One Planet Development Management Plan

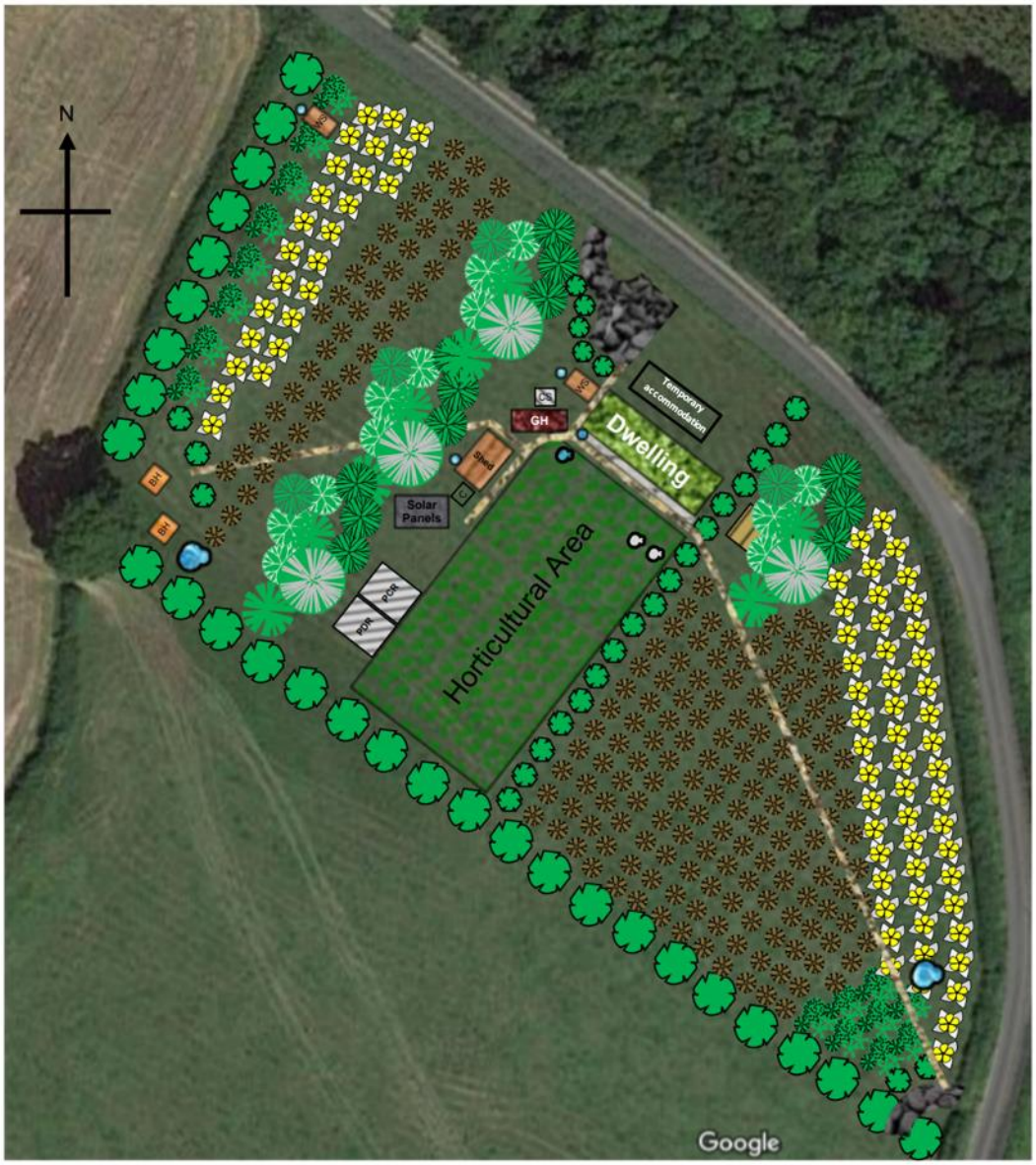
Land in Pen y Banc (near Llandeilo) referred to as:

Maes Digonedd

Key:

- Beehive
- Existing hedge
- Re-wilding
- Proposed hedge (visual shield & windbreaks)
- Wild flower meadow
- Willow
- Foot track
- Forest garden
- Solar Panels
- Rainwater harvesting
- Portable chicken run
- Compost
- Reed bed system
- Cob Green-house
- Vehicle track
- Wood store
- Wildlife ponds
- Portable duck run
- Cold storage
- Mushroom growing
- Overflow pond

Maes Digonedd: Proposed Site Layout



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1.0 Introduction

This management plan is a proposal for a One Planet Development (OPD) at Pen y Banc near Llandeilo. We have chosen to call the OPD ‘Maes Digonedd’ as this sums up what we can achieve from the land; ‘abundance’. We will transform the land from a field of poor-quality monoculture comprised of ‘improved grassland’ to a rich biodiverse landscape that will have the capacity to produce an abundance of produce for our family and for the wider community to benefit from.

We realise that what we are embarking on at this site requires an enormous amount of dedication and technical expertise in order to successfully comply with the aims and objectives of the One Planet Development policy. However, we believe that

the techniques that we will use will benefit the wider community and citizens of Wales in general, as we all move towards more sustainable forms of living.

Maes Digonedd will be the residence for a family of three; two adults and a child where we will grow food for our own consumption and set-up land-based businesses to meet our basic needs.

We have been preparing for this for many years in the form of training, acquiring the necessary skills and knowledge and preparing ourselves financially. Steve worked for eight years as an engineer in the automotive industry and for 14 years as a teacher, specialising in woodwork. Steve was part of the 'Le Flacon' Erasmus project in conjunction with Lammas where he learnt about eco building in France, Wales and Spain. He also attended a weekend course on Writing a One Planet Development Management Plan with David Thorpe, and a one day 'OPD on a Shoestring' course with the owners of Willow Farm OPD Pembrokeshire, a one day course at Lammas on renewable energy with Bobby Bazalgette, a one week long course on Cob Building at Lammas with Cassandra and Nigel Lishman and a course on the 'Secrets of Soil' at Denmark Farm, Lampeter. Amy has recently completed a Permaculture Design course with 'Shift Bristol'. She is booked onto the weekend OPD course at Rhiw Las (although this was postponed due to COVID-19). We have visited the following OPDs: Rhiw Las, Gardd Darna, Beeview Farm, Gardd y Gafel and Nant y Cwm. We have also visited Lammas which isn't an OPD as it was set-up pre-OPD via policy 52. We have built up an excellent support network, we are members of Permaculture Tywi and the One Planet Council and have contacts within the Welsh Government.

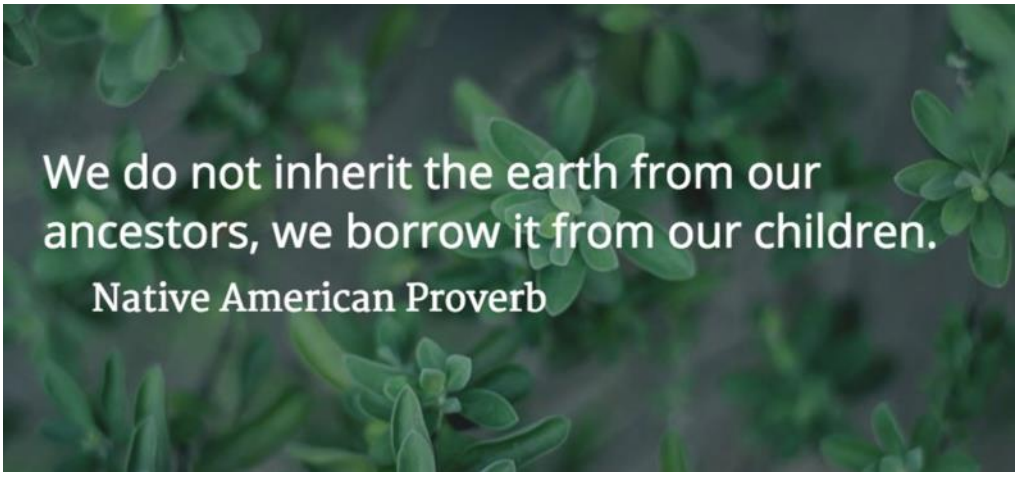
Due to COVID-19 restrictions we both engaged in five one-hour video calls with Dr Paul Jennings (Rhiw Las OPD resident) to improve our knowledge with regards to permaculture. After the restrictions were lifted, we met him on-site where he provided further advice and has since produced a report, see Appendix B.

Through the growth of hedgerows and trees the site will be screened from all public viewpoints and will blend beautifully into the landscape, enhancing the natural beauty of the area. See figure 19 for artist's impression on the 'built area' and figures 20 to 22 for the visual impact from differing locations.

We believe that it is important to enjoy life, but not at the expense of others. Therefore, we believe we should do all we can to live sustainably to help safeguard

the lives of future generations. We have made a concerted effort throughout our lives to live as sustainably as possible, however, we feel that we haven't been able to do enough. The Welsh Government's progressive, forward thinking OPD policy is a fantastic opportunity to achieve 'real' sustainability. To satisfy all the criteria of the policy is no 'mean feat', however we enjoy hard work and a challenge and are highly motivated because we will be working towards something that we are deeply passionate about.

