporting Document B2b). We have also attached a copy of the Ecological Land Cooperative's report entitled "Small Is Successful – Creating Sustainable Livelihoods on Ten Acres or Less", which demonstrates the capacity for small acreages to support strong sustainable businesses. This is Supporting Document B2d.

3.1.4 Business Plan – Plot 1 (Orchard produce; beekeeping)

Plot 1 - Overview

Two acres of orchard will transition over 20 years from varieties on small, early-cropping rootstocks to widely-spaced full-size trees of a traditional orchard. This will produce apples, apple juice, dried apple rings, cider and vinegar. Young grafted trees will also be produced from the traditional varieties. The orchard is interplanted with soft fruit and forage crops for bees. As qualified beekeepers⁹ and members of the Bee Improvement and Bee Breeders' Association focusing on the native bee, Chris and Erica will manage 20-30 bee hives to breed colonies and queen bees for sale, produce honey and wax, as well as improve the pollination of the orchard and other plants on site.

Figure 1: Some of Chris and Erica's honey crop from 2013.



Plot 1 - Products and markets

Orchard

Orchard products will include apples, apple juice, dried apple rings, cider and vinegar. The best quality apples will be sold locally in season via the Rhiw Las community supported agriculture (CSA) scheme, but we anticipate this being only a small proportion of the crop. The rest will be juiced, processed, and bottled, some as apple juice, some as cider and some as vinegar. As these are non-perishable items we will be able to sell them throughout the year via the Rhiw Las CSA scheme,

⁹ Chris and Erica have both passed the following examinations set by the British Beekeepers' Association: BBKA Basic Assessment; BBKA Module "Honey Bee Management"; BBKA Module "Honey Bee Behaviour".

to local shops and occasional market stalls. To supplement this income and while the orchard is developing, we will also juice and preserve soft fruit interplanted between the trees. We have grafted all of the 300 apple trees ourselves and will continue to graft fruit trees for sale making use of scion wood harvested from our formative winter pruning of the orchard.

Beekeeping

Apiary products consist of bee colonies, queen bees, honey and beeswax. Our nucleus colonies and mated queen bees will be sold to other beekeepers in Southwest Wales. Our Welsh honey shall be sold through the Rhiw Las CSA, local shops and occasional market stalls. Beeswax shall be sold / bartered to neighbours for use in cosmetic production. The British Beekeeping Association has long maintained a policy to discourage the importation of queen bees and colonies from outside the UK. Despite this, the UK supply is unable to meet demand leading to a large amount of imports.

In the future we shall investigate expanding the products to include mead, honey fudge, and other added-value non-perishable food stuffs.

Plot 1 - Financial detail

Set up costs

Orchard

We have already invested in apple tree rootstocks (M9, MM106, MM111) and have grafted and planted approximately 300 (spring 2014) apple trees at Rhiw Las. In addition we have purchased a wide range of named varieties of soft fruit (raspberries, currants, and gooseberries) from which we will be able to propagate new plants over the next few years. We will need to purchase both a press and pasteuriser for processing orchard produce.

Beekeeping

We already have all necessary beekeeping equipment, clothing, and tools as we currently manage 10 colonies. However we will need to purchase some additional bee hives and will do this gradually as our colony numbers expand.

Table 2: Set-up costs for Plot 1 beekeeping and orchard businesses

Item	Cost
Apple juice pasteuriser	£200
Apple press	£600
Bee hives (15 @ £90)	£1,350
Larger capacity honey extractor	£600
Total	£2,750

Income and expenditure

The table shows the overview of income and expenditure derived from the land-based businesses listed above.

Table 3: Income and expenditure for Plot 1 beekeeping and orchard businesses

INCOME	Year 1	Year 2	Year 3	Year 4	Year 5
Honey	£720.00	£1,080.00	£1,530.00	£2,160.00	£2,430.00
Queen Bees	£60.00	£80.00	£340.00	£560.00	£520.00
Nucleus Bee Colony	£200.00	£400.00	£600.00	£1,900.00	£2,200.00
Apples		£6.75	£53.10	£108.30	£127.47
Apple Juice		£45.00	£354.00	£1,083.00	£1,821.00
Cider			£35.40	£433.20	£1,001.55
Vinegar		£4.50	£35.40	£72.20	£91.05
Dried Apple Rings		£2.25	£17.70	£36.10	£48.56
Grafted fruit trees		£200.00	£400.00	£500.00	£500.00
Total	£980.00	£1,818.50	£3,365.60	£6,852.80	£8,739.63
EXPENSES	Year 1	Year 2	Year 3	Year 4	Year 5
Beekeeping	-£1,566.00	-£2,338.00	-£2,259.00	-£1,986.00	-£2,142.00
Orchard	-£30.00	-£1,058.38	-£406.35	-£814.55	-£1,259.59
Total	-£1,596.00	-£3,396.38	-£2,665.35	-£2,800.55	-£3,401.59
Net Profit	-£616.00	-£1,577.88	£700.25	£4,052.25	£5,338.05

In year 5, the total land-based revenue is £8,740. The total land-based profit is £5,338. The projected profit from these two businesses is therefore more than sufficient to meet the Plot 1 minimum needs of £3915 (see above).

Whilst the beekeeping business is stable by year 5, the orchard production continues to increase as the trees mature. In year 8 the projected income and expenses are £8,059 - £2,756, producing a net profit of £5,303 in addition to £3,278 profit from beekeeping for a total of £8,581.

Detailed accounts including assumptions are provided in supporting document B1.

3.1.5 Business Plan – Plot 2 (Micro-dairy; natural remedies)

Plot 2 – Overview

Microdairy

Wyc has been making cheese at home for several years with milk bought in bulk from local farmers.

Figure 2: Cheese produced by Wyc



The grassland of Plot 2 (approximately 2 acres: see Landscape Design, supporting document A3) will be dedicated pasture supporting three Jersey cows, supplemented by undergrazing of the orchards of plots 1 and 3 (an additional 4 acres of pasture) and some bought-in organic feeds.

Milk production will not actually begin until year 3, by which time all the infrastructure will be set up. There is a further delay for mature cheese production of approximately one year, and this is reflected in the plans below.

Natural Remedies & Cosmetics

Silvia makes tinctures, soaps, creams, lip balms, herb and flowers infused oils, flower essences and beeswax polishes and she envisions dedicating a significant area to growing herbs to use in natural remedies.

Figure 3: Natural products hand-made by Silvia



Products and markets

Microdairy

The milk produced will provide for the entire dairy needs of the site (4 families) which will be sold within the site or bartered. The considerable excess will be processed into hard cheeses and sold locally throughout the year via the Rhiw Las CSA scheme and at local markets.

The bulk of cheese varieties produced will be Cheddars, although smaller quantities of blue cheeses and Swiss and Italian-style varieties will be made, with continued innovation expected to find the best niches in the long term.

Local competition until recently would have included the Llanboidy Cheese Company, a respected brand made from the milk of a pedigree cow breed. However the makers have now retired, leaving a potential gap in the market for a local specialized cheese brand.

Natural Remedies & Cosmetics

Products include balms, infused oils, flower waters (lavender and rose), baby products (nappy cream, sun screen) and beeswax polishes (for shoes and furniture)

Our natural remedies and cosmetics will be hand crafted and Welsh made. We will use recyclable and recycled packaging. While much of the market is dominated by multinational corporations, more and more people enjoy supporting cottage industries and small, local businesses and buying products that are local, ethical, eco-friendly and economical.

Our customers will typically be interested in natural products and holistic health. They will be interested in buying quality remedies and chemical-free cosmetics. We have designed attractive labels that are simple, clear and suggestive of the natural quality of the products.

Sales will be made through the CSA scheme, the local markets and online via our website with the highest sales expected through Christmas Fayres. We also hope to sell our products at health food shops in the local area and Carmarthen, which will make sales easier and less time consuming with a small impact to profit.

Financial detail

Set up costs:

Table 4: Set-up costs of Plot 2 Micro-dairy business

Item	Cost £
Cow barn, feed storage and milking parlour	1800
Fencing	200
Purchase of cows (spread over years 3 & 4)	1600
Cheese cave	400
Kitchen area.	500
Short term Refrigeration room	250
Milk churns, cheese presses & other dairy equipment	500
Food Hygiene Certificate (Manufacture)	18
Total	5,268

Table 5: Set-up costs of Plot 2 natural products business

Item	Cost £
Tools & utensils	155
flowers+herb plants and seeds	60
raised beds (compost)	200
safety assessment reports	120
Cosmetic portal registration	120
Total	655

Income and expenditure for both businesses

Table 6: Summary of income and expenditure projections for Plot 2 businesses

Income	Y1	Y2	Y3	Y4	Y5
Hard cheese	-	-	-	£3,612.00	£12,552.00
Milk sales	-	-	£350.00	£350.00	£350.00
Calf Sales	-	-	-	£200.00	£400.00
Nat. remedies sales	-	£394.06	£788.13	£1,576.25	£3,152.50
Total	£0	£394.06	£1,138.13	£5,738.25	16,454.50
Expenses	Y1	Y2	Y3	Y4	Y5
Feed/bedding	-	-	£730.00	£2190.00	£2190.00
vet + insemination	-	-	£100.00	£300.00	£400.00
consumables	-	-	£80.00	£240.00	£240.00
hygiene	-	-	£400.00	£1,200.00	£1,200.00
fuel	-	-	£40.00	£120.00	£120.00
tools	-	-	£100.00	£100.00	£100.00
packaging	-	-	-	£100.00	£300.00
Nat. products expenditure	-	£246.13	£342.25	£534.50	£919.00
Total	£0	£246.13	£1792.25	£4784.50	£5469.00
Net Profit	£0	£147.93	£-654.12	£953.75	£10,986.50

In year 5, the total land-based revenue is £16,454.50. The total land-based profit is £10,986.50. The projected profit from these two businesses is therefore more than sufficient to meet the Plot 2 minimum needs of £3287.

It will also be noted that the estimated land based profit exceeds the minimum needs calculation by a factor of 3.3 showing that there is ample revenue to meet the needs of one or two additional persons, for instance Willow Tippins and any future sibling when fully grown.

Detailed accounts and assumptions are explained in Supporting Document B1.

3.1.6 Business Plan – Plot 3 (Celtic Harps; Forest School)

Plot 3 - Overview

Stef is a musician and coppice-worker, and combines these two interests by making Celtic harps from wood harvested on site, as well as small greenwood products such as spoons, shakers, and whistles. We will plant a small orchard for longer-term orchard products, and while we wait for this orchard to establish itself we will produce strawberry punnets and butternut squash for local sale. Peni is a qualified Forest School teacher and will run forest school education days for local children.

Plot 3 - Products and markets

Celtic harps are a traditional Welsh instrument. High end harps can retail for several thousand pounds, but Stef would initially produce harps for learners, which cost between £100-£400. We have contacted James Music¹⁰ in Carmarthen who would provisionally be willing to buy these harps for re-sale. Sue Berry, an independent music teacher, has provided useful feedback on early prototypes and would also (provisionally) be able to sell harps to learners. We expect to be able to sell at least 20 harps per year at a price of £300 each, made using a small quantity of the best quality wood harvested on site.

Figure 4: Stef's beautiful hand-made Celtic Harp



¹⁰ <http://www.james-music.co.uk/>

Coppice products will include greenwood furniture, charcoal and small household items. These will be sold through the existing network of local contacts that Stef has developed through his coppice work, and at market stalls.

We will produce punnets of strawberries for sale in the summer season (June-August), which will be sold via the Rhiw Las Community Supported Agriculture scheme (see details below), directly to participants on courses and at events, and if there is still a surplus, to very local shops in Llanboidy and Whitland. The costs and additional carbon footprint associated with selling strawberries further afield make it less attractive to satisfy more than this local market. We will also grow a small number of butternut squash, which require less attention and can be stored through the winter months for local sale.

Forest School opportunities are in demand locally. Peni currently works with Carmarthenshire Forest Schools¹¹, is qualified to level 3 (Forest School Leader), and is currently setting up her own business, Trackways, with a colleague, under the Carmarthenshire Forest Schools umbrella. She is also involved with the John Muir Award scheme which can be integrated with the Forest Schools, Eco-Schools and Duke of Edinburgh schemes. The John Muir Award is an environmental award that encourages people of all backgrounds to connect, enjoy and care for wild places through a structured yet adaptable scheme. Peni will run 8 Forest School events per year in the woodland at Rhiw Las, after the bluebells have finished flowering (from June onwards). A Letter of Support from Carmarthenshire Forest Schools is provided in Supporting Document B2 as evidence of Peni’s qualifications and experience, and the local demand for these events.