The old American Indian proverb inspires us:



We are determined to do what we can to preserve our planet for future generations to enjoy. As Permaculture author Patrick Whitefield said, 'So my answer to the question, 'how do I want to live my life?' is that I want to be a part of the solution rather than part of the problem.' We certainly feel the same way.

The creation of OPDs bolsters Carmarthenshire County Council's and the Welsh Governments environmental targets and supports the Well-being of Future Generations Act. Since COVID-19 public opinion has significantly shifted towards the importance of a 'green recovery'. The Climate Assembly UK recently found that 80% of people support an economic recovery designed to help reach net zero carbon. Also, the pandemic has highlighted the need for regions to be able to produce their own produce as we have all seen how fragile supply chains are in a crisis.

The government have demonstrated that they want more OPDs, the public are behind them and future generations need them.

Summary

This management plan comprises of 12 mains sections. Sections 3 to 12 will be summarised below:

3.0 Baseline – Maes Digonedd is a 3-acre field in Pen y Banc, 2.1 miles north/west of Llandeilo. There are many advantages of its location being close to a town. The field is grass with a mature hedgerow. A new 150m hedgerow will be planted to split the current 7-acre field into 4-acre and a 3-acre fields. This will create new wildlife habitat and wildlife corridor linking existing hedgerows to woodlands. The field has been used for many years to rear cattle.

Currently the field has very poor biodiversity. We will rapidly increase this through; planting trees, hedges, creating ponds, growing food, applying our own organic compost etc.

4.0 Design Strategy – The site has been designed following permaculture principles with the support from the permaculture expert Dr Paul Jennings. The key to permaculture is waste elimination and sustainability. The site will comprise of; a dwelling, a shed, a cob greenhouse, a horticultural area, two forest gardens, two wildflower meadows, areas of willow, ponds, solar panels, chicken and duck coups and beehives. These functions of the OPD have been carefully positioned in 'zones' to maximise interrelations.

5.0 Business and Improvement Plan – This section demonstrates how our minimum needs are calculated and that we plan to produce 44% of our basic foo needs from the land (exceeding the minimum requirement of 30%). It includes a profit and loss account for our land-based businesses which include: music therapy experiences, hiking sessions, training courses, willow artist pencils, garlic, food boxes and mushrooms. It demonstrates that we anticipate achieving our minimum needs from the land by year three and to then significantly exceed this over the following years.

It illustrates how we will conserve and create habitats, enhance the landscape and filter views and to provide shelter and visual screening. This will be achieved through implementing an intensive planting program from the outset where fast growing trees such as hybrid Willow and Poplar will be planted on the perimeter to provide rapid shelter and screening (see figure 14).

It discusses how we will extend habitats and create wildlife corridors linking to habitats beyond the site. How we will create habitats to support farmland birds

which are in decline. It details how we will improve the soil quality, which in summary will be achieved through planting and producing our own organic compost and fertilisers. It also discusses how extending habitats and through planting carefully selected species we will support populations of pollinating insects.

6.0 Energy and Water – All our electricity will be generated through solar panels that will be located at ground level to reduce visual impact. Energy requirements will be minimised mainly through making the dwelling super insulated and maximising solar gain. We will also utilise manual labour over power tools where possible. All our water needs will be met from harvested rainwater. We will use all roof surfaces to collect water. We also have legal rights to take water from the spring in the adjacent field to north/east. We will put into place a range of measures to minimise water usage such as a compost toilet (non-flushing) as 33% of household water usage is used for flushing toilets.

7.0 Waste – All our grey water will be treated using a three-pond reed bed system. All human waste will be thoroughly composted utilising a compost toilet. We will comply with Environment Agency guidelines. The compost will be used on no-edible plants such as trees, willow, hedgerows etc. All organic waste will be composted using a vermin proof design.

8.0 Zero Carbon Buildings – The main dwelling will be single storey, three-bedroom, timber framed, super insulated building, with a grass monopitch roof. It will be clad with Welsh Larch or similar timber and plants will be grown up the walls making the building blend further into the landscape. We are planning to build a cob greenhouse, as this can be built from natural materials from the land, it will blend beautifully into the landscape and is very effective for absorbing heat. The shed will be constructed with a timber frame and timber cladding (all local, probably Larch) and it will have a grass roof to embed it further into the landscape.

9.0 Community Impact Assessment – We already have many good contacts in Llandeilo and the surrounding areas as Amy went to secondary school in nearby Llandovery. Our son will attend Ysgol Gynradd Llandeilo. We will arrange a meeting with locals (if they wish) to introduce ourselves and discuss our plans once the application is submitted. We have provided detailed information on how we will benefit Llandeilo and Pen y Banc, socially, economically and environmentally and how we will do our utmost to mitigate any negative impacts. We are determined to embed ourselves into the community by developing positive and purposeful relationships.

10 Transport Assessment and Travel Plan - We will significantly reduce our environmental impact with regards to transport primarily through reducing the need to travel by being as self-sufficient as possible and ensuring that when we do drive that we make sure the journeys are ‘multi-purpose’ where possible. We will use low carbon and zero carbon modes of transport such as walking and cycling. We will purchase an electric bike with a trailer for delivering produce and collecting supplies locally. We will also use public transport as much as possible, we will encourage friends and family to do so too and will provide incentives, such as discounts for customers who use public transport. Maes Digonedd is located close to bus routes and the Heart of Wales train line.

11 Ecological Footprint Analysis – The Welsh average global hectares (gha) is currently at approximately 5 per capita. The target for OPDs is 2.4 gha by the end of year 5. Based from the results of the Ecological Footprint Calculator our current gha is 4.24. We have calculated that we can achieve 2.14 gha by the end of the first year of habitation at Maes Digonedd and 1.32 gha by the end of year 5 which exceed the OPD Guidance targets. The main reasons for these low values are: less car travel, more food grown and consumed, energy will be generated on-site through solar, all our water requirements will be harvested on-site from the rain and we will not be paying a mortgage for the dwelling.

12 Phasing, Monitoring and Exit Strategy – We have carefully compiled a Gantt chart demonstrating the phases of set-up for Maes Digonedd (see section 4.6). We will comply with all monitoring requirements and have included a copy of our proposed annual monitoring report in Appendix F. We are acutely aware that there are stringent rules to adhere to and realise that ultimately failure to do so could result in eviction. We have put together a clear exit strategy to deal with this. To ensure this would be an effective process with minimal disruption we have designed the site and its buildings so that it would be left in an improved condition after the exit strategy was implemented.

3.0 Baseline

This section on the ‘baseline’ will enable us to measure improvements made to the land in all aspects of sustainability and ecology. The baseline is based on the land as purchased, prior to any OPD related activities have taken place.

3.1 Location

Maes Digonedd is located 2.1 miles north/west of Llandeilo town centre and 0.5 miles north of the small village of Pen-y-Banc. The location of Maes Digonedd is denoted on the map below by the yellow pin with a white star.

Figure 1

The location can also be seen on the OS 1:25000 map below. It is denoted by a green dot. The grid reference is SN 61734 24668.

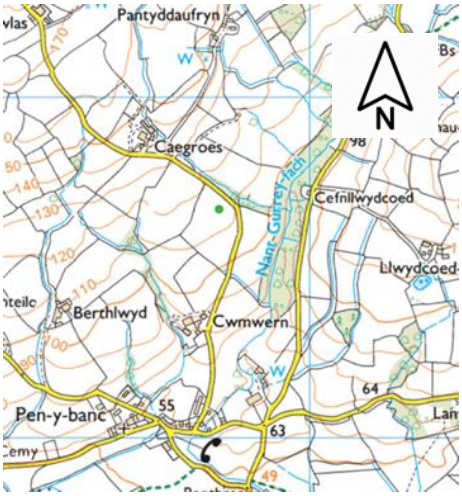


Figure 2

Maes Digonedd is located close to the town of Llandeilo and therefore there are many useful services within walking and cycling distance. This will enable us to embed ourselves into the existing infrastructure, resulting in significantly lower carbon emissions than many existing OPDs which are located in more remote locations.

2.4 miles to Llandeilo train station (on the 'Heart of Wales' line)
2.3 miles to the nearest bus stop
2.3 miles to the Black Mountain food hub (where we can sell our produce)
2.4 miles to local shops
2.4 miles to pubs, restaurants and cafes
2.4 miles to the bank and post office
2.3 miles to Llandeilo Primary School (where our son will attend)

We are both keen cyclists who have cycled to work for many years. It would only take 12 minutes to cycle to Llandeilo town centre. It would take about 40 minutes to walk in.

Maes Digonedd will be locate next to Ty Derwen OPD (awaiting approval at time of writing). There are many benefits to this as we will be able to pool resources, knowledge, skills, labour and be able to supply produce to each other. We already share tools and own a trailer that we share. It would also enable us to increase the quality of any training courses we provide as we could offer a wider range of expertise. For example, I am a qualified engineer and woodwork teacher, Amy has completed a permaculture design course, Matt (co-owner of Ty Derwen) is an electrical engineer and Claire (co-owner of Ty Derwen) has a business background and equine, and poultry experience.

3.2 Area and Shape

Figure 3

The area of the land (depicted in green) is 3 acres. The shape can be seen on the map.