Plot 3 - Financial detail

Set up costs

There are no set-up costs involved in any of the businesses run from plot 3, as we already have tools and equipment and Peni is already trained in Forest School working.

Income and expenditure

Table 7: Summary of income and expenditure projections for Plot 3 businesses

INCOME	Year 1	Year 2	Year 3	Year 4	Year 5
Harps	£1,500.00	£2,400.00	£3,600.00	£6,000.00	£6,000.00
Coppice products	£100.00	£200.00	£300.00	£400.00	£500.00
Forest School	£1,350.00	£2,700.00	£2,700.00	£2,700.00	£3,600.00
Strawberries	£35.00	£70.00	£140.00	£280.00	£560.00
Winter squash	£20.00	£40.00	£80.00	£100.00	£100.00
Total	£3,005.00	£5,410.00	£6,820.00	£9,480.00	£10,760.00

¹¹ <http://www.carmarthenshireforestschoools.com/> and <http://www.forestschooolwales.org.uk/>

EXPENSES	Year 1	Year 2	Year 3	Year 4	Year 5
Harps	-£375.00	-£610.00	-£915.00	-£1,475.00	-£1,475.00
Forest School	-£845.00	-£1,490.00	-£1,490.00	-£1,490.00	-£1,920.00
Strawberries & Squash	-£28.53	-£57.07	-£89.13	-£99.67	-£118.33
Marketing	-£10.00	-£110.00	-£110.00	-£110.00	-£110.00
Total	-£1,258.53	-£2,267.07	-£2,604.13	-£3,174.67	-£3,623.33
Net Profit	£1,746.47	£3,142.93	£4,215.87	£6,305.33	£7,136.67

In year 5, the total land-based revenue is £10,760 (with the Forest School courses being subsidiary to the other land-based activity as required by the Practice Guidance). The total land-based profit is £7,136.67. This exceeds the Minimum Needs for plot 3, which were calculated as £5,204. In later years the profit can be expected to continue to increase as the businesses become established and as orchard produce becomes available.

Detailed accounts including assumptions are provided in Supporting Document B1.

Longer-term plans

In the last few years we have run several successful workshops around creating affordable, accessible musical instruments from sustainable coppice wood, most recently at the National Botanic Garden. These workshops are very popular and give an opportunity for participants to create their own instruments (whistles, shakers, and xylophone) and then play with professional musicians, connecting people to nature and to music. We plan to continue to run these workshops at external venues and also intend to host some ourselves. As above they would be subsidiary to the main land-based activity of coppicing and harvesting wood and making and selling Celtic harps. Since we can easily meet the Minimum Needs requirements without this additional source of income, we have not included it in the formal business plan. The revenue from sale of the musical instruments themselves is of course “land-based”, as they will be made from wood harvested on site.

3.1.7 Business Plan – Plot 4 (Community Supported Agriculture)

This is a business plan for the first five years of work on the One Planet Development project at Plot 4 of the site Rhiw Las between Whitland and Llanboidy in Carmarthenshire.

During this time the needs of the businesses will need to be balanced with the work involved in settling on the land; there will, in addition, be shelterbelt planting, earthworks and pond creation. These elements, which stand aside from the individual business plans, will nevertheless bring into being the long term framework within which the whole project will fit.

Current situation

The land comprises 5 acres of mixed pasture and woodland. The site slopes to the west and includes along about half of its northern boundary a brook. Whilst somewhat exposed to south-westerlies towards the top of the hill (east), at the bottom (west) it is very sheltered and along its entire length enjoys the protection of the woodland on the north side.

Work started on the land in spring 2014 and produce was being sold at local Farmers' Markets and to restaurants (including *Con Passionata* of Nott Square, Carmarthen) from July onwards. These are being developed as supplementary revenue streams to support the business until a veg box customer list is built up, and will also help with marketing by developing networks of customers with interests in high quality local produce.

Community Supported Agriculture

A small community supported agriculture scheme will contribute both to financial security and to furthering the wider aims of the One Planet Development project. The nearest similar schemes are in Tenby¹² to the south, Kidwelly¹³ to the east and to the west of Haverfordwest¹⁴ in the other direction. A thriving CSA network now exists both in Wales and in the UK which is testament to the widespread popularity of such schemes and will help to promote the uptake of vegetable boxes by more customers.

A wide range of seasonal vegetables will be sold to scheme members, who will commit to a share of the harvest for each season. On a small acreage, the total amount grown will be relatively small, with only a couple of dozen regular customers. The most local customers will be given priority, to reduce the cost and ecological impact of transportation. This will also help to develop community links. As is usual for such schemes, the contents of the box will vary by season.

¹² <http://www.rvorganics.co.uk/>

¹³ <http://www.bancorganics.co.uk/>

¹⁴ <http://www.coca-csa.org/>

Marketing

Marketing and promotion of the veg boxes has already begun. In 2014, we have grown a range of vegetables on site for sale at local Farmers' Markets in Carmarthen and at the Whitland Memorial Hall, where customers have expressed interest in ordering boxes when they become available. In addition, we hope to work with the Whitland Five-a-Day club to promote healthy eating choices by connecting local people with local growers.

Sales: 15 - 20 boxes a week (£10 & £15 boxes)

In the medium to longer term neighbouring plots will gain the possibility of selling their own speciality produce (such as honey, cheese, apple juice, soft fruit) through the Plot 4 CSA, thus will a deeper degree of interdependence be built between the plots, and also CSA members will have access to a greater range of produce than would otherwise be possible.

In the first year of production we intend to expand production up to a maximum of 12 boxes per week, allowing some time to be devoted to building, soil development, habitat creation, etc. After the plot 4 dwelling house is built, production will be expanded to a maximum of 20 boxes per week. Advertising in the first few years will therefore consist of:

1. A series of meetings about local food and the CSA concept (see below)
2. Leaflet distribution in Llanboidy, Whitland, and Narberth.
3. Advertisements in local papers
4. Word of mouth

Beyond 5 years we expect that the project will be self-sustaining, indeed is highly likely to be oversubscribed (which we hope will encourage the formation of new CSAs in other nearby communities). However, if there were to be any difficulty in selling veg boxes we would continue to direct sales to local Farmers' Markets, restaurants and shops, with the potential to move to those outlets completely if necessary since this demand has already been demonstrated.

Finance

The CSA has already secured a £3000 grant from UnLtd for marketing, a commercial polytunnel and crop covers.

Who are UnLtd? *"UnLtd is the leading provider of support to social entrepreneurs in the UK and offers the largest such network in the world. UnLtd resources hundreds of individuals each year through its core Awards programme. UnLtd operates a unique model by investing directly in individuals and offering a complete package of resources; from Awards of funding, to ongoing advice, networking and practical support."*

This start-up grant will be used to get the CSA scheme off the ground. In particular, the budget for marketing has been allocated to ensure that there is a community buy-in, enabling us to host local meetings about local food and make Llanboidy and Whitland residents aware of the new enterprise and how they can get involved and benefit from it. The social aspect of community supported agriculture is the reason why UnLtd is supporting this venture.

Table 8: Set-up costs for Plot 4 CSA business (note that £3000 has been received as start-up grant)

Item	£
Tools & Equipment	£500.00
Crop Covers	£250.00
Compost	£400.00
Seeds	£200.00
Polytunnel	£2,000.00
Potting shed	£500.00
Irrigation	£150.00
Packaging	£50.00
Total	£3,950.00

Table 9: Projected annual income, expenditure and net profit for Plot 4 CSA business.

Income	Year 1	Year 2	Year 3	Year 4	Year 5
Medium box (£10)	180 @ £10	360 @ £10	540 @ £10	540 @ £10	540 @ £10
Large box (£15)	72 @ £15	144 @ £15	180 @ £15	180 @ £15	180 @ £15
Grant income	£3000				
Total income	£5,880	£5,760	£8,100	£8,100	£8,100
Expenditure	Year 1	Year 2	Year 3	Year 4	Year 5
Depreciation	£350	£350	£350	£350	£350
Seeds	£200	£150	£100	£50	£0
Compost	£400	£300	£200	£100	£0
Transport & Delivery	£1000	£1000	£1000	£1000	£1000
Packaging	£150	£150	£150	£150	£150
Set-up costs	£3,950				
Total expenditure	£6,050	£1,950	£1,800	£1,650	£1,500
Net profit	-£170	£3,810	£6,300	£6,450	£6,600

The net profit in Year 5 is £6,600. This exceeds the Minimum Needs for Plot 4, which were calculated as £5242.

Notes:

1. Seed saving will eventually reduce seed costs to zero over 5 years.
2. Compost inputs are initially for soil improvement and propagation and will fall to zero over 5 years.
3. Transport costs could be shared with other businesses both on the same plot and on neighbouring plots. This has not been factored in to these figures. Clearly sharing or reducing transport costs could make this business much more profitable.

Table 10: Seasonal variation in hours of labour required for CSA activities.

	Propagation & Care	Planting	Weeding	Harvesting	Packing	Delivery	Maintenance & Other
Jan	5	2	-	2	1	2	2
Feb	5	2	-	2	1	2	2
Mar	5	4	1	5	2.5	-	2
Apr	6	8	1	5	2.5	-	2
May	6	8	1	6	3	-	2
Jun	6	8	2	6	4	2	2
Jul	5	6	3	6	4	2	2
Aug	5	5	3	6	4	2	2
Sep	4	4	1	6	4	2	2
Oct	2	1	1	4	2.5	2	2
Nov	1	1	-	2	1	2	2
Dec	1	1	-	2	1	2	2

3.2 Land Management

3.2.1 Baseline condition and management recommendations

The baseline for each of the elements (biodiversity, cultural heritage and landscape) has been described above.

A Phase I biodiversity report has been compiled by Matt Sutton of Biodiversity Solutions (an ecological consultancy¹⁵ based in Haverfordwest), which is provided separately as Supporting Document B4. The report concludes that “a sensitive ‘one planet’ development with care for the existing habitats and species, and a desire to create opportunities for new ones, would be a positive step for this somewhat degraded agricultural land.”

The LANDMAP assessment of the site’s Cultural value is High, but the report notes that existing management of rural Carmarthenshire is “Generally inappropriate in the sense that the centuries old principal pastime of farming has undergone radical change; in addition, the hedgerows, hedge banks and walls are in a poor state”. Our landscape vision, set out in more detail below, proposes to return to smaller-scale agricultural practices, which would have been common in Carmarthenshire prior to the mechanisation and industrialisation of farming. This will involve restoration and extension of hedgerows, and avoiding the use of artificial fertilisers and pesticides. “Decline in environmental husbandry” is listed by LANDMAP as a “significant threat” to the integrity and condition of the cultural landscape of this region.

3.2.2 Land management strategy

A landscape vision will be developed:

1. After 5 years:

After five years the whole site will have seen a great deal of tree (orchard, SRC & broadleaf native) and hedge planting; gardens will have been established and some ponds created. Screens and earthworks will be in place to ensure that tracks and buildings are recessed into the landscape.

The site will already be much more productive than in Year One and will also have enjoyed biodiversity benefits from new plantings and management (eg Pond creation).

2. After 10 years:

After ten years the earliest hedge plantings and tree plantings will be well established, clothing large areas of the site in a broad and productive canopy and creating a beneficial micro-climate for animals, crops and people. Ponds will be well established and thriving; characteristic species will be significantly strengthened in the new agro-ecological landscape.

Dwellings and other buildings will have virtually disappeared into the panorama of ecological land management, obscured from view by re-greened earthworks, maturing trees and use of climbing plants.

By this stage the positive synergies brought about by careful design implementation, reassessment and tweaking will have become the bases of a stable and resilient

¹⁵ <http://www.biodiversitysolutions.org.uk/>

production matrix; the site will generate its own fertility and enjoy the benefits of widening biodiversity. It will also act as a reservoir of that biodiversity for the surrounding countryside.

3. After 25 years:

Twenty five years after the commencement of the project the landscape will have changed beyond recognition. From all viewpoints the site will blend seamlessly into the local landscape, whatever the season strengthening the characteristic riparian and arboreal features in the valley.

Visitors to the site will follow paths that lead through mature woodland and well established orchards, past ponds with every appearance of being entirely natural and to buildings which fit absolutely into the rich natural environment.

By that stage perennial plantings will provide much of the food for the site dwellers and the productive and synergistic cycles of production will be embedded in the manifestation of long followed plans as well as in the culture of the place.

4. For future generations:

It is to be hoped that the profound transformation that we will work on the landscape at Rhiw Las will become a positive example of sustainable land management which will help to inspire wider application of the principles involved, and so we might dare to imagine that this one site will in time become part of a much changed landscape.

The following specific activities will be undertaken:

- Manage to retain and where appropriate expand diverse native broadleaf woodland to reflect the nature of the wider valley. Positive synergies: firewood; craft wood; wild foods; shelterbelts; leaf mould; biodiversity.
- Manage hedgerows traditionally by hedgelaying and plant new hedges, reducing field size, hedgerows with headlands and banks planted with understorey. Positive synergies: edible species in hedgerows; firewood (faggots & small wood); shelterbelts and improved micro-climates (better for crops, livestock and wildlife); biodiversity corridors; bee forage.
- Traditional orchard landscapes recreated. Positive synergies: micro-climatic benefits; bee forage; traditional grazing opportunities; biodiversity benefits.
- Traditional unimproved grassland recreated for livestock where appropriate. Positive synergies: biodiversity benefits - encouraging characteristic species; possibility for small scale organic hay production (much sought after).
- Transition to low or no dig gardening/small scale field crops for soil OM improvement; use of composts and manures; chicken tractors; green manures; soil first growing; increase in perennial crops and multi-function crops; leaving soil covered. Positive synergies: biodiversity benefits; radical reduction of energy use (& costs) for cultivation; pest-predator balance benefits; plant health benefits.

- Pond creation to manage site water resources. Positive synergies: fish; aquatic edibles; ducks; biodiversity; irrigation possibilities; micro-climatic improvements.

Positive Impact:

- Creation of a traditional small farm landscape blending into the pre-existing riparian forest edge that dominates the character of the valley.
- Habitat increase - biodiversity increase; security for species in a landscape dominated by large scale farming.
- Buildings and trackways recessed in the mid-slope area of the site and hidden with tree plantings and banks.
- Increase in habitats for characteristic bird, insect, mammal, reptile and amphibian species.

3.2.3 Plot-specific land management issues

Finally, brief outlines for individual plots indicate where the emphasis of the land management plan is significantly different from the other plots:

Plot 1:

The Traditional Orchard habitat which makes up approximately 2 acres of Plot 1's upper field will be managed in the traditional manner without the use of synthetic chemicals. This will leave it to some extent dependent on the vagaries of pests and disease, which is partly why we have elected to juice the apples rather than attempting to sell large quantities of fresh fruit. We will follow the "holistic orchard" management techniques of Michael Phillips, encouraging mycorrhizal growth and a diverse community of organisms around the trees which contribute to Integrated Pest Management by maintaining the natural balance of predators and prey in the orchard ecosystem. This will involve grass management by mowing (scythe), mulching (ramial woodchip), and light grazing (using our own geese and plot 2's cattle). In order to meet the 5 Year target, we have included some smaller trees on M9 (dwarfing) rootstocks which will require more intensive management (though still organic) and will not be replaced after their expected lifetime of 20-25 years.

Plot 2:

The eastern slope of plot 2 will consist of silvopastural fields and hedges combining grazing with a low density of trees consisting of native broadleaves to be pruned as fodder interspersed with conifers for shelter, shade and habitat. Water will be supplied through a number of semi-natural pools supplemented by water gravity-fed from the spring in the northeast of the site. Further ponds will help irrigate the vegetable beds and provide habitat for domestic Khaki Campbell ducks, known for slug-eating.

The immediate area of the dwelling will consist of forest garden trees, shrubs and perennial food plants along the north edge, masking the dwelling house and other buildings from that direction while extensive flower, herb and vegetable beds extend to the south-west. The foot of the upper eastern slope will contain cheese cave and cow barn and various perennial crops. The mature woodland will be extended with fresh plantings and the less mature north-facing slope thinned and replanted at a higher density with native broadleaf. The western slope of Plot 2, currently scrub, will be planted with Willow coppice while the broadleaf at the bank of the stream is extended upwards to meet it.

Plot 3:

As Plot 3 businesses are woodland-focused, both the top and bottom of the slope will be planted with mixed native medium-to-long rotation coppice and managed lightly, providing a long-term semi-wild habitat for woodland-edge species. The lower half of the top slope will be planted with a very low density traditional orchard, using an Integrated Pest Management strategy including under-grazing by the Plot 2 cows.

Plot 4:

Plot 4 will be characterised by the creation of a series of “micro-fields” for vegetable and cereal production each at around ¼ acre in size. The new enclosures will be surrounded by new hedges and around them there will be extensive forest garden type plantings, ponds and areas of native broadleaf trees. Over time the “micro-fields” will come to include increasing amounts of perennial plantings including perennial vegetables, soft and top fruit and even perennial cereals. In this landscape there will be chickens, ducks, and potentially also a donkey and a dexter house cow (and follower).

3.3 Energy

The OPD Practice Guidance states that, as part of minimum needs, energy needed by the residents of the site must be met from the land¹⁶.

The first priority is the minimisation of energy use. The average UK household uses 3,300 kWh for electricity and 16,500 kWh for gas¹⁷. Through the use of passive solar gain, super-insulation and low usage of highly efficient appliances and lighting, electricity consumption at Rhiw Las will be less than half the UK average (see projected figures in Supporting Document B5) and no gas shall be used in dwelling houses beyond the five year set up period.

¹⁶ Small amounts of non-renewable energy are acceptable where justified by need and suitability. Examples given include bottled gas for cooking in the summer and specific agricultural, horticultural, woodland management and processing tasks. Such non-renewable energy will be picked up through the Ecological Footprint Analysis. Energy for transport is considered within the transport section.

¹⁷ OFGEM Household energy bills explained:

<https://www.ofgem.gov.uk/ofgem-publications/64006/householdenergybillsexplainedudjuly2013web.pdf>

Conventional use of (mainly fossil fuel powered) grid electricity has large carbon dioxide emissions¹⁸ (0.484 kgCO₂e / kWh). In addition to minimisation of energy consumption, remaining energy needs must therefore be met using zero-carbon renewable energy: biomass, solar thermal and solar photovoltaics.

The site does not currently benefit from a grid connection. This application is written assuming this will continue to be the case. However, a grid connection is permitted (para 3.59 of the Practice Guidance) and were one to be economically viable, excess photovoltaic generation would be exported to the grid, lowering the regional carbon intensity of grid electricity.

Energy consumption requirements are divided into three categories:

- Electricity
- Space and water heating
- Cooking

Energy is obtained on site from a combination of four sources:

- Solar photovoltaic panels (electricity)
- Wind turbine (electricity)
- Solar thermal (heat)
- Biomass (heat)

Each of the four plots adopts a similar energy system design to meet its consumption, differing only in scale. Detailed plot specific energy system dimensioning is provided in Supporting Document B5.

Electricity

Each plot shall generate electricity from photovoltaic panels installed on south facing dwelling house roofs, accommodating the diurnal cycle and weather variations with an on site battery store, scaled in proportion with typical daily consumption. Generation is greater in the summer than the winter so dimensioning the systems to ensure basic needs are met in the winter results in an abundance of electricity during the summer months. Electricity consumption varies during the year, with a greater use of electricity for cooking and refrigeration during the summer than the winter. A wind turbine generates, on average, more energy in the winter than the summer so also compensates to a degree, the photovoltaic generation. Ad hoc use of electric bicycles, particularly in the summer, is also possible due to the excess generation capacity.

¹⁸ DEFRA 2013 Government GHG Conversion Factors for Company Reporting: Methodology Paper for Emission Factors
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224437/pb13988-emission-factor-methodology-130719.pdf

Table 11: Energy generation and demand in winter and summer.

	Photovoltaic array [kWp]	Wind turbine [Wp]	Typical winter generation [kWh/day]	Typical summer generation [kWh/day]	Typical winter demand [kWh/day]	Typical summer demand [kWh/day]
Plot 1	4.0		4.2	12.8	3.0	5.3
Plot 2	3.5		3.6	11.2	3.0	5.2
Plot 3	3.0		3.1	9.6	2.7	5.0
Plot 4	3.0	0.25	4.1	10.1	3.3	5.0

The projected typical generation comfortably exceeds demand for each plot in both the winter and summer allowing for the storage of excess energy as hot water or in batteries, providing inter-day flexibility of demand in case of protracted unfavourable weather. With a grid connection, excess electricity could alternatively be exported.

Space and water heating

In addition to the houses being designed to make use of passive solar gain, each plot shall generate hot water both by solar thermal and biomass stove. Solar collectors are installed on south facing dwelling house roofs, these collect heat from the sun and use it to heat water which is stored in a large well insulated hot water cylinder. Solar collectors work all year round, however in the winter months their output will be supplemented with hot water from biomass stoves.

Demand

Significant space heating demand is limited to the coldest winter period through passive solar gain and super insulation. Water heating is limited to washing at between 120 and 240 litres per day per plot depending on household size.

Supply

When active heating is required it shall be met through a combination of wood burning range with water boiler, solar thermal (evacuated tubes) feeding underfloor heating or radiators and a small wood burning stove. Hot water is stored in a large (400-600 litre), highly insulated thermal store in the centre of the buildings able to maintain heat inter-daily.

Cooking

Each plot shall use a wood burning range with both an oven and hotplates. During the winter months this will be used as the principal method of cooking. During the summer with relatively abundant, zero-carbon photovoltaic electricity some plots propose to use a microwave oven (800 W) and induction hob (3 kW). Both microwaves and induction hobs are highly efficient with 90%+ of the electrical energy being used to heat the food rather than typically less than 50% with conventional electric or gas cooking.

The site shall also benefit from a communal wood fired pizza/bread oven which will be fired up approximately weekly for efficient cooking for bread for the four households.

Biomass

The site does benefit from the ability to sustainably grow biomass in adequate quantities, however only short rotation willow coppice grows quickly enough to be viable inside the 5 year deadline set by OPD policy. A detailed study by the Biomass Energy Centre¹⁹ funded by DTI, Defra, DARDNI and the Forestry Commission, shows that three-year rotation Q83 Willow produced 9-12 tonnes of dry biomass per hectare (3.6 - 4.8 tonnes per acre) in the local area on cutting 2, year 1 (4th year after planting), 12-18 t/ha (4.8- 7.3 per acre) the following year (year 5), and 18-27 t/ha thereafter.

Table 12: Biomass yield from short rotation willow coppice over 6 years from planting (data from Biomass Energy Centre).

OPD year	Coppice stage	Tonnes per hectare	Tonnes per acre
1	1st cut year 1	3 - 6	1.2 - 2.4
2	1st cut year 2	6 - 12	2.4 - 4.8
3	1st cut year 3	9 - 18	3.6 - 7.3
4	2nd cut year 1	9 - 12	3.6 - 4.8
5	2nd cut year 2	12 - 18	4.8 - 7.3
6	2nd cut year 3	18 - 27	7.3 - 10.9

Going by a conservative estimate of 20 t/ha on year 6 this equates to 0.05 ha (0.124 acres) for each tonne of biomass needed per year in the long term. However, assuming the biomass is aged (dried) for one year before burning and harvested during Winter, on year 5 they will be using the harvest from year 3 (conservative estimate of 4 tonnes per acre).

It is difficult to estimate the amount of fuel needed by a household before the dwelling is built, however an existing One Planet Development²⁰ contains a similar structure to our planned dwellings but larger, housing a family of 7 with four bedrooms, and uses 6 tonnes of biomass per year. The smaller, straw-bale insulated dwellings at Rhiw Las can be estimated to need only 5 tonnes per year, equating to a long term total requirement of 0.62 acres of Willow per dwelling.

On year 5 they will have amassed a conservative total of 4.7 tonnes of dry biomass. This falls short of requirements, as do years 6 and 7 (only 2.5 and 3.1 tonnes respectively). All needs are fulfilled from year 8 onwards. Please note that these

¹⁹ "Yield Models for Energy Coppice of Poplar and Willow" ,pp 40 - 45
http://www.biomassenergycentre.org.uk/pls/portal/docs/PAGE/BEC_TECHNICAL/RESEARCH%20AND%20STUDIES/ENERGY%20CROP%20STUDIES/YIELD%20MODELS%20FOR%20SRC%20A.PDF

²⁰ Nant y Cwm Farm, Rudry – see case study in Supporting Document B5.

estimates use a conservative interpretation of the above statistics and with good management we should be able to achieve higher yields.