3.3 Boundaries

To the north and east the boundaries follow the road and have a well-established hedgerow. Also, the boundary to the north-west which divides Maes Digonedd with the adjacent field is made up by a well-established hedge. The red line in the diagram above depicts the boundary that does not currently physically exist, we will build a fence and use a combination of native plants such as Willow and Hawthorn.

The following photos show the existing hedgerow boundaries: (the orange highlighted regions on the adjacent maps show which section of the boundaries the photos display).

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

3.4 Context/Adjacent Land Uses

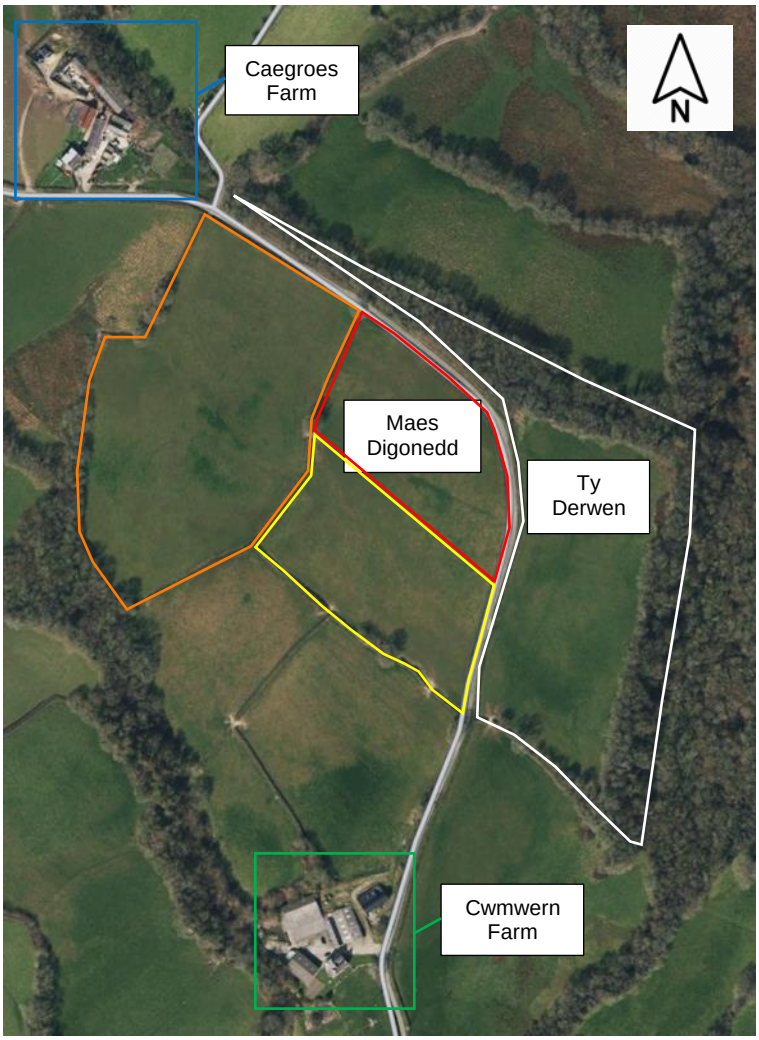


Figure 10

There are two residential farms: Caegroes, a sheep farm and Cwmwern, a cattle farm. (both less than 300m from Maes Digonedd)

The area in orange has been used for cattle and sheep in the past, but it is not currently being used. It belongs to Mark and Megan Gray.

The area in red is Maes Digonedd.

The area in white is Ty Derwen, a prospective OPD site.

The area in yellow belongs to Gwyn Jones who previously owned the land of Maes Digonedd, Ty Derwen and the field denoted by the orange boundary.

As shown in the image above, Maes Digonedd is surrounded by agricultural land. This is either utilised for pasture or crops.

3.5 Tenure

At the time of writing we were in the process of purchasing the land. Our allocated title number is CYM750463. We reserved the land from the seller in August 2019 and have visited the site many times along with visiting Ty Derwen in the neighbouring field. We completed the land purchase on 20/07/2020.

3.6 Existing On-site Services

There are no services on the land.

3.7 Site Access Arrangements

Figure 11

The orange line denotes the existing vehicle access point to the site. We have been informed that it has been used by farm vehicles for over 40 years.

We would like to create a new access point, denoted in blue above, as it is significantly closer to the dwelling which will result in a shorter track and therefore minimising impact on the land. The road is also very straight at this point providing greater visibility. It will be at least 3.7m wide to allow access for emergency vehicles.

Visibility in both directions from proposed access vehicle point:

N/W View:

S/E View:

Figure12

The drive will comply with those detailed in CCC's 'TL5'. See Appendix H.

3.8 Physical

The lay of the land slopes to the south/west. The most southerly point of the field is at an elevation of 103m whereas the most northerly point is 120m.

Please see Landmap: Geological Landscape Appendix K. The aspect area classification is: Lowland hills and valleys/undulating lowland hill terrain/undulating lowland hill terrain (Level 3).

Whilst attending a 'Secrets of Soil' training course at Denmark Farm, Lampeter we tested the soil using the ADAS texture by feel flow chart and determined that the soil is a 'Clay Loam' type. We also used the 'Test West' soil testing kit which confirmed the following:

pH -	7 (Neutral)
Nitrate –	Low
Phosphorus –	High to medium
Potassium –	Low

This information will enable us to determine the most suitable type of plants to grow and what adjustments to make to the soil i.e. adding lime, fertiliser, potash etc.

3.9 Biodiversity

Please see The Preliminary Ecological Assessment report in Appendix A.

The Preliminary Ecological Assessment report stated that the field is comprised of two habitats; improved grassland and hedgerows. 'Improved grassland consists of mainly Ryegrass with few flowers such as buttercups, docks and thistles. Although there may be high numbers of these 'weeds', they have little value for wildlife.' (http://www.highweald.org/look-after/land-management/grassland/improved-grassland.html). **This poor level of biodiversity provides the opportunity for us to rapidly increase site habitat and biodiversity through a permaculture approach.**

The existing hedgerows will be maintained to improve biodiversity, also there is one mature Oak and one mature Ash on the land these will be retained.

Please see Landmap: Landscape Habitats Appendix K for further information.

Carmarthenshire County Council have produced a Local Biodiversity Action Plan (LBAP).

According to the Science Daily website: 'A Biodiversity Action Plan (BAP) is an internationally recognised program addressing threatened species and habitats, which is designed to protect and restore biological systems.' https://www.sciencedaily.com/terms/biodiversity_action_plan.htm

The overall objective of CCC's LBAP

• To identify new sites for survey (biodiversity) in the county.
• Encourage volunteer interest in mammals.
• To use key species as a focus for public/school engagement.
• To raise awareness of these species and the issues affecting them.

Our OPD could support these objectives in the following ways:

- We would welcome the council to carry out a survey on our land as long as they do not cause disruption or damage.
- We will carry out on-going surveys ourselves using The Biological Records Centre's iRecord app. 'iRecord app enables you to get involved with biological recording. Contribute your species sightings with GPS acquired coordinates, descriptions and other information, thus providing scientists with important new biodiversity information that contributes to nature conservation, planning, research and education.' https://irecord.org.uk/app/
- We would encourage volunteers to support the OPD and as part of this they would have the opportunity to learn about mammals.
- As I am a qualified teacher and am passionate and knowledgeable about nature, I would be keen to work with schools and the public to improve engagement in learning about specific species. I would like to make connections with local schools and to develop learning opportunities.

The OPD Practise Guidance requests that the management plan should provide an audit of 'broad habitats present, especially habitats identified in the Local Biodiversity Action Plan and records of important flora and fauna (species) and their

abundance on the site and in the immediate vicinity, again especially those noted in the Local Biodiversity Action Plan'. This information can be seen in Appendix A and in Landmap: Landscape Habitats in Appendix K.

In addition to the LBAP, CCC have recently produced a Nature Recovery Plan (NRP) 2020-30. See link to NRP below:

https://www.carmarthenshire.gov.wales/home/council-services/planning/biodiversity/carmarthenshire-nature-partnership/#.Xv8F4pNKjlx

This was produced by the CCC Nature Partnership. The NRP makes a number of recommendations. Details on how we will comply with these can be seen in Appendix L.

Further details on biodiversity can be found in section 5.2 'Land Management'.

3.10 Cultural Heritage

Please see Landmap titled 'Historic Landscape' in Appendix K for details.

Also, the Archwilio website 'archwilio.org.uk' found that there are no sites of cultural importance on the parcel of land or in the immediate vicinity:

Figure13

In a 'zoomed' out view it shows that there is a 'battlefield' from 1403 in Llandeilo along with a number of listed buildings. The diagram also shows 'Landmap HL

areas' in orange, that there is a historic landscape in yellow, it shows a conservation area around Dinefwr Park in blue and the park and garden area around Dinefwr Park in green.

3.11 Existing Buildings

There are no existing buildings on the parcel of land.

3.12 Landscape

Landmaps describes the area as lowland hills and valleys/undulating lowland hill terrain. The landscape of the field is typical of the surrounding landscape.

The field is comprised mainly of grass/pastureland. There is a well-established hedgerow that follows the road to the north and east. There is also a hedgerow dividing the upper field to the north/west where there is one mature Oak tree along this boundary. There is a mature Ash tree in the northernmost corner. The land is relatively wet so there are sporadic patches of reeds. See ecology report in Appendix A for more details. There are no public rights of way on the land. The nearest footpath is 690m away.

3.13 Past Land Use

The land has been used as pastureland for livestock in the past. Until recently it was used to rear sheep.

3.14 Present Land Use

In August 2019 the farmer who was renting the field removed his sheep, since then it has been left to lie fallow.

3.15 Statutory Designations

Natural Resources Wales have confirmed that there are no statutory designations in the field or in the immediate area.

3.16 Existing Transport

Currently we travel, on average, once a week to the land to carry out preparation works such as planting. When viable we travel by train with a bike to ride to the land. If we have to deliver items such as saplings, we will use our car. On a few occasions consultants and surveyors have/will visit the land.

3.17 Landmaps

See Appendix K for Landmaps which provide details of the area's: geological landscape; habitats; visual and sensory status; historic landscape and the cultural landscape. We have highlighted sections in yellow and have commented on these to demonstrate how Maes Digonedd OPD would support the recommendations.

4.0 Design/Strategy

This section provides an overview of how; the land will be utilised; how the elements of the land interrelate; how the land will sustain its occupants; how it will be managed and how it will be developed over time.

4.1 Land Layout

Maes Digonedd is a relatively small site compared to some existing OPDs. We explain in section 4.2 how it is sufficient to meet the requirements of the OPD Guidance. Willow Farm OPD is 2.1 acres in total and was approved by Pembrokeshire County Council in September 2017. It is home to two adults and child residing full-time and a child residing part-time and they are successfully achieving their targets.

Please see proposed site layout below:

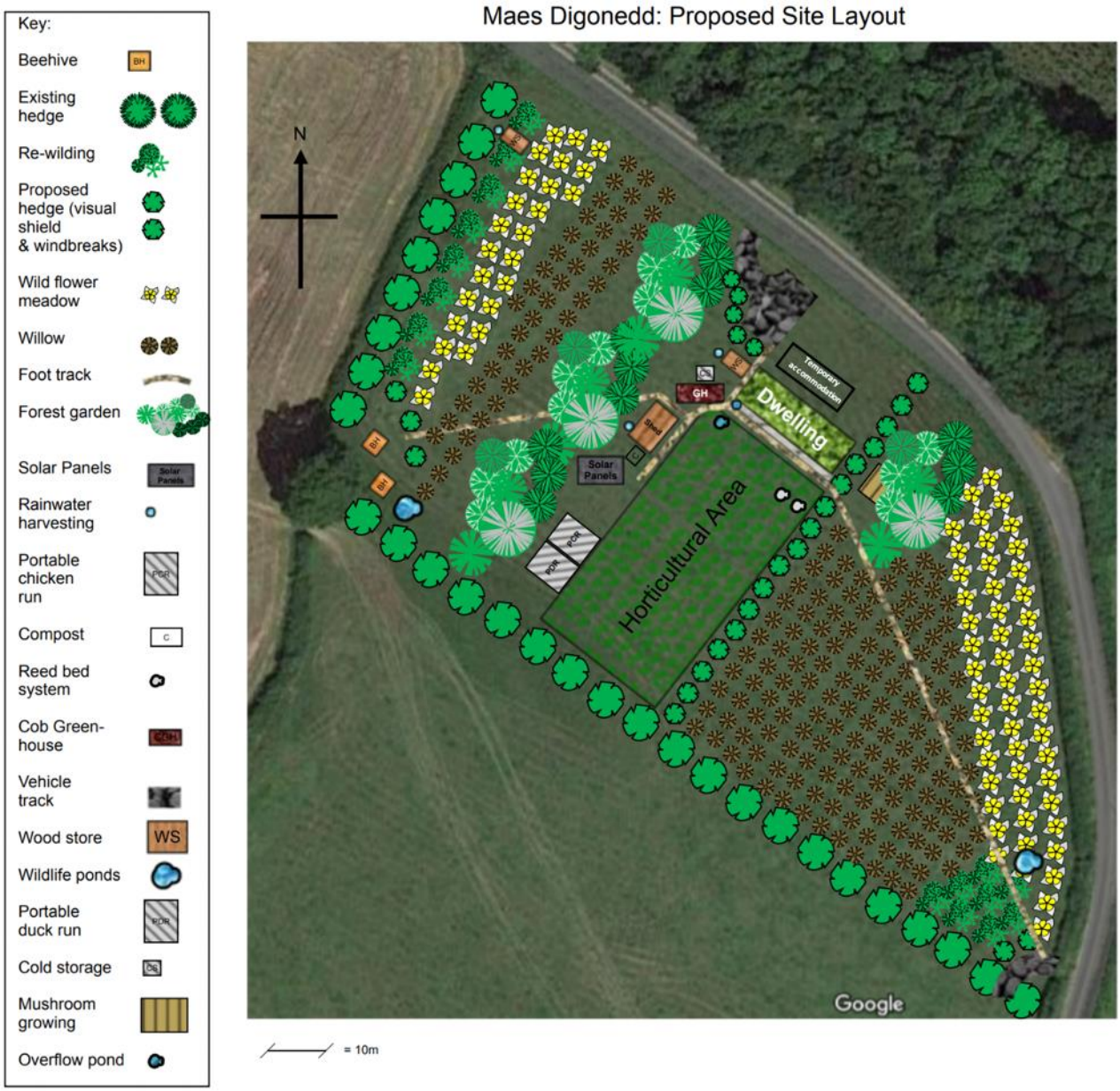


Figure 14

Please note that the above diagram is drawn to scale however, the following items demonstrate location rather than size: beehives, solar panels, rainwater harvesting, portable chicken and duck runs, compost, reed beds, ponds and cold storage.

4.2 Distribution of Land Uses

Please see site layout below with designated permaculture zones:

Figure15

The following section explains the zones in-line with permaculture design principles:

Zone 0 – Dwelling – it is south/west facing to maximise afternoon/evening sun. It is located to have minimal visual impact and is situated on a lower flatter area of the field away from the road. We will fit bat boxes on the exterior walls. There will be a stone patio area outside at the front as this will act as a heat trap by absorbing the sun's energy throughout the day producing a warm micro-climate, which will create an excellent environment for growing soft fruits such as peaches, tomatoes, courgettes and squashes. The ancillary buildings are located at 90 degrees to the dwelling creating an 'L shape' to produce a sun trap. The dwelling has a large kitchen for processing food and a dedicated food preparation area. We have included a music room so that Amy can accommodate music therapy clients (maximum of three per week). We would also use it for our own pleasure as Amy is a singer and Steve plays guitar and writes/records songs.

Zone 1 - Ancillary buildings and horticultural area. The horticultural area is just over 1/4 of an acre (this is equivalent to approximately 1000 square meters; an allotment of the size 254 square meters is considered enough to support a family of four with fresh produce through the year). We will use raised beds and intensive organic horticulture which will significantly increase productivity per acre.

This zone includes solar panels, these are located on the ground rather than on a roof to minimise visual impact and are placed away from shade, facing south. Also, a benefit of them being on the ground is that angles can be adjusted easily (to maximise energy from the sun) and access for maintenance is improved. A compost heap is located close to the greenhouse, horticultural area and the dwelling to allow compostable food waste to be added easily and compost to be spread easily. Shed: this will include an area for tools, maintenance, general storage, seed storage and harvested crop storage. It is located in close proximity to all related ancillary buildings. The roof will be used to harvest rainwater. Cob greenhouse – this will be south facing to maximise sunlight. We have chosen a cob greenhouse rather than a polytunnel for the following reasons: Lower visual impact; uses natural materials; absorbs and radiates heat; able to 'weather the elements' especially the wind well and can be returned to the earth after its useful life. It will include an area for propagation and greenhouse tools and will also be used to harvest rainwater. It is located next to the horticultural area. Wood store: Is situated close to forest garden, willow and dwelling to reduce the distance wood must travel, it will also be used to harvest rainwater. We will build a mobile run for

ducks and chickens which will allow them to scarify the ground and provide nutrients to the land when and where required. On the north side of the green house (behind its rear cob wall) we will locate an earth sheltered cold store, it would function like an old-fashioned larder by making use of the stable temperature of the ground.

Zone 2 - Forest garden – This acts as visual screening and a windbreak. It will be a haven for wildlife and highly biodiverse. We will include bird boxes when the trees are mature enough. It will incorporate multi-layer food growing including apples, pears, nuts, berries and a herb under story. The inner side of the boundary hedge is included in zone two as it will function as a forest garden. The boundary hedge will be made from a range of plants including: Native Willow; Bowles Hybrid Willow; Italian Alder; Autumn Olive; Red Alder; Cobnuts; Crab Apples; Elder; Thornless Brambles; Bulace Damson, Poplar. etc. The hedgerow has many purposes including: marking the boundary of the land; visual screening; a wind break; increased biodiversity; a new wildlife corridor (connecting existing hedgerows to woodlands) and a source of food. Also, in the microclimate created by the boundary, soft fruit and shade or semi-shade tolerant plants like Rhubarb and Comfrey, Wild Garlic and so on will grow. We will source regionally appropriate fruit trees from nurseries as local as possible. We would also like to plant some deciduous trees for future generations to benefit from such as Alder, Oak, Sweet Chesnut, Birch, Sycamore, Hazel and Hawthorn etc. These particular species have been selected to reflect those found in the local area. Zone 2 also incorporates a mushroom growing area which is close to the dwelling and benefits from the shade of the forest garden – these are part of our business plan and will be grown for commercial use.