These issues are mitigated by the necessary management and thinning of the approximately 1 acre of mature broadleaf woodland present on each plot. To make up the deficit, each plot must make a one-time-only harvest of 4.7 dry tonnes during the first three years of residence, and this woodland combined with activities such as hedge laying form a contingency stock of fuel in future years.

Monitoring

Annual reports shall be prepared detailing:

- usage of all on site renewable energy
- usage of all bought in energy (included in EFA)
- amount of electricity exported to local grid if applicable

Summary

Energy use has been minimised and is significantly lower the UK average. The energy that is used is met from on site renewable sources with zero carbon dioxide emissions. Excess electricity generation has potential to be exported from site, lowering the regional carbon intensity of grid electricity. Energy use is monitored and reported annually.

3.4 Water

The OPD Practice Guidance [1] states that, as part of minimum needs, the majority of water needs should be met from the site (para 1.12).

Requirements

The first priority is the minimisation of water use. A very large reduction relative to an average household is achieved by the use of composting rather than flush toilets, requiring no water at all. On average, each Welsh household uses 420 litres of water per day, of which one third is used by flushing toilets. Another third is used in baths and showers. At Rhiw Las, residents will be constantly aware of water levels in ponds and storage in water butts. Therefore, there will be a much more active relationship between usage and resource: for instance, residents may choose to take more baths in the autumn and spring when both rainfall and solar heating are readily available. The final third of water (in the average household) is used for all other uses: taps, laundry, dishes, etc. Where appliances are used, the most efficient ones will be chosen. Where activities are done by hand, residents will be mindful of the limited water resource and actively reduce usage during times of stress.

The total expected household water usage on site is therefore conservatively estimated at half the Welsh national average, a total of 840 litres per day or 306,600 litres per year (76,650 litres per year per household), though it may well in practice be lower.

Horticulture in non-covered areas typically needs very little irrigation in the Welsh climate, so water will only be required for newly planted seedlings in warm weather. Horticulture in covered areas (polytunnel/greenhouse) requires full irrigation. The total amount required will slightly exceed the amount collected by rainwater harvesting from the roofs of these structures, due to evaporation and transpiration in the warm ventilated environment. This additional water will be provided by storage ponds located above the structures, drained using a gravity feed and replenished by rainwater.

Home gardens and livestock will be watered with harvested rainwater. Sheds, greenhouses and houses will provide for irrigation and livestock drinking water. "Soil first" gardening reduces irrigation needs, but in very dry spells and in protected cropping irrigation remains indispensable. Storage of winter rains will be an integral feature of this system at Rhiw Las and will necessitate the creation of ponds and the use of tanks. This water system will not only sustain productivity and subsistence, it will increase biodiversity and provide the opportunity for micro-climatic management.

Livestock require constant water availability, which will be provided by ponds.

Rainwater harvest

The site receives an average of approximately 1320mm annual rainfall, which means that each year 1200 litres of water may be collected from each (horizontal) square metre of roof, allowing for some loss. Every effort shall be made to collect and retain on site this water from all suitable roof surfaces and modest landscaping of ponds and swales. A hierarchy of water storage solutions shall be deployed from water butts to ponds with flow gravitationally managed down the site.

The (horizontal) surface area of the barn roof is 314 square metres (75'x45' or 22.9m x 13.7m). Therefore it will collect a total of 377,000 litres of water over a single year. This will be collected, stored, and used for irrigation of vegetable beds located below the barn. In the event of particularly extreme rainfall, overflow will be diverted into a pond and then flow down through the woodland to the stream at the western boundary of the site.

Other buildings have the following roof areas and water collection potential:

Plot 1: House (9x13m) + workshop (3.5x7.5m) = 143.25m².

This will provide 172,000 litres of water per year (greenhouse water harvesting not included).

Plot 2: House (8x13m) + cow shed (4x6m) = 128m².

This will provide 154,000 litres of water per year (polytunnel water harvesting not included).

Plot 3: House (~12m diam circle)= 452m²

This will provide 543,000 litres of water per year (polytunnel water harvesting not included).

Plot 4: House (8x11m, with a green roof factor of 30%) + covered veranda and solar room (64m² of hard roof) = 90.4m²

This will provide 109,000 litres of water per year (polytunnel water harvesting not included).

The total amount collected by all surfaces described above (including barn) is 1,355,000 litres per year, clearly much more than sufficient to meet residents' needs. Rainwater collected from dwellings will be treated to potable quality using sediment filter followed by an ultraviolet lamp. Regular replacement of these lamps will result in a small quantity of waste which cannot be assimilated on site but can be recycled. We will continue to research less polluting water purification methods such as activated charcoal.

Climate change is expected to result in greater variability of the Welsh climate, with the potential for longer periods of drought and also more extreme rainfall. The storage systems designed on site will therefore be deliberately over-engineered to build in resilience to these possible future changes. Sustainable drainage systems will be used to deal with excess rainwater, via the reedbeds and ponds, eventually returning to groundwater.

3.5 Waste

The essential criteria are that:

- All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.
- The only exception to this is occasional offsite disposal of small non-biodegradable amounts of waste which cannot be assimilated on site which arise from things used on site wearing out or breaking irreparably.
- All waste handling and assimilation on site must comply with Environment Agency guidelines.

Waste produced on the site can be divided into the following categories which will be dealt with in turn:

Inorganic Waste

Waste usually imported from off-site, which cannot be decomposed or put to new uses. This includes plastic and metal packaging, some paper, chemicals, electronic components, broken tools, etc.

Minimisation

Meeting the food production requirements of the policy onsite will naturally cause a great reduction in imported packaging. The majority of food not produced on site will be bought cooperatively as occasional deliveries in bulk through wholesale suppliers such as Essential or Suma; for instance large sacks of flour, rice and dried beans, or large barrels of ecological cleaning product.

Re-use

Many of the waste products that remain, especially containers and large packaging can be re-purposed for containing our own products at home or for other farming activities such as mulch, while paper and card packaging can of course be composted.

Recycling

The much reduced waste that remains can be delivered to or collected by the local municipal facilities for recycling or landfill as appropriate.

A case study demonstrating the reduced level of waste taken to municipal facilities by a low impact development can be found here

Human Waste

All plots will process human waste through composting toilets, situated inside the dwellings as required by Building Regs.

Urine and faeces are separated and are allowed to decompose aerobically, which avoids unpleasant odour and methane production.

Once a faeces container reaches capacity it is sealed and allowed to further decompose for around two years, whereupon the output is hygienic and highly fertile compost. Nonetheless, so-called 'humanure' is used only on top-fruit and non-food crops to avoid any possibility of contamination.

Urine is either allowed to soak in and be absorbed by willow or comfrey which is later harvested for compost or fuel, or diluted and used as a nitrate-rich plant food.

Further information about composting toilets can be found at the Centre for Alternative Technology²¹.

Green Waste

Vegetable waste from outside the kitchen will be composted in the conventional way, that is through compost heaps.

Domestic Food Waste

Cooked or processed food and meat cannot be composted with green waste as it will attract vermin, nor can kitchen waste be fed to farm animals such as pigs or chickens.

All plots will therefore keep special vermin-proof composting containers or wormeries, which will convert scraps into nutrient-rich plant food.

²¹http://info.cat.org.uk/sites/default/files/documents/CompostingToiletDesign_4page.pdf

Grey Water

Rhiw Las households and businesses will produce no “black” water from toilets because composting systems are used rather than water flush toilets. Grey water will come from kitchen and bathroom sinks, and laundry. In all cases ecological cleaning products will be used, reducing impacts on the reed bed waste treatment system. Occasional harmful materials in waste water resulting from the processing of raw meat will easily be dealt with by the reed bed system.

The water will be purified by use of a reed bed system for each plot. The minimum size allowed by the Environment Agency for a 1-3 bedroom house, serving up to five people is 12m² (3.5x3.5m), and each plot’s domestic reed bed will be approximately this size, split into two sections and used alternately, allowing each side to rest and regenerate, with the exception of Plot 2 which will be larger (see: plot-specific waste, below).

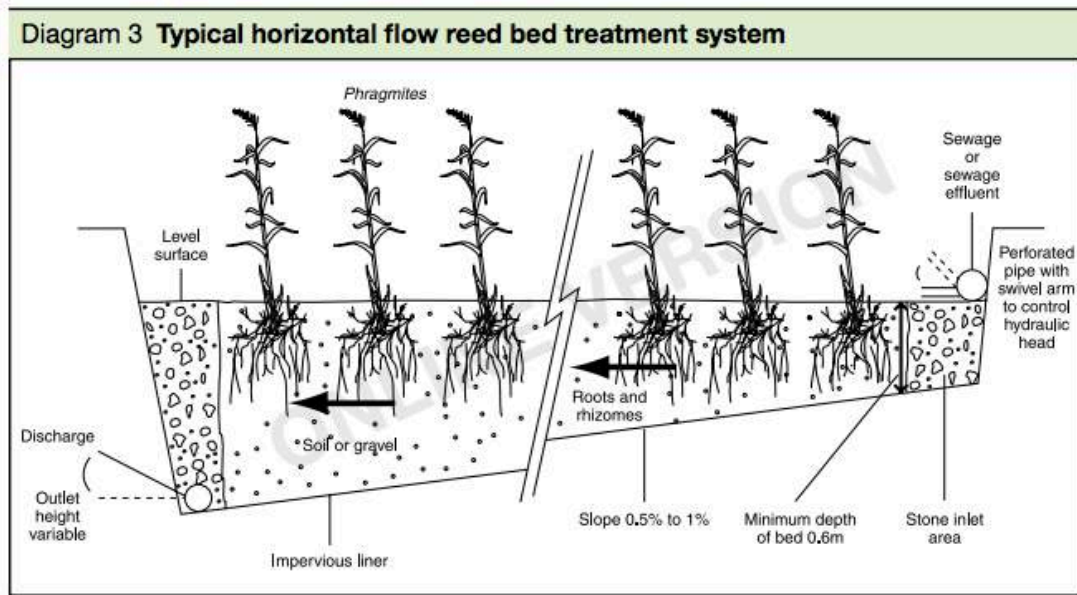
Reed beds are mentioned in the Building Regs Approved Document H (page 33-35), where it says “Reed bed system should be designed and constructed in accordance with BRE Good Building Guide 42”, which we will follow. Reed bed systems are capable of taking and treating foul water, although as noted above very little would be produced on site and our systems would only have to treat grey water. As such, they can be sited reasonably close to the houses.

Since waste water production is erratic, it will be distributed via a surge tank for each plot.

Non-biodegradable and toxic cleaning products will of course be avoided as these will damage the living systems in the reed beds.

The western edge of the site is bordered by a stream, which must not become polluted. The reed beds will be situated well away from this watercourse, and screened by willow or comfrey plantations, which will absorb excess fluid in the event of overspill. The placement of reed beds is shown on the Landscape Design document A3.

Figure 5: Diagram showing reed bed system (from Building Regs Approved Document H).



Plot specific waste

Plot 1

Cider pulp: Pulped apples are a by-product of juice and cider production. By Year 5, plot 1 will be juicing 3.3 tonnes of apples in this way, resulting in 2.3 tonnes of apple pulp. This will be mixed with 15-30% hay and used as cow fodder on plot 2. Any remaining pulp which cannot be eaten by the cows will be mixed with woody material and composted.

Plot 2

Manure: Cows will naturally produce large amounts of manure, both on the pasture and in the cowshed. It is a useful by-product to be composted and used over the site, but can cause problems if there is run-off. Drains will channel run-off away from the cowshed to a comfrey-patch, and composting manure piles will be kept covered. The small number of cows is not expected to create a hazard for the clean water of the stream, but the wooded western slope of the plot will act as an absorbent barrier in the unlikely event of any contamination of surface run-off. It is expected that some manure will be used by Plot 4 to generate insects for the chickens.

Whey: The quantity of whey produced in cheese-making is comparatively large and while it will be used to create numerous food products such as ricotta, mysost and tonic fizzy drinks, there will be excessive liquid waste.

Wyc will first remove as much protein as possible from the whey, creating the above products (a potential sideline business) as well as feed suitable for chickens. The remaining liquid will be gently fed into Plot 2's reed bed (which will be extra large) via the surge tank.

Plot 2 aims to work toward a more elegant solution, feeding whey into a methane digester which can then be used to supply heat for the cheese-making process.