Amy is a qualified music therapist intends to run therapeutic sessions in the forest garden. Please section 5.1.7.

Zone 3 – This incorporates the main growing area for willow and the wildflower meadow. The willow will act as a shelter belt; nectar for bees; biomass and as a product to sell. The wildflower meadow with be a highly biodiverse area; beneficial for bees; for enjoyment and as part of the land-based businesses.

Zone 4: Beehives will be located at the top to take advantage of the existing well-established hedge and Oak tree to provide shelter from wind, sun and the cold travelling down the hill. It is near to the wildlife pond and the wildflower meadow

which will be beneficial for the bees. It has a broken shelter belt around it to reduce wind and sunlight but not to block it out.

Zone 5: Re-wilding area - to attract wildlife and increase biodiversity. Biodiversity is central to the functioning of organic systems. More predators will be present due to a healthy zone 5 which will result in less pest problems. We have also located an additional woodstore here as it is close to the willow and it is located higher up in the field where it can be used to harvest rainwater to irrigate the land beneath.

Vehicle track and paths – if there is shale present when we excavate ponds, we will utilise this for the tracks and a layer of geotextile below to prevent growth. It is likely that we will be required to buy shale in from a local farmer. The paths and track have been designed so that there is the minimal length required to easily access all key areas. The paths will not be visible from any public viewpoints. The track and parking area have been located close the hedge to minimise visual impact.

All building surfaces (except windows) will be used to grow plants, which will also result in reduced visual impact of buildings.

4.3 Site Interrelations

The permaculture philosophy (which we will practice) requires interrelations between elements so that they support each other and maximise beneficial relationships. Outputs from one part of the system should be used as an input for another creating a cycle with no or little waste. Land that utilises permaculture philosophies 'mimics' nature rather than working against it. As permaculture-based practises are highly biodiverse, they absorb significantly more CO2 than monoculture (the land at Maes Digonedd is currently monoculture).

Here are some examples (not an exhaustive list) of how systems/elements on the land interrelate:

- Manure from humans and animals will be used to fertilise the land. (Human manure will only be used on non-edible plants such as willow and once it has been fully composted) (see section 7.3 for details of how humanure will be dealt with safely)
- Fertiliser will be produced from food composting and green waste.

- We will build our own biodigester (I was due to attend a course at Bee View Farm in Pembrokeshire, however, it has been postponed due to COVID-19) to generate gas from compost.
- The willow we plant will create wind breaks, visual screening, habitats, nectar, fuel, absorb CO2, absorb water to reduce flooding, improve soil quality and structure and provide produce to sell.
- The forest garden will also create wind breaks, visual screening, habitats, food, shade for growing, enjoyment, absorb CO2, absorb water, improve soil quality and structure and fuel.
- Hedges will create wind breaks, visual screening, habitats, food, boundaries, shade for growing, absorb CO2, absorb water and wildlife corridors.
- Once the willow and trees have matured sufficiently, they can be felled for logs to grow mushrooms and for fuel thereafter.
- The chickens and ducks will provide, eggs, fertiliser, pest control, income and they also scarify the land.
- The bees will provide a source of income from honey sales, wax for sealing mushroom logs and, of course, they are vital pollinators.
- The areas of re-wilding will further increase the land's biodiversity, which will result in an increase of pollinators and a natural balance that will reduce pests that damage crops by introducing natural predators. This balance can also help prevent diseases.

4.4 Households

There will be one household present on the land to home two adults, a young child (2 years at the time of writing) and occasionally a teenager (15 years at the time of writing) who we expect will visit no more than once a month. This will be our sole residence. We have explained in detail how the site will sustain us in section 5.1 where calculations demonstrate how we will produce 44% of our minimum food needs from the land and the rest will be purchased through profits generated from a range of land-based businesses. We have also demonstrated, in table 23, how much labour time we predict two adults will be required to work to sustain us on the land and meet our responsibilities. We will not employ any labour to achieve these. Both Amy and I will work as a partnership with equal responsibility to maintain the OPD. All activities to be carried out to manage the OPD are detailed in section 5.

4.5 Gantt Chart

Please see below a Gantt Chart detailing the stages of implementation for Maes Digonedd OPD. This is based on a five-year timescale as this is the period of time that OPD sites are required to meet their minimum needs. Please be aware that the values on the ‘duration’ column are in days.

Maes Digonedd OPD - Proposed Stages of Implementation

	Task	Start	End	Dur
	Set Up of Maes Digonedd OPD	1/10/20	1/12/24	1523
1	Set-up reed beds for water treatment	15/10/20	21/10/20	7
2	Set-up compost	29/10/20	30/10/20	2
3	Consultation with neighbours	15/10/20	5/11/20	22
4	Potential date to gain planning permission	1/12/20	1/12/20	1
5	Excavation of ponds (potential shale for track)	10/12/20	13/12/20	4
6	Creation of vehicle track and new access point	14/12/20	17/12/20	4
7	Build shed	19/12/20	19/1/21	32
8	Caravan on land for temporary accommodation	18/1/21	19/1/21	2
9	Temporary water harvesting	20/1/21	21/1/21	2
10	Compost toilet	22/1/21	24/1/21	3
11	Temporary solar system	27/1/21	29/1/21	3
12	Commence living on-site	30/1/21	30/1/21	1
13	Build wood store	3/2/21	7/2/21	5
14	Preparation of mushroom growing area	9/2/21	18/2/21	10
15	Preparation of veg growing area	1/10/20	1/4/21	183
16	Planting of willow	15/11/20	1/4/21	138
17	Preparation of apiary	10/4/21	1/5/21	22
18	Creation of paths	12/5/21	19/5/21	8
19	Preparation for chickens and ducks	3/6/21	24/6/21	22
20	Wind break and visual screen planting (hedges)	1/11/20	16/7/21	258
21	Build cob greenhouse	1/7/21	29/8/21	60
22	Build dwelling	1/4/21	26/4/22	391
23	Install water harvesting	27/4/22	4/5/22	8
24	Install solar system	13/5/22	20/5/22	8
25	Commence living in dwelling	21/5/22	21/5/22	1
26	Preparation of cold storage	22/5/22	25/5/22	4
27	Set up businesses	1/12/20	26/2/23	818
28	Preparation for wildflower meadow	15/4/21	14/4/23	730
29	Forest garden planting	1/11/20	29/3/23	879
30	Annual monitoring form submission (on-going)	1/12/21	1/12/24	1097

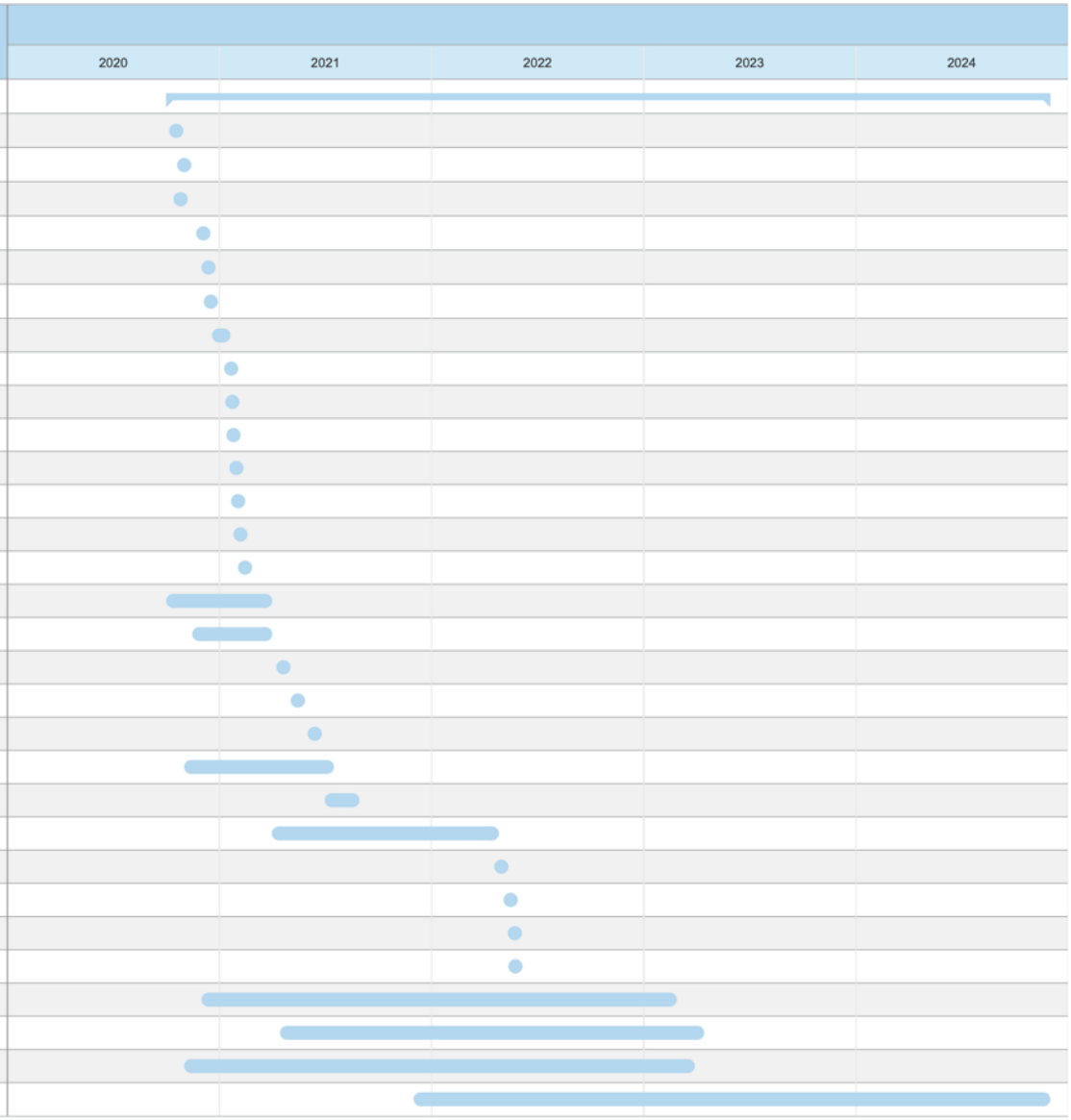


Figure 16

5.0 Business and Improvement Plan

5.1 Land Based Activity

What TAN 6 requires

- That land use activities on the site should be able to provide directly for the minimum needs of its occupants in no more than five years in terms of income and food. The Management Plan should quantify how these minimum needs can be obtained directly from the site [4.15.2, 4.16.1, 4.17.1].
- That the need to live on site is justified and that the number of occupants has a clear relationship to (a) the site's ability to sustain them; (b) the smooth running of the venture; and (c) the return that is gained [4.16.1, 4.17.1].
- That the site should be the sole residence of the occupants [4.17.1].

Land-Based Activity	
Essential Criteria:	How Criteria is Met:
The minimum food needs of all households are met from produce grown and / or reared on the site or purchased using income derived from other products grown and reared on the site.	Five Year Forecast Profit and Loss Balance Sheet *'Table 4' (p.39)* and the whole of section 5.1 (p.34) demonstrates this. Graph 1 (p.40) also demonstrates this.
The basic domestic needs of all households are met from income derived from produce grown and reared on the site, including processing and adding value, and other income streams derived from the productive and regenerative capacity of the site, such as from training and education courses, or consultancy directly linked to land based activities on the site. These latter activities should be clearly subsidiary to the primary activity of growing and rearing produce.	Five Year Forecast Profit and Loss Balance Sheet *'Table 4' (p.39)* and the whole of section 5.1 (p.34) demonstrates this. Graph 1 (p.40) also demonstrates this.
The number of occupants is directly related to the ability of the site to support their minimum food and income needs and the number of people needed to run the site effectively.	*'Table 2' (p.36)* demonstrates how minimum needs are calculated. *'Table 5' (p.51)* demonstrates that two adults are required to meet needs.

Contributory Criteria:	How Criteria is Met:
The land-based enterprise provides food and other products to local markets, reducing local footprints.	Section 5.1 (p.34) in general and specifically 5.1.1 (p.35) for details of how all our products will be sold at local markets.
Facilities for processing produce are made available to other local producers.	It is advantageous that we will be located next to another OPD; Ty Derwen. We have an agreement that we will share equipment.
Training / courses / consultancy are offered as components of the land-based enterprise to share best practice of One Planet Development.	See section 5.1.5 (p.45) which describes courses that we will deliver. We will work closely with Ty Derwen and have good links with other OPDs that we have forged through courses that we have attended and through being active members of the One Planet Council Facebook group.

Table 6

5.1.1 Land-Based Activity Overview

The table below shows our weekly and annual minimum food spend from 2019 to 2025 and the percentage which is grown/produced. A detailed table of how our total minimum food spend was calculated can be seen in Appendix C.

	2019 -20		2020-21		2021-22		2022-23		2023-24		2024-25	
	Weekly	Annual	Weekly	Annual	Weekly	Annual	Weekly	Annual	Weekly	Annual	Weekly	Annual
Total food spend	57.38	2983.76		3327.43	70.60	3671.10	77.21	4014.77	83.82	4358.44	90.43	4702.11
Value of food grown and eaten	0.00	0.00	6.70	348.40	20.18	1049.31	34.60	1799.20	34.60	1799.20	39.44	2050.62
% of weekly food that is grown/produced	0.00	0.00	10.47	10.47	28.58	28.58	44.81	44.81	41.28	41.28	43.61	43.61

Table 1

The total food spend has been increased each year to reach £4702.11 in year 5, which incorporates the food needs for 3 adults as opposed to 2 adults and a two-year-old which was the case in 2019-20.

The table below shows the monetary value of our annual minimum needs from our current life in Penarth to year 5 on at Maes Digonedd.

	Penarth	Year 1	Year 2	Year 3	Year 4	Year 5
Clothes	700.00	300.00	300.00	300.00	300.00	300.00
Travel costs	1,117.00	1,085.60	1,054.20	1,022.80	991.40	960.00
IT/Comms	1,320.00	612.00	612.00	612.00	612.00	612.00
Council Tax	1,657.00	928.00	928.00	928.00	928.00	928.00
a - Total non-food requirements	4,794.00	2,925.60	2,894.20	2,862.80	2,831.40	2,800.00
b - Total food requirements (b)	4,701.60	4,701.60	4,701.60	4,701.60	4,701.60	4,701.60
c - Food from land	0.00	348.40	1,049.31	1,799.20	1,799.20	2,050.62
d - Total food to be purchased (b-c)	4,701.60	4,353.20	3,652.29	2,902.40	2,902.40	2,650.98
e - Additional food to be purchased from land-based business						987.34
f - Additional food to be purchased from other income sources						1,663.64
Financial Minimum Needs (a+d)						5,450.98

Table 2

We predict that we will produce 44% (£2050.62) of our basic food needs from the land ((c/b)*100). This is a prudent prediction which we may exceed especially beyond year 5. This exceeds the minimum requirement of 30% stated in the One Planet Development Guidance. 21% (to make up the 65% of food from the land) of our food will be purchased from funds raised from the land-based businesses or through bartering. Producing such a large proportion of food from the land will significantly reduce our carbon footprint through reduced food miles and packaging and also due to the fact that none of our food will be grown with artificial chemicals.

The table below shows how our travel costs were calculated:

Annual figures	Penarth (£)	Year 5 @ OPD (£)	Change
Miles travelled by car	6000	1908.5	-71%
Petrol	817	260	-71%
Bus	0	50	N/A
Taxi	200	50	-75%
Train	100	600	+74%
Flights	0	0	0
Total	1,117	960	-14%

Table 3

Our minimum needs are based on two adults and one child (currently 2 years old) living permanently on the land and one teenager (currently 15 years old) visiting occasionally (we anticipate no more than once a month).

From a sensitivity point of view, we have decided to opt for the 'peasant model' so that we can 'test the water' to determine which products will be most profitable and sustainable. We believe it is wise to have a diverse portfolio of products to ensure we can exceed our minimum needs whatever the conditions with regards to weather, economy and customer requirements. We intend that our land-based businesses will have positive outcomes for the environment, the local economy and that it will benefit local people. We would like to invite local residents and potential customers to the land for occasional produce tasting days/open days, in conjunction with Ty Derwen OPD, where they would be able to taste free samples and purchase produce if they wish.

Amy went to school in Llandovery, so has many friends in the area who are keen to support us and work with us. For example, many have shown an interest in buying a fruit and veg food box from us.

All our produce will be pesticide free and therefore grown using natural processes. We will brand our produce with the official OPD sticker.

We will sell produce at local farmers markets in Llangadog, Llandeilo and Myddfai and at village fayres and fetes. We will also look into the possibility of selling through carmarthenfood.com and the Black Mountain Food Hub. We have contacted many businesses, schools and individuals who have shown an interest in buying produce off us in the future (see appendix M for responses to market research). Ty Derwen OPD have already established markets and have agreed that we can work with them to satisfy customer demands (see appendix N for an email from them confirming this) We will grow different produce to ensure variety and increase sales. We shall also approach other shops within the area. We will also utilise eBay, Facebook/Facebook Marketplace and Etsy to sell and advertise. Clients who attend music therapy experiences, hiking sessions and courses will be given the opportunity to purchase produce. We will run up to three open days a year in conjunction with Ty Derwen OPD to benefit from economies of scale, to reduce frequency of traffic and to encourage visitors/customers as more will be on offer. We will also sell our produce on these days. We will share an honesty stall with Ty Derwen.

To keep costs down and to follow the zero waste principles of permaculture we will use outputs from the land to produce our own compost and fertiliser. We may need to purchase additional initially, however, over time we will produce sufficient to meet our requirements.