Animal Carcasses: Plot 2 will sometimes have to slaughter a male calf after it is weaned, and other animals will occasionally die. The meat will be eaten by the family, and other body parts can be made useful, for instance by curing and tanning the skin. Large bones can be kept for pet dogs. Unwanted animal parts will need to be disposed of by a registered incineration company in compliance with the law. At the time of writing, Goddards in Haverfordwest can collect and dispose of a single animal for £18.

Plot 3

All plot-specific waste assimilated on site.

Plot 4

All plot-specific waste assimilated on site.

4 Ecological Footprint Analysis

4.1 Summary of Ecological Footprint calculations

The assessed ecological footprint of each of the four households is as follows (see Ecological Footprint assessments attached as Supporting Document C1):

Table 13: Ecological Footprint summary for the four plots

	Pre-application (optional)	At first habitation	Year 5
Plot 1 (2 people)	3.86	2.38	1.09
Plot 2 (3 people)	2.12 (3.18)	1.54 (2.26)	1.02 (1.54)
Plot 3 (3 people)	not calculated	2.14	1.02 (1.54)
Plot 4 (5 people)	not calculated	1.12	0.76 (0.95)
Average (13 people)		1.63	0.91 (1.09)

The figures show that the four households at Rhiw Las will each achieve an Ecological Footprint below 2.4gha per person by Year 5. All households currently have Ecological Footprints well below the Welsh average of 4.88gha per person, which demonstrates that we already make efforts to live in sustainable ways, to the extent that is possible without living and working on a piece of land as we aspire to do. A pre-application footprint is not calculated for Plot 3 because residents do not currently live in the same household. Figures in brackets refer to calculations in the event that a currently-dependent child leaves home (plots 3 and 4) and as a projection for the increased consumption of a child who is currently under 2 years of age (plot 2).

Potential for further reductions in the longer term will come from the improved productivity of the site due to the rebuilding of soil fertility, the establishment of tree crops including orchard and coppice, and establishment of the businesses within the local economy. Our aim is to continue to reduce our Ecological Footprint after Year 5 in these ways. As discussed in the OPD Practice Guidance (page 61), there are aspects of the EF that we individually have no control over, such as those for public services and capital investment (which of course as Welsh residents we benefit from), but our aim is to reduce all other aspects to the minimum feasible in the current economic and social environment in Wales.

4.2 Narrative explanation of EFA contributions by plot

Plot 1: The largest contributions to the pre-application EF of plot 1 applicants are fruit and veg, diesel, rail transport, and on-grid electricity. Between them these four items currently contribute a total ecological footprint of 2.2gha for each of the two people. The footprints of fruit and veg and on-grid electricity will be reduced essentially to zero in year 5 because we will be off-grid for electricity and growing/preserving almost all of our fruit and veg needs. Diesel will continue to be used in small quantities in line with the Travel Plan, but will be greatly reduced due to working on site rather than commuting to a workplace. Rail travel will be greatly reduced as it is also currently used for commuting to work and this will no longer be necessary when we have a business operating on site. By Year 5, the largest single contributors to the Ecological Footprint

are the Public Services and Government (0.26gha) and Capital Investment (0.13gha) over which we have no control, plus our own use of diesel, the costs of home construction (spread over 30 years as the spreadsheet guidance advises), and the Miscellaneous Dwelling Services of Council Tax and Rhiw Las membership subscriptions (0.23gha). In the longer run we aspire to convert to using biodiesel, but this has not been included in the Year 5 figures.

Plot 2: Strictly speaking, the footprint calculation per person is distorted for plot 2, as the third member, Willow was born in 2013, and consumes far less than an adult; hence above in brackets the same calculation counting only two persons is included. Pre-application the largest contributions are fruit & veg (1.88gha), car travel, electricity & gas. As with Plot 1 above, the footprints for fruit & veg and on-grid electricity will be reduced to close to zero by year 5 as will meat and dairy (provided by the micro-dairy and home poultry) though diesel use remains relatively high (0.33gha) due to an assumption that Willow will want to be transported to various childrens' activities frequently. However in future years this petrol cost is expected to go down as she becomes able to cycle, use public transport, and eventually to car share. Ultimately, she is naturally expected to become fully independent and self-supporting.

Plot 3: The EFA for Plot 3 includes one dependent child, who is 16 years old at the time of application. It is possible that Isis will leave home by the end of the 5-year period, and therefore our results are presented both with and without (in brackets) her contribution. By Year 5 the largest contributions to the Ecological Footprint of Plot 3 are Miscellaneous Dwelling Services (as above, 0.23gha), diesel use (0.43gha, which we aspire to replace with biodiesel over time), and grain mill products (0.26gha).

Plot 4: The EFA for Plot 4 also includes a dependent child who by Year 5 will have reached an age by which she may have left home; results are presented with and without (in brackets) her contribution. By Year 5 the largest contributions to the Ecological Footprint are Miscellaneous Dwelling Services and private car use, along with the expected large contributions from food products due to there being 5 people to feed.

Why are these numbers so low?

Essentially, they are low because residents' income levels are low. Looking at the spreadsheet, we can deduce that the highest impact item per pound spent is fruit and vegetables (input ref 30). This has an ecological footprint of 0.16 gha for every £100 spent. To take the most extreme case, therefore, if a 2-person household with an £8000 income were to spend it in the highest impact manner possible, they would have an average footprint of 6.4gha per person, only a little above the Welsh average of 4.88. In practice, after 5 years almost nothing is spent on fruit and veg and the majority of income therefore goes towards much lower-impact products and services. Residents' current consumption of fruit and veg is also spent locally and seasonally, so we must assume that the very high ecological footprint given in the spreadsheet corresponds to an average value, incorporating out-of-season and air-freighted produce rather than a more sustainable diet.

On the flip-side, it must be noted that high incomes are a primary cause of high ecological impact. All spending creates impact, and additional income is not normally spent on the lowest-impact items (wood, biodiesel, and second-hand clothing). It is even difficult to find an ecologically sustainable way to maintain cash savings, since most banks invest in fossil fuel companies and other unethical organisations - the Ecological Footprint Calculator does not account for this additional impact.

We understand that a low ecological footprint is meant to be “challenging to achieve” and indeed it is. What makes it possible is the opportunity afforded us to create our own modest, One Planet homes and thus release ourselves from the conventional vicious circle of higher income and higher spending. For instance, rent alone would double our outgoings (with consequent increase of the ecological footprint) at a stroke, if we were not able to live on site.

The One Planet lifestyle is necessarily low-cost and low-impact, because:

- we do not commute to work;
- we produce our own energy, rather than buying it;
- we produce our own food, rather than buying it;
- we will make our own house, rather than buying/renting it;
- we do not regularly buy any non-recyclable items;
- we cannot easily go away for long periods, due to the need to be on site to care for livestock and tender plants;
- we choose to live a lifestyle where our needs are met by the land around us and not by high-impact products brought in from elsewhere.

5 Zero Carbon Buildings

5.1 Principles of One Planet Building

We have designed these houses to conform to the primary requirements of One Planet Development, which are:

- to provide a functional space which, in addition to housing residents, can also be used as a working area, as a water collection system, as a growing area, as a drying space, and as a source of electricity;
- to be embedded into the landscape;
- to be made of local, natural materials;
- to be zero-carbon in construction and use.

These requirements, along with the needs and resources of each household, have dictated the designs. They therefore share the following attributes:

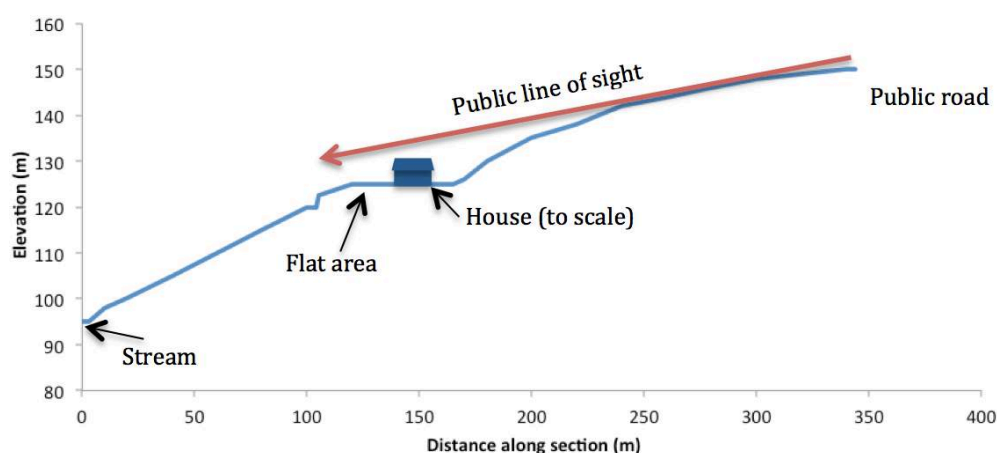
- use of passive solar heating from south-facing windows;
- space allotted for solar photovoltaic panels and solar hot water;
- flat outdoor space near to the house for working;
- plenty of storage space for seasonal crops and materials;
- no more than one-and-half storeys high;
- timber-framed structures with straw bale insulation.

All dwelling houses will of course conform to the relevant Building Regulations and have been designed with these in mind.

5.2 Embedding into the landscape

Embedding the houses into the landscape has been achieved by several methods. Firstly and most importantly is the choice of building locations on site. All the dwellings are positioned approximately halfway down the valley side, on an area of flat land which forms a natural terrace. Nestled within this terrace the dwellings are hardly visible from above or below, as shown in Figure 6. The existing agricultural barn (erected in 2008), which is much larger than any of the proposed new buildings (14 metres by 23 metres footprint, and 5.5 metres tall), is not visible from the public road or entranceway. This is demonstrated by the photomontage shown in Supporting Document A5, which also indicates the house positions, showing that they too will be screened by the contours of the land.

Figure 6: Embedding the houses into the landscape, so they cannot be seen from the land above.



The second method for embedding the houses into the landscape is the use of landscaping and planting around the houses, some of which already exists. As there are no overlooking vantage points from the south, a clear area can be left in front of the house to allow best use of solar energy. Neighbours at Baily Mawr and Pant-y-Groes overlook the site from the north, so we propose to create screening banks and hedges immediately to the north of each dwelling, which will have the secondary advantage of improving insulation and protection from the cold north winds.

The third method is the use of natural materials and low profiles in the house designs. Taking on a natural appearance from the start, these materials will weather over time, timber will fade and the houses will blend in even more with the surroundings.

Finally and perhaps most importantly, the houses will be embedded into the landscape in a more material way by their use and function. They are not merely dwellings, they are also a part of what makes the One Planet livelihoods and activities on site possible.

5.3 Building Regulations

All dwelling houses will of course conform to the relevant Building Regulations and have been designed with these in mind.

The four dwelling houses are the only structures on site to which formal Building Regulations will apply. Other structures on site fall into the category of agricultural buildings or greenhouses (Planning Portal, class 3 exemption), and satisfy the following conditions :

- (a) no part of the building is used as a dwelling;
- (b) no point of the building is less than one and a half times its height from any point of a building which contains sleeping accommodation; and
- (c) the building is provided with a fire exit which is not more than 30 metres from any point in the building.

5.4 Re-use of existing agricultural building

The site benefits from a large modern agricultural building. This barn significantly reduces the need to construct further ancillary buildings and also demonstrates how a large building (much larger than any buildings covered by this application) can be accommodated within the landscape with minimal visual impact, thanks to planted screening and use of existing topography.

The barn will be used during the set-up phase of the project for storage of building materials and as a covered working area for wet days. There is ample space for all four households to make use of this resource.

5.5 Proposed buildings – design and materials

5.5.1 Sourcing of materials

More comprehensive notes on the sourcing of materials may be found in Supporting Document D5, which considers the Code for Sustainable Homes. Some materials used are:

Timber: Welsh-grown oak and Douglas fir are suitable as load-bearing structural timbers and readily available locally (particularly Douglas fir).

Straw bales: Straw is not typically grown locally due to the climate. Experiments at Tir-y-Gafel in Pembrokeshire have confirmed that hay, while easily available locally, does not have the required structural stability. Therefore we propose to bring in straw from the nearest available source. Straw is widely used for animal bedding and therefore we anticipate no difficulty in sourcing.

Plaster: Lime plaster is sourced from Tŷ-Mawr Lime Ltd of Brecon.

Cladding: Welsh larch is a fine cladding material with excellent resistance properties and a natural aesthetic. Again, it is readily available locally.

Slate roof: In Wales the traditional local natural roofing material is of course Welsh slate. We aim to source reclaimed slate where possible, to keep costs down.