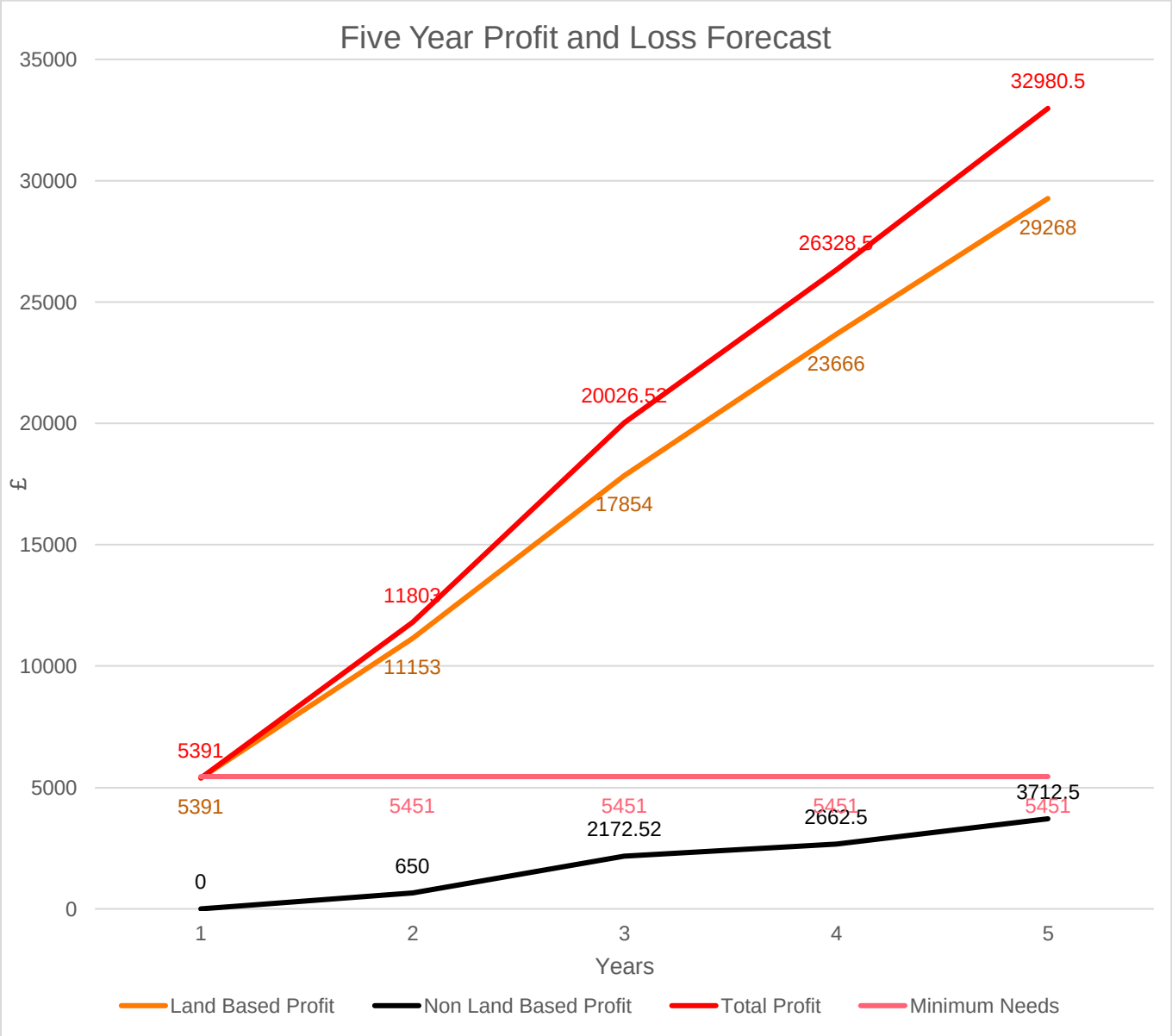
The table below shows how much profit and loss we anticipate making over a five-year period from a range of different products and services. A large proportion of the profits made above our minimum needs will be invested in the land to improve biodiversity, efficiency and sustainability. There are further business ideas which we may choose to implement. See Appendix I for details.

Five Year Forecast Profit and Loss Balance Sheet:

Product/Service	Year 1		Year 2		Year 3		Year 4		Year 5	
	Land based profit	Non-land based profit	Land base profit	Non-land based profit	Land base profit	Non-land based profit	Land base profit	Non-land based profit	Land base profit	Non-land based profit
Music Therapy Experience	0	0	0	0	0	1522.5	0	2012.5	0	2012.5
Music Therapy Experience - Lunch	0	0			960	0	960	0	960	0
Hiking sessions	0	0	0	650	0	650	0	650	0	650
Hiking sessions - Lunch	0	0	320	0	320	0	320	0	320	0
Training Courses	0	0	0		0	0	0	0		1050
Training Courses - Lunch	0	0	0	0	0	0	0	0	240	0
Pencils	732	0	1464	0	2196	0	2928	0	3780	0
Wholesale	1762	0	3524	0	5286	0	7048	0	8810	0
Veg Boxes	2747	0	5495	0	8242	0	10990	0	13738	0
Garlic	150		350		850		1420		1420	0
Total/year	**5391**	**0**	**11153**	**650**	**17854**	**2172.5**	**23666**	**2662.5**	**29268**	**3712.5**

Table 4

For Music therapy experiences, hiking courses and training courses £8 per person is allocated as profit from lunch provided that has been grown from the land.



Graph 1

The graph demonstrates that we will meet and then exceed our minimum between year one and two with land-based profit only.

Processing and adding value will be through artisan production replacing automated production methods, thereby raising the overall environmental performance of the development.

Sensitivity analysis:

If we only sold 20% of our forecasted land-based sales we would still exceed our minimum needs in year 5: 20% of £29286 = £5854

Our total forecasted profit by year 5 is over 6 times greater than our minimum needs. It is possible that we could exceed this total as our forecasts are conservative.

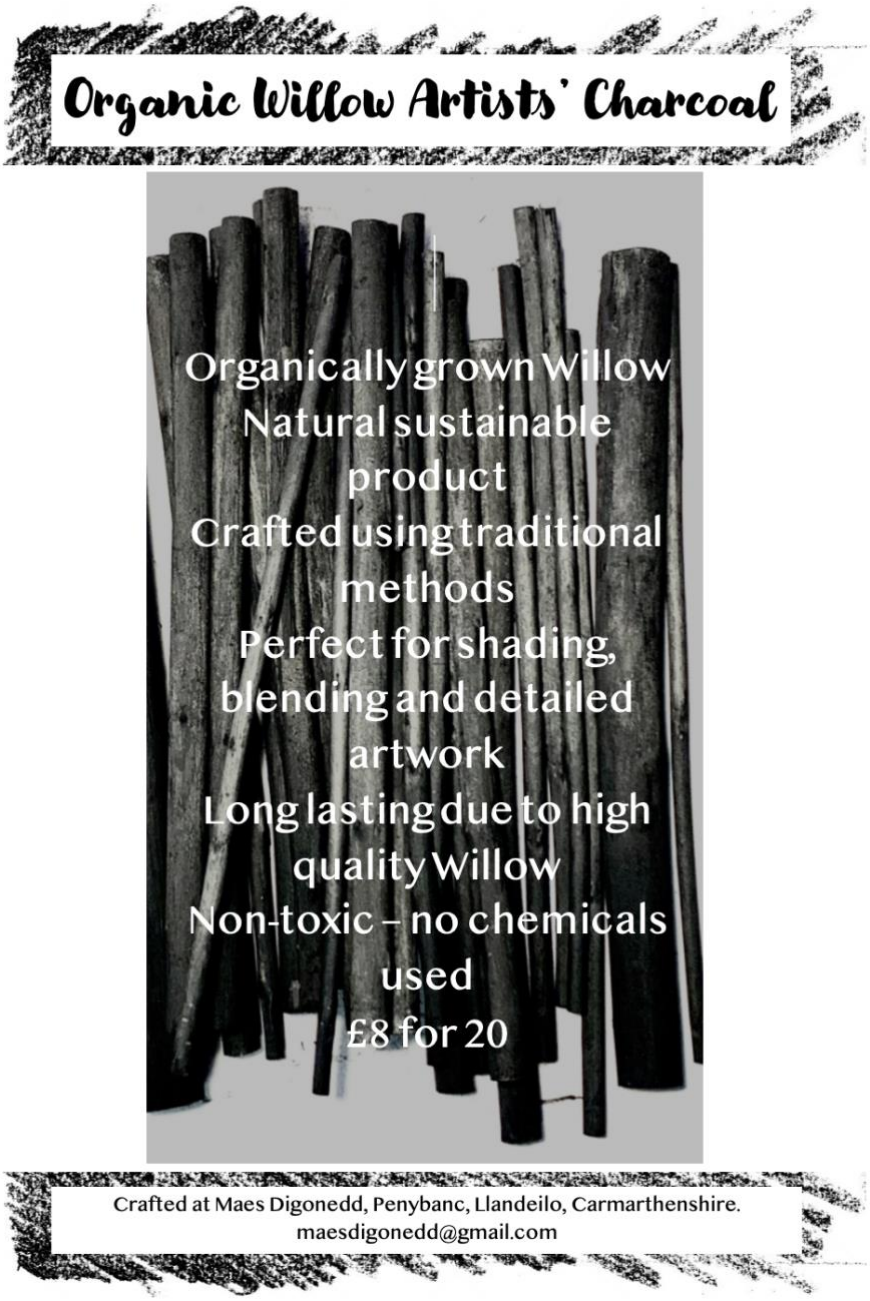
If any one of our businesses completely failed we would still exceed our minimum needs from year 3 onwards.