Turf roof: The cheaper alternative to slate is a “green roof”, which has the additional benefit of reducing the visual impact of the dwelling. Turf is of course available on site. A plastic waterproof membrane is required beneath the turf, which is not a natural material but can be expected to have an extremely long life if well protected.

Roof and floor insulation: Several good options are available for insulation. Either a further layer of straw bales may be used, or, to reduce thickness while keeping an excellent U-value, solutions such as Warmcel (recycled newspaper, sourced in Newport Gwent) or Thermafleece (treated sheep’s wool, sourced in Cumbria). An even lower-cost option is direct use of sheep fleeces, treated with borax powder to deter pests.

Windows: We will aim to find reclaimed double-glazed windows where possible, to reduce costs and minimise the ecological footprint of this non-natural product. Due to the use of straw bales and lime plaster, reclaimed windows can be built into the house in an attractive way. Where incorporation of reclaimed windows is infeasible, new double-glazed units will be purchased.

Doors, fixtures and fittings: These will be reclaimed/recycled where possible, or made on site out of local timber.

5.5.2 Buildings – Plot 1

The dwelling house is a 9x13m one-and-a-half storey oak-framed building, with straw bale infill providing excellent wall insulation. The walls will be rendered internally and externally with lime plaster, and clad externally with Welsh larch. A lean-to single-storey workshop is attached to the eastern side of the dwelling, for frost-protected storage of beekeeping materials and produce. A lean-to uninsulated pantry is at the north side of the building, for refrigeration in winter and storage space in summer. A small conservatory on the south side acts as an entrance porch preventing draughts into the main building, and also as a bright growing area for tender seedlings. The covered veranda to the west and south provides an area close to the house suitable for outdoor working on wet days. The house is screened from views to the north by a raised bank and mid-height planting.

A greenhouse is nestled on the terrace below the main dwelling, to minimise its visual impact from the rest of the site and reduce the vulnerability to westerly winds. We intend to construct this greenhouse from timber and glazed panels. However, if a cheap second-hand greenhouse of similar dimension were available we would be pleased to re-use any materials. The greenhouse is essential, to extend the season of subsistence crops such as tomatoes and beans, for seedlings, and to provide a covered working space in winter. This allows us to produce our own food needs all year round, to meet the OPD policy.

Detailed plans of the dwelling and greenhouse are provided in Supporting Document D1.

A small additional composting toilet for outdoor use is positioned on the upper edge of a terrace, to facilitate disabled access and ease of compost retrieval.

The existing polytunnel will be kept in use until end of life (it is already several years old, but serviceable), after which the metal frame will be repurposed with dark-coloured netting to form a small cage for protection of soft fruit and brassicas.

5.5.3 Buildings – Plot 2

The dwelling house will be of timber frame construction, with highly insulated walls of straw bale and lime. The large south and west facing windows and low eaves provide solar gain in winter when the sun is low and shade in summer. The north and east facing windows are small by comparison, minimising heat loss. The floor is raised above ground to guarantee against damp and to dissuade vermin. The building is one and a half stories high and if possible will have a Welsh slate roof, however if this is unaffordable a roof of corrugated, bitumen-soaked organic fibre such as 'Coraline' will be used in a slate colour. Either roofing material would allow

rainwater collection. Roof insulation will be sheeps' wool which offers excellent performance with smaller bulk and weight than straw bale.

The areas to the south and west will be decked, while the south will also have a glass conservatory. A covered veranda and porch serve to give comfort outside during inclement weather. Inside, the living room and kitchen areas will have a high ceiling, while the east side of the house will be covered by the child's bedroom and mezzanine.

The compost toilet will be located inside the building but positioned in such a way that any unwanted vapours cannot circulate inside the dwelling house.

The house will be screened from visibility by its position at the bottom of the long slope to its east (see Landscape Design in Supporting Document A3, and photomontage in A5) and the forest garden trees planted close to its north.

Detailed plans of the dwelling and cow barn are provided in Supporting Document D2.

Cow barn & Milking parlour

The Rhiw Las barn will be in constant use by the four households as a workshop and storage space. It will also contain food processing areas. These reasons, and the large space needed to house and milk cows and to store their food and bedding, and the potential disruption to other plots in moving cattle around outside of plot 2 make it an inappropriate place for the cows and their facilities. It is therefore necessary to create a new building.

The building consists of two main sections; the cow shed and milking parlour, and the food and bedding store. The two sections are connected by a feeder. All the walls are constructed of timber sourced as locally as possible, and the roofs are corrugated bitumen such as 'Coraline', allowing collection of rainwater. The storage section has a timber floor raised above ground to avoid damp and contamination from cow run-off. The cow housing areas will have a compounded subsoil floor, while the milking parlour will for hygiene reasons be finished with reclaimed flagstones. Where possible the floors will be covered by recycled rubber matting for the comfort of the cows, and to aid in cleaning.

This building will have its visual impact reduced by its position at the foot of the slope, partially dug into the hillside and screened by the willow hedge to its north.

Polytunnel

A polytunnel is essential, to extend the season of subsistence crops such as tomatoes and beans, for seedlings, and to provide a covered working space in winter. This allows us to produce our own food needs all year round, to meet the OPD policy. The polytunnel will be screened from view by planting on the north side, and will also benefit from the screening around the dwelling house.

Professional Kitchen

The professional grade kitchen will be located inside an area of the Rhiw Las barn designated to Plot 2. It will consist of a simple single story roofed and enclosed room, with flooring and walls protected by impermeable reclaimed tiles. Drainage and grey water assimilation will be provided by a reed bed system.

Cheese cave and Root Cellar

These will be dug into the hillside and will have almost zero visual impact, appearing only as a pair of doors. They will consist of walls and arched ceiling of reclaimed brick with gravel floor. Drainage pipes will lead outside while small ventilation chimneys will extend upwards. The constructions will be buried and turfed over, and are expected to maintain humid conditions at approximately 11 degrees centigrade throughout the year.

5.5.4 Buildings – Plot 3

The dwelling house is based around a 12m diameter roundhouse structure, with two short wings providing sleeping area. The roundhouse shape has a low profile and the use of a natural-colour shingled roof further embeds the building into the landscape. A strong timber frame is infilled with straw bale insulation and rendered with lime plaster. The two offset wings of the house outline a small south-facing courtyard area for outdoor working. The house will be screened on the north side by dense planting which will also break up the shape of the house from this angle: only the tip of the roof will be visible, if at all. A shingle rather than turf roof is used for the purposes of rainwater collection.

Detailed plans of the dwelling are provided in Supporting Document D3.

A polytunnel is essential, to extend the season of subsistence crops such as tomatoes and beans, for seedlings, and to provide a covered working space in winter. This allows us to produce our own food needs all year round, to meet the OPD policy. This polytunnel will be screened from view by being dug into the slope and by the use of hedging, especially on the north side.

5.5.5 Buildings – Plot 4

The proposed single-storey dwelling house consists of a locally-sourced timber frame infilled with straw bale and rendered with mud and lime plaster. The main section of the house is roofed in turf, to reduce visual impact. Wrapping around the south face of the house are a timber veranda for covered work/living space, and a solar room which will provide warmth for the house in the cooler season. The solar room will also provide an area for the most tender seedlings and for storage and drying of some home produce. The veranda and solar room also provide the main rainwater-harvesting area of the building.

Detailed plans of the dwelling are provided in Supporting Document D4.

A large commercial polytunnel is located halfway up the slope. This is screened from view in three ways: by being dug into the slope, by being located close to the large trees on the northern boundary of the field, and by the use of low hedging around the tunnel. Therefore we expect it only to be visible from across the valley, not from the east, north or south.

5.6 Code for Sustainable Homes statement

To meet the requirements of the OPD policy, the materials used are expected to conform to the Code for Sustainable Homes level 6, in respect of Category 3 (Materials). Advice we have received suggests that a full pre-assessment would be unnecessary and unrevealing, because many of the materials we plan to use are not included in the CSH standard materials inventory. A detailed consideration of how our approach meets the spirit of the CSH criteria is found in Supporting Document D5.

5.7 Exit strategy

With regard to the buildings, the exit strategy requires that they no longer be used as dwellings. Following the principles of Re-use and Re-cycling, we would therefore suggest the following hierarchy of use in the event of planning permission not being gained after 5 years:

1. Re-use of the buildings as agricultural buildings, with removal of any aspects only suitable in dwellings and (depending on use) removal of internal walls.
2. Re-use of all re-usable materials:
 - a. Fixtures and fittings can be re-used directly, including windows and doors.
 - b. Good quality structural timber can be re-used directly in other buildings.
 - c. Other timber such as floorboards, cladding etc can be re-used directly for the same purpose.
 - d. Waterproofing materials in the roof may or may not be re-usable depending on condition and type.
 - e. Straw bales are unlikely to be re-usable as building material but could be used for other purposes eg livestock bedding.
3. Composting following removal of the small quantity of non-biodegradable materials (glass windows, metal items, and roof liner).

The option of material re-use is preferred over composting because it would be a very energy-intensive way to make compost. However, because the homes are made of local, natural materials, they would decay quickly if left open to the elements. (Note, however, that with appropriate rendering and cladding straw bale houses are very durable: the oldest known straw bale house in Europe was built in 1921 and is still inhabited²².)

²² <http://www.naturalbuildingblog.com/the-oldest-known-strawbale-house-in-europe/>

6 Community Impact Assessment

The essential criteria are that:

- There is a thorough assessment of all impacts of the proposals on neighbouring communities. One Planet Development in the open countryside should not impact negatively on neighbouring communities.
- Any negative impacts are mitigated.

The community impacts of the project are assessed below.

6.1 Community Supported Agriculture (CSA)

Rhiw Las will provide a Community Supported Agriculture scheme for locals, where members pay a subscription to receive a share of the harvest throughout the year. Paul Jennings has extensive experience organising and working with such a scheme. The primary pick up/ distribution point will be placed in Whitland where we can also receive our bulk orders of dry goods. If membership is significant North of Rhiw Las, another pick up point in Llanboidy will be arranged.

No similar, pre-existing projects currently exist locally; we will seek to join forces and co-operate with them if they come into being. Banc Organics in Bancffosfelen is the nearest existing CSA scheme, distributing organic veg to members in the Gwendraeth Valley. Caerhys Organic Community Agriculture operates a similar set-up near to St Davids. Links between such schemes can help with marketing and selling, as well as providing a buffer for swapping produce where particular crops fail, allowing a more reliable year-round supply of local organic produce.

Positive community impact:

- Creates a locally based social network from which many of the beneficial activities below can be initiated.
- Distributes local, low impact produce (see below)
- Encourages traffic into Whitland where members can become customers of other local businesses.
- Possibility to sell (by arrangement) items from other local producers

6.2 Low impact produce

Rhiw Las will produce a broad range of products, all of which have a significantly lower ecological footprint than equivalent shop-bought goods. These products will be sold both via the CSA and at local markets. All these products will be marketed under brands that emphasise the qualities of local character, local manufacture and traditional, organic methods.

Positive community impact:

- Customers will be reducing their own footprints by purchasing these products instead of ones that have been imported, packaged, transported, and displayed in a shop.
- Customers will have more personal and direct relationships with their food growers, which could include visiting and even working on the farm with the CSA scheme.
- New locally identified brands of cider, cheeses, honey and similar products will enhance the local cultural identity.
- Produce such as fruit and veg will tend to be fresher and more nutrient-rich than shop-bought equivalents.
- The use of non-hybridised, heritage seeds preserves and strengthens local and traditional varieties.
- Reduction of food transport into the Carmarthenshire region, reducing impact of heavy lorries on roads.

6.3 Farm and food processing facilities

Rhiw Las businesses will involve some specialist facilities which will be made available to rent by people outside of site when they are not in use. Examples include the cider apple and cheese presses and professional standard kitchen facilities for making jams, cordials, meat products, etc.

Positive community impact:

- Home producers from the local areas will get the opportunity to operate at a more professional level, encouraging start-ups of small local business.
- Networking with other producers in this way encourages further collaboration within the locality, with the potential to increase and expand the quantity, range and quality of locally identified products available.

6.4 Participation in local economy

Residents will spend money with local retailers and will sell primarily to local customers. Businesses will also participate in local networks such as the produce market in the Whitland Memorial Hall.

Positive community impact:

- Diversifying the produce on offer at local markets encourages more customers to attend.
- We will advertise other local businesses within our networks, on the basis that we can all support each other and create a distinctive identity and demand for high quality local produce.
- Money spent locally is recirculated within local economy rather than going back as profit to international shareholders in large retail chains.

6.5 Use of public services

The residents will all use public transport when viable. Whitland train station is three miles from the farm and easily reachable by bicycle or electric bicycle. Guests will also be encouraged to use the train and local bus services as much as possible. Volunteers will be likely to come with heavy baggage, and we will naturally offer to pick them up by our own motor vehicles, which at least saves the long distance travel by car. More detail of the Travel Plan is provided in that section.

Public services also include refuse collection and emergency services.

Positive community impact:

- Use of public transport services by residents and visitors will make local public transport schemes more economically viable.
- By using public transport we endeavour to reduce motor vehicle traffic and our carbon footprint.
- We will promote cycling, walking and public transport within the local area by welcoming cyclists and walkers and offering discounts on courses to anyone who arrives under their own steam, or by public transport.

Mitigated negative impacts:

- Trackways will be created and improved to allow access by emergency services to all of the dwellings. See Design and Access Statement.
- Refuse collection needs will be minimised, and will be much less than that of average dwellings. See Waste section for detailed information.

6.6 Access to site

Rhiw Las will hold occasional, locally advertised Open Days where the general public is welcome to come on to the land. These will be themed with local and seasonal events and the activities on site, such as Apple Days and harvest festival celebrations. People will also be invited onto the site for voluntary experience of low impact building or farming; this would be by pre-arrangement only. Outside of these times we would not encourage “drop-in” visitors to call uninvited, since residents will be busy with their own lives and businesses.

Positive community impact:

- Opening up more land for the public than is currently available.
- Educational resource both for children and others, to learn about low impact development, Permaculture, building, farming and how food is grown in Wales.
- Celebrations of local food growing and local seasonal events.
- Exemplar of low impact buildings which are zero carbon in construction and use, and which are made of local natural materials.

Mitigated negative impact:

- Events could attract a larger than normal amount of traffic at certain times, which will be mitigated by adding extra charges for parking, providing a pick-up service at Whitland station and providing an online bulletin-board or similar to promote lift-sharing.

6.7 Education

There is a strong demand in the UK for education and experience in low impact building and life skills, to the extent that projects such as Tir-Y-Gafel in nearby Glandwr have been built with an entirely volunteer-based labour force and continue to benefit from volunteer labour. Courses in low impact living are always popular and a particular selling point will be the opportunity for attendees to visit a working site rather than spending time in a less characterful venue.

Positive community impact:

- During setup, experience in low-impact building will be provided for free to volunteers.
- Once up and running, the residents will provide workshops and training courses in their respective crafts.
- The overall effect on the community is enrichment by the spread of useful skills and experience of One Planet living.
- There is also an ongoing positive impact as visitors take back examples and inspiration from the work on site into daily lives, such as energy conservation techniques and gardening skills.

Mitigated negative impact:

- Traffic impacts will be minimised by offering discounts on courses to those who arrive by bike or public transport, and by encouraging car-sharing.
- Where we are over-subscribed for courses or volunteers, we will selectively choose those who have the least distance to travel and who will arrive by bike or public transport, or who can share transport with other attendees.

Forest School:

Working with local schools, Peni (Plot 3) will provide Forest School on the site for local young people (approximately 8 sessions per year). Forest School is an experiential education set in a woodland environment. It is all about learning and having fun in a natural environment which boosts a learner's confidence and self-esteem by giving them achievable tasks and managed risks. It increases awareness and appreciation of the natural environment and fosters improved communication and group dynamics.

Positive community impact:

- Helps young people gain self-confidence, motivation and good health²³.
- Forest School enables young people to learn about respecting themselves and thus then learning to respect their environment.
- Learners who may not find it easy to learn in the classroom find new ways of learning and expressing themselves.
- There is a growing body of research that supports the view that children who have meaningful experiences in nature during their childhood, grow up to care for the natural world.

Mitigated negative impact:

²³ For further info see <http://www.forestschoolltraining.co.uk/forest-school/the-benefits/>

- A small amount of additional traffic. We will expect attendees generally to arrive in a minibus or similar, rather than individual cars. If individuals book rather than a group, they will be encouraged to car-share. Sessions are small groups and will be planned not to overlap with other events.

6.8 Research, information gathering and sharing

One Planet living is of academic interest to science, as are many of the low-tech, yet cutting edge techniques the plot holders will be using; Tir-y-Gafel near Glandwr has already been the subject of several academic studies. Aspects could include development of soil fertility, organic crop yields, feasibility of low impact smallholding, biodiversity and the use of biochar. The monitoring aspect of One Planet Development and the annual and 5-yearly review offers a clear opportunity for documentation and research into an area that has traditionally been rather neglected, yet is recognised as having great importance for the future of sustainable agriculture. Organisations such as the Centre for Alternative Technology in Machynlleth, the Sustainable Places Research Institute at Cardiff University, the Ecological Land Co-operative and the Permaculture Association may be interested in research partnerships or case studies. We are informed that the One Planet Council (www.oneplanetcouncil.org.uk) is actively pursuing such partnerships and we will work with them where possible.

Positive community impact:

- Contributes to a scientifically robust body of knowledge on low impact living and sustainable agriculture.
- Provides well-documented examples of ecologically and economically sustainable small businesses.
- The 5-year and ongoing monitoring will track and demonstrate the improvement in biodiversity and productivity.
- As a Permaculture LAND project, we will be able to share the results of this monitoring and demonstrate best practice in sustainable and productive land management.
- We will make our monitoring reports publicly available on the Rhiw Las website and via the One Planet Council.

Local groups

Rhiw Las will be of interest to groups interested in biodiversity and traditional skills such as the Tywi Centre, Carmarthenshire Bat Group and other members of the Carmarthenshire Biodiversity Partnership.

Positive community impact:

- Allowing these groups access to the site for study or experience, and to use our venues for (small) meetings.
- The plottolders can work with these groups to develop and improve the site further in response to their feedback.

6.9 Conservation of local honeybee populations

There is a strong need to rear bees locally. A recent academic study across 11 European countries compared the local strain of honeybee with two foreign strains at each location²⁴. Author of the study Dr. Kryger said "It is very clear that the local bees fare better than imported ones, and that they live longer". The paper concludes "the results of our study show that it is not merely an ecological issue, but also a commercial one: the use of local honey bee populations provides a higher chance of colony survival, and the use of maladapted bees attributes to high colony losses, as recently observed in many regions. Thus, local breeding activities should be promoted and encouraged throughout the native range of *Apis mellifera*." In addition to this recent work the British Beekeeping Association has long maintained a policy to discourage the importation of queen bees and colonies from outside the UK. Despite this, the UK supply is unable to meet demand leading to a large amount of imports.

Positive community impact:

- Increase the supply of locally bred bees.

6.10 Supplementary businesses

The plottolders of Rhiw Las will be supplementing their basic needs incomes with other skills that are not directly land-based but nonetheless bring their own benefits to the local community. They are summarised below:

Yoga & Tai Chi

Silvia (Plot 2) and Paul (Plot 4) are teachers of the above disciplines and will hold occasional workshops or retreats on the land.

Positive community impact:

- The practices are gentle and health-giving, and provide a wide range of benefits to practitioners.
- They can be used by people who find most exercises difficult- for instance elderly or pregnant people and those recovering from injuries.
- Pregnancy and post-natal yoga classes are great networking opportunities for new mothers with similar interests.

Mitigated negative impact:

- Events could attract a larger than normal amount of traffic at certain times, mitigated by adding extra charges for parking, providing a pick-up service at Whitland station and providing an online bulletin-board or similar to promote lift-sharing. Where significant traffic is expected, courses will be timed so that large numbers of arrivals do not happen simultaneously (in any case this is limited by our parking arrangements).

Lecturing at local colleges:

²⁴ Büchler R *et al.* The influence of genetic origin and its interaction with environmental effects on the survival of *Apis mellifera* L. colonies in Europe, Journal of Apicultural Research 53(2): 205-214 (2014)

Wyc (Plot 2) means to continue his teaching career on a part time basis for the first few years. He will be leaving a very successful Computer Games Development course in Stroud and hopes to transfer all elements he can to one of the local colleges.

Positive community impact:

- Providing skills for young people that inspire interest and lead to higher education.

Mitigated negative impact:

- Might be considered to put pressure on the job market, however, Wyc's specialist subjects are not currently taught at local colleges, so a new position could be created.

Bicycle Maintenance:

Chris (Plot 1) is a qualified bicycle mechanic to Level 3 Diploma²⁵, and hopes to continue his existing bicycle maintenance work on an occasional basis. Activities could include temporary set-up in town centres to offer on-demand maintenance and repair. Chris also has many years' experience of providing a "Doctor Bike" service at community events. In addition Chris will maintain the bicycles on site to ensure that residents and visitors can make safe use of their bikes. Plot 1 residents intend to use electric bicycles charged by a zero-carbon renewable charging system from solar panels, which will be available to visitors with electric bikes as well.

Positive community impact:

- Encourages use of bikes as a zero carbon transport method.
- Encourages site visitors to arrive by bicycle.
- Ensures safety of bicycles on site.
- Promotes use of renewable electricity and electric bikes as an alternative to cars for short/medium length journeys.
- Reduces fossil fuel reliance of both residents and visitors.

6.11 Traditional Celtic Music

Peni and Stef (Plot 3) are well known musicians and members of both the Mordekkers and Corelw²⁶, having been part of the Welsh music revival for the last 20 years. They specialise in traditional instruments such as the pibau (Welsh bagpipes), bombarde and mandola, and are often invited to represent Wales at cultural celebrations such as the Lorient Inter-Celtic Festival and the St David's Day parade in Cardiff. They regularly organise and play for folk dances and festivals in South West Wales. In addition, they bring Welsh music to younger audiences as a "fusion" mix of traditional Welsh tunes with drum and bass. They will continue to create and perform while living at Rhiw Las, and offer tuition to individuals and small groups in traditional instruments such as the Celtic harps that Stef makes for sale. Living and

²⁵ The Diploma VRQ in Cycle Maintenance and Repair is the highest quality and highest attainable qualification in cycle maintenance in the country.

²⁶ <http://www.mordekkers.co.uk/> and <http://corelw.tumblr.com/>

working on site will allow both Peni and Stef to deepen the connection between the traditional instruments and the natural materials from which they are traditionally made, and to share that connection with others.

Positive community impact:

- Local performances.
- Performances at local and regional cultural events.
- Preservation of ancient traditional music of Wales.
- Connecting people with nature through music, and connecting people with music through nature.
- Tuition in traditional instruments helps to foster local, regional and national cultural identity.
- Demonstration of traditional, ecologically sustainable musical instruments and the relationship of music with the land.

7 Transport Assessment and Travel Plan

The site is served by Abbey Road, a council-maintained road on which there are 27 other addresses, including the Roadhouse Restaurant, the Ivydene Garden Centre, the old Whitland Abbey and a number of working farms.

7.1 Baseline

The traffic generated by the site at the time of application is estimated at 18 visits per week, broken down as follows (all of these journeys are by car/van):

- 2 visits per day by Paul to water/plant/harvest crops in the polytunnel and fields;
- approximately 1 visit per fortnight by Chris and Erica to look after beehives;
- approximately 10 visits per month for general management.

7.2 Public transport

The 221 bus (Logan-Carmarthen, Weds and Sat) goes through Llanboidy, which is a short walk north of the Rhiw Las site. Whitland is easily reachable by bicycle, 3 miles to the south, and has the 223 (Glandwr-Carmarthen, Weds only), 224 (Whitland-Carmarthen, Mon-Sat) and 322 (Haverfordwest-Carmarthen, Mon-Sat) buses as well as the rail station for connections to Carmarthen, Swansea and beyond. The proximity to such transport connections (particularly the rail station) was one of our primary reasons for choosing this site.

7.3 Transport assessment and strategy

The following table describes our estimated number of trips made and the strategy for minimising each type of journey. This table is based on numbers provided by each household (please note that this is a summary of fuller details given in Supporting Document B3, Minimum Needs calculations).

Note that in all of these documents 1 trip is defined to mean a there-and-back trip, and refers except where specified to all transport modes (car, bicycle, etc).

Table 14: Transport Assessment and Travel Plan

Description	Trips	Strategy
Delivery or collection of additional food needs and other goods (personal needs not related to businesses)	6 bulk food deliveries per year, plus 2 other deliveries per month (e.g straw or animal feed)	Rhiw Las will run a food buying co-op to have non-perishable goods delivered in bulk. Because there are many other houses on Abbey Road, normal Royal Mail deliveries do not create any extra traffic. Residents will buy other goods in bulk or as a group to minimise extra site deliveries.
Social (residents going out)	Total of 19.8 trips per week (car, bike, public transport)	Residents will use bicycles where possible, including electric bikes which have a comfortable range of 10-15

		<p>miles.</p> <p>Residents will share car journeys where possible, using a community noticeboard to plan trips.</p> <p>Public transport will be used when feasible.</p>
Social (visitors coming to site)	Total of 15.5 trips per week (car, bike, public transport)	<p>Secure bicycle parking will be provided.</p> <p>Friends and family will be encouraged to visit using public transport, and to car-share.</p>
Business	Total of 8.3 trips per week	<p>The Community Supported Agriculture scheme will provide a single outlet for multiple products, greatly reducing the transport requirements by using a single bulk delivery to a pick-up site in Whitland.</p> <p>Businesses will share other journeys where possible, using a community noticeboard to plan trips.</p>
Business (deliveries to site)	Total of 2.8 trips per week	<p>Containers such as the CSA boxes will be recycled where possible so that additional deliveries are not required.</p> <p>Business deliveries will be minimised by ordering items in bulk where possible.</p>
Business (courses)	Total of 4.6 trips per week, of which $\frac{1}{3}$ by car, $\frac{1}{3}$ by train, $\frac{1}{3}$ by bike	<p>Forest School pupils will arrive in a minibus which will park inside the entrance.</p> <p>Course fees will be discounted for visitors who arrive by public transport or share cars.</p> <p>Course timings will be co-ordinated to avoid large numbers of cars arriving at once.</p>
Volunteers	Total of 1.5 trips per week, of which $\frac{1}{2}$ by car and the rest take train to Whitland and arrive by bike/foot.	<p>When looking for volunteers, we will preferentially choose those who live closest or who would be in the area anyway.</p> <p>Volunteers will be encouraged to arrive by public transport and can be picked up from the train station at Whitland.</p> <p>Bicycles will be provided for visitors to make short journeys themselves.</p>

Open days	Total of 1.5 trips per week	A small number of Open Days will be held at intervals to promote low impact living. As such we will encourage visitors to arrive by public transport or bicycle, or to car-share, and will primarily advertise locally.
Travel related to off-site work	Wyc (College): 2 per week Stef (coppicing): 2 per week Sarah (to post deliveries): 2 per week	The nature of the ongoing project is such that as the on-site businesses become established we will aim to minimise off-site work. This is therefore included as a short-term expectation during the transition phase.

In the set-up phase (years 1-5) it is likely that our transport requirements will be a bit higher than set out above, mainly due to the transport of materials onto the site and the extra journeys required for marketing and promoting the new businesses.

7.4 Travel plan

The travel plan strategy to minimise the impact of journeys has been outlined in the table above. Having four households and businesses on site allows us to reduce journeys considerably by sharing transport and co-ordinating deliveries, as well as making shared infrastructure more efficient.

By implementing the above strategies, the total number of journeys (half of an out-and-back trip) per year made by residents (personal plus business) will be $(19.8+8.3) \times 2 \times 52 = 2922$ per year, which is 225 per person (counting 2+3+3+5=13 people on site) by all transport modes. For comparison, the average number of journeys per person by a Welsh household is 967 per person, of which 671 are by private transport. This figure is taken from the National Travel Survey²⁷, Table NTS9903 of National Statistics 2013, and does not include visitors or deliveries. See Supporting Document B3 for further details of Rhiw Las transport projections broken down by type of journey. One reason why the travel requirements are so much lower than average is that residents primarily work on site, immediately mitigating 20 trips per week (1000 per year) for each adult not commuting to another job.

Secure bicycle parking will be provided. See Design and Access Statement (supporting document E1) for more details of access provision.

7.5 Monitoring

All vehicle journeys and site visitors will be recorded in a log-book and reported in the annual monitoring statistics that we provide to Carmarthenshire CC.

²⁷ <https://www.gov.uk/government/statistical-data-sets/nts99-travel-by-region-and-area-type-of-residence>

8 Phasing, Monitoring, and Exit Strategy

8.1 Timeline for development

Note that business development has been described on a year-by-year basis in the Business Plans provided separately. These all involve a steady increase in production over the 5-year set-up period. This allows the businesses to develop and find new customers at a sustainable rate, and also accounts for the time and energy that will go into construction of the dwellings in the first 2-3 years on site. Business development is therefore not included in this timeline but should be kept in mind as running in parallel, including the CSA run from Plot 4. Work on the businesses will expand as work on the initial construction and set-up decreases.

Year 0 (prior to application):

General maintenance of site. Clear-up of rubbish left by previous occupants. Consultation with neighbours and potential customers. Improvement of soils and growing areas. Planting perennial crops which will take some time to establish (eg grafted apple trees, willow coppice). Biodiversity survey. Soil analysis. Growing and harvesting some crops. Establishment of honeybee colonies. Preparation of planning application. Detailed plans submitted.

Year 1:

Earthworks and landscaping, including excavation of ponds and clearance of house sites. Excavated material to be used for earth banks to shelter and screen the dwellings, further embedding them into the landscape. Fast-growing perennial and evergreen shrubs/trees to be planted on the screening banks. Most residents will move onto site in temporary accommodation during construction of the dwellings. Foundations and drainage laid in winter for construction to begin in summer. Growing areas defined, mulched, and planted with low maintenance crops (eg potatoes, broad beans, rhubarb). All short rotation coppice to be planted by the end of the first winter following approval of the planning application, to allow full harvest by Year 5. Perennial crops also to be established as early as possible. Completion of Annual Monitoring Form.

Note: temporary accommodation will be located in the barn yard, where it is screened from view in all directions by the bank and willow hedge. Any temporary accommodation outside the yard will also be screened either by landscaping, planting, or choice of visually attractive materials (eg canvas yurt rather than caravan).

Year 2:

Structural completion of most dwellings expected by the autumn of Year 2, with roofs on and buildings watertight. At this point residents will move into the dwellings and temporary accommodation will be removed or re-purposed. Growing areas are expanded again, planting low maintenance crops both outside and undercover.

Completion of Annual Monitoring Form.

Year 3:

In the summer season after dwellings are complete, food production will expand at a greater rate as residents have more time to devote to gardening. Crops requiring greater attention are planted and plots will be at least half-way to the full subsistence requirement. All small livestock (chickens, ducks, etc) will have been introduced by Year 3, probably earlier. Re-assessment of biodiversity and tweaking Management Plans to ensure that any new species on site are well provided for. Initial success of the businesses will be monitored and efforts made to ensure that they expand in line with the business plans. First harvest from the short rotation coppice in winter of Year 3.

Completion of Annual Monitoring Form.

Year 4:

Continued expansion of food growing - some plots will have achieved the subsistence requirement already (particularly Plot 4, for whom this is also a business); others will be working towards the last few percent. Businesses are also on the final stretch, making improvements in areas of weakness and reacting to opportunities that arise.

Completion of Annual Monitoring Form.

Year 5:

All dwellings and ancillary buildings will be complete and screening banks will be well-established, so that the buildings are embedded into the landscape. Trees and shrubs will be growing strongly, providing further visual screening and contributing to the productivity of the landscape. Food production on site will contribute at least 35% of residents' food needs (probably a great deal more), and land-based businesses will be generating income to cover all of the identified Minimum Needs as set out in the OPD Practice Guidance. Community impacts are assessed in detail, with the opportunity for neighbours and customers to contribute their experiences and interactions with Rhiw Las residents and businesses.

Production of final Monitoring Report, to include updated Biodiversity Survey and summaries of how each plot and the site as a whole meet the requirements of the One Planet Development policy.

Year 6 and ongoing:

Monitoring will continue to ensure that residents meet the requirements of One Planet Development, living a productive land-based lifestyle with a very low Ecological Footprint and contributing to the local rural economy and community in Llanboidy, Whitland and Carmarthenshire. Biodiversity will continue to increase as habitats such as the Traditional Orchard become better established, previously improved grassland returns to a semi-natural state, and the existing ecosystems are strengthened by the variety of sustainable land uses on site. The dwellings will become less visible as trees and shrubs continue to grow around them and the natural materials develop an attractively aged appearance (for instance, timber cladding takes on a light grey tone over time). The businesses at Rhiw Las will be an important part of the local economy, supplying good value, high-quality local

produce to local customers and in turn relying upon other local businesses. Residents (children and adults) will continue to take part in community events and join in with the active social and cultural life of Llanboidy and Whitland. A revised Management Plan will be produced every 5 years, to ensure the ongoing development of the site towards the goals of One Planet Development, and to share the knowledge and experience generated at Rhiw Las with other such sites across Wales.

8.2 Template monitoring form

A template Monitoring Form is provided as Supporting Document F1.

8.3 Exit Strategy

The aim of the Exit Strategy is to return the land to solely agricultural use (as opposed to habitation), in equal or better condition than it was in originally. The land itself is already in better condition than when it was bought by the group, having had a large amount of farmyard rubbish cleared up, and pigs removed from steep slopes where they were causing soil erosion into the stream. Planting of native hedgerows, coppice woodland and small mixed garden areas will also improve biodiversity and the condition of the soil itself. We are therefore confident that the condition of the land will be improved if the Exit Strategy is invoked at any stage. The exit strategy for the dwellings has been described above and consists of removing and re-using any non-degradeable materials off-site and allowing the remaining natural materials to compost on site. None of the other activities on site require planning permission, and therefore they could continue to operate as agricultural businesses. However, it would not be feasible to maintain four businesses in the manner described without living on site, so there would either be a reduction in the productivity of the land (requiring former residents to seek work elsewhere), or the use would have to be intensified, with negative impacts on the biodiversity and condition of the soil.

The asset lock provided by the incorporation of Rhiw Las Limited as an Industrial and Provident Society (Co-operative) means that the land possessed by the company could not be sold except to another organisation with similar aims. Therefore it is likely that Rhiw Las Limited would continue to exist as a small company and to conduct activities on site, although it would then have a greater traffic impact because employees would need to travel to and from the site rather than living there.

Identification of needs for improvement

We therefore hope to avoid the need to implement this Exit Strategy. The system of annual monitoring reports will allow us to identify areas of weakness or where businesses or subsistence are “behind schedule”. This will be done using a system of yellow and red cards during the first five years.

Yellow cards would include:

- Reduction of any species or habitat
- Failure to reduce Ecological Footprint towards OPD target
- Failure to increase land-based income towards Minimum Needs target
- Increase of traffic beyond the levels described in the Transport Assessment and Travel Plan
- Failure to increase land-based subsistence (food production) towards Minimum Needs target

Red cards would include:

- Any increase in Ecological Footprint (unless the required level is still met)

If a yellow card is identified, then a clear and effective proposal for addressing this problem will be submitted with the Monitoring Report. If the same yellow card is identified again at the time of the next annual report, it will become a red card.

As described in the OPD Practice Guidance (p67), failure of the site would consist of “a failure to achieve one or more of the essential characteristics of One Planet Development in the open countryside (para 1.9) over a period of two years without instituting clear and effective measures to address the identified problems.” This would consist of two consecutive red cards for the same problem.

9 List of supporting documents

For ease of reference, this shows the supporting documents that have been provided with the application:

A. Site maps and plans

- A1. Site location plan (1:2500 at A4)
- A2. Block plan (1:2500 at A4)
- A3. Landscape design, plots 1 and 2 (1:1000 at A3)
- A4. Landscape design, plots 3 and 4 (1:1000 at A3)
- A5. Photomontage showing view from public road

B. Supporting information for Business and Improvement Plan

- B1. Detailed business plans
- B2. Letters of Support and case studies
- B3. Minimum Needs calculations
- B4. Phase I Survey report from Biodiversity Solutions
- B5. Detailed energy requirements

C. Supporting information for Ecological Footprint Analysis

- C1. Detailed EFA spreadsheets for all plots

D. Plans, elevations and information about the proposed buildings

- D1. Plot 1 buildings (1:100 at A4)
- D2. Plot 2 buildings (1:100 at A4)
- D3. Plot 3 buildings (1:100 at A4)
- D4. Plot 4 buildings (1:100 at A4)
- D5. Zero Carbon Buildings

E. Supporting information about travel and transport

- E1. Design and Access Statement (DAS)

F. Supporting information about monitoring

- F1. Template monitoring form

G. Information from LANDMAP

- G1. Cultural
- G2. Geological
- G3. Habitats
- G4. Historical
- G5. Visual and Sensory