There are seven micro-businesses that we intend to focus on initially. These are detailed below. A profit and loss table for each business can be seen in Appendix J. We will adopt the 'peasant model' to ensure we spread the risk. In addition to these seven micro-businesses we have detailed profit and loss accounts for nine further potential businesses. See details in Appendix I.

5.1.2 Willow Charcoal Pencils

We will grow a significant amount of Willow for screening, as a wind break and for biomass, therefore there will be no set-up cost for the Willow charcoal pencils because we will already be growing plenty. We will use a small proportion of the Willow to make charcoal for drawing. Through careful research we have found that this is likely to be a more profitable use of willow as opposed to basket weaving etc. We have already planted approximately 700 willows and by year three will have more than 2000. There is also a significant amount of mature willow in the hedgerows which we can use to make pencils with from year 1. We will work in conjunction with Dr Paul Jennings at Rhiw Las OPD on this project.

We put the following advert up on Facebook and emailed it out to various schools and businesses:



We received 17 responses from potential customers who are interested. Three of those were businesses. Three were schools and 11 were individuals. At this stage we were unable to obtain confirmation on the quantities people would like to purchase although there is excellent potential to sell large quantities to schools and businesses. See appendix M for a copy of the responses. When we are in a position to go in person to potential customers with well-presented samples, it is likely that we will have an even greater response. We believe that schools/pupils could provide a good market as the use of charcoal pencils is part of the curriculum and they will help schools achieve their 'eco schools' status. The 'One Planet Development Sticker' may help encourage sales.

We have looked at typical prices for willow charcoal pencils. See appendix O for a price comparison. The table below provides information on average prices and quantities:

	Price/pencil	**No of pencils sold***
	0.3095	1220
	0.2	Not known
	0.4435	134500
	0.3745	Not known
	0.3956	Not known
	0.899	Not known
	0.66666667	792
	0.15	581250
	0.728	33025
	1.105	122
Average price per pencil	0.52717667	
20 pencils at average price	10.5435333	

Table 4a

*Information obtained from etsy.com

Above is a sample of ten different suppliers. The prices range from £0.15 to £1.1/pencil. We intend to sell 20 for £8 (£0.40/pencil), therefore we have pitched the price below the average . Even the higher priced pencils appear to sell well ie the second most expensive type at £0.78/pencil sold a total of 33,025 on Etsy. Therefore we believe that if we produce a high-quality product and promote them as ethical/sustainable then they will sell well. From a sensitivity point of view if sales were poor we could reduce our price down to £4/pack (£0.16/pencil) and still make a profit of £1780.

From a labour point of view the charcoal pencils will fit in well with our food box business as outside the growing season we can concentrate on the pencils in the winter and burn them when the wood burner is lit hence not wasting fuel/heat.

5.1.3 Garlic

We will also grow a range of interesting types of garlic including: Bianco Veneto, Rossa di Sulmona, Solent White and Elephant garlic. These varieties demand a high sale point. We will also sell these at farmers' markets and directly to local restaurants and cafes. Also a number of food box companies have shown interest in purchasing from us. The more unusual types command a higher profit margin. We will also pickle garlic in jars and make flavoured oils.

We will require 26m^2 for 1000 bulbs, therefore by year 4 when we would hit our target of 3000 bulbs in 78m^2 of growing area would be required plus 237m^2 for rotation, however other crops would grow in these areas for 5 years. Our horticultural plans are created using the GrowVeg software which automatically states what follow on plants can be planted where and when.

The following local shops sell garlic: Gardd Sadwrn, £1 each https://garddsadwrn.co.uk/product-tag/organic/ Swn y Coed £0.95 each https://carmarthenfood.com/shop/organic-produce/vegetables-organic-produce/garlic-2/ , Liliwen Herbs £1 each https://carmarthenfood.com/shop/vegetables/garlic/ therefore at 50p I am confident the demand would be high especially due to the fact that Liliwen Herb's £1 garlics were sold out on the website.

Also, a number of potential customers have stated that they would like to purchase garlic and many said that they would buy any seasonal veg from us.

From a sensitivity point if view demand was low we could reduce the price down to 25p each and still make a profit of £670, conversely if demand was high we could increase the price to £1 to be in line with local sellers which could increase our profits to £2920. If garlic sales were particularly profitable we could look into increasing the growing area specifically for garlic and reduce the growing area for less profitable produce. We will employ a flexible outlook to all our businesses.

5.1.4 Wholesale Fruit and Veg

A number of local restaurants, cafes, existing food box suppliers and shops have stated that they are interested in buying our produce including The Angel Inn in Salem, The Warren in Carmarthen, Mary Ellens 139 in Llandeilo, Gardd Sadwrn in

Llansadwrn, Hooma Hu in Golden Grove and C & M Organics in Llanglydwen. See appendix M under the heading 'Wholesale Produce' for copies of their responses, which on the whole have been very encouraging. See appendix M under the 'Wholesale Produce' heading. In addition Y Pantri Glas a zero-waste shop in Llandeilo and Iechyd Da an organic shop in Llandovery have both stated verbally that they would be interested in buying general fresh produce from us.

We have calculated an average price for 1kg of fruit and vegetables based on figures from national average wholesale prices of home-grown horticultural produce form https://www.gov.uk/government/statistical-data-sets/wholesale-fruit-and-vegetable-prices-weekly-average. The figure was based on the average monthly price for the year 20-21 for 1kg of: Blackberries, Raspberries, Strawberries, French Beans, Runner Beans, Brussels Sprouts, Pak choi, Curly kale, Curly Kale, Cabbage, Carrots, Celery, Coriander, Courgettes, Cucumbers, Leeks, Mixed Babyleaf Salad, Brown Onion, Red Onion, Spring Onion, Tomatoes, Rhubarb and Spinach. The total average of 1kg of these items equates to £2.10. From a sensitivity point of view, these prices are not based on organic produce, therefore we may be able to achieve a higher sales price, however, to err on the side of caution we have based our projections on this figure. We have already established a potential broad customer base who are interested in purchasing a wide range of produce. This enables us to spread the risk of failure that may occur through a customer or a particular item of produce.

The vast majority of our produce will be grown over a 6-month period, so we won't be able to provide produce all year round. See appendix P for a Gantt chart that shows when we will sow and harvest.

5.1.5 Training Courses

We will run courses on the setting up and running of OPDs and associated areas of sustainability such as solar energy, building a cob greenhouse etc to share best practice. I have attended many courses on sustainable building and am a qualified engineer and Design Technology teacher. Amy has completed a Permaculture Design course. We would like to team up with Ty Derwen OPD and any other OPDs that may become established in the local area to enable us to provide a broader provision and to share knowledge and skills. We will start running training courses in year five when the OPD is well established. We will keep the number of attendees modest to ensure minimal traffic to the local area. We will offer discounts

for car sharing and will pick people up from local train station/bus stops. We will run no more than six courses a year for up to five people per day. All attendees will receive lunch produced from the land which will be included in the cost of the course. We will also offer some free consultancy to others who are planning to set up an OPD as we believe it is an important policy that should be more commonplace.

5.1.6 Food Boxes

We will grow a wide range of organic fruits and vegetables. From this we will produce food boxes to sell. The set-up costs are low because we will produce as much of our own compost and fertiliser as possible. We would employ a box return scheme and estimate that we would achieve approximately 50% back. Peak production is likely to be six months of the year (we will use Spanish tunnels to extend the season as long as possible). See appendix P for a gantt chart that shows when we will sow and harvest. We plan to ramp up our yield starting at 300 boxes in year one and increasing by 300 per year up to our maximum of 1500 boxes in year 5. This would equate to approximately 12 boxes a week in year one and up to a potential of 58 a week by year 5.

After space for garlic there would be the potential to grow up to 9000kg from the remaining land. Approximately half this will be dedicated to wholesale. Therefore up to 4500kg would be dedicated to food boxes. We will maximise productivity by employing Charles Dowding's no dig horticultural techniques. In addition a proportion of the food box produce will come from the forest garden ie fruit, berries and herbs. Blackberries and sloes can also be harvested from existing hedgerows.

We emailed out and posted the following advert on Facebook:

We had 29 responses saying that they would be interested in purchasing food boxes from us. See appendix M under the 'Food Box' heading for details. This would be an excellent start as it would give us enough customers to meet our targets for the first two years.

From a sensitivity point of view, even if we only sold half the predicted year 5 amount (from 1500 to 750 boxes) we would still be more than £1300 over the minimum financial needs excluding other income streams. Also, if we were to grow more than we can sell through food boxes we could sell a greater proportion as wholesale, although we would opt for greater food box sales if possible due to the fact that the profit margins are higher.

We also asked what types of produce they would like to find in their boxes. The results are collated in appendix N. We received 14 responses. We would require a higher number of responses to make a more robust decision with regards to what produce to include in food boxes. Four responses said 'whatever is seasonal', which would make supply easier. The most common requests were for carrots, potatoes onions and tomatoes. Generally speaking these are low value produce so these items would help make the food box scheme more profitable.

We will continue to carry out market research to ensure our food boxes satisfy or exceed customers' expectations.

We have spoken to local food box suppliers (Gardd Sadwrn and Hooma Hu) and read articles on what makes an excellent food box including:

https://www.independent.co.uk/extras/indybest/food-drink/subscription-boxes/best-veg-boxes-vegetables-delivery-organic-fruit-uk-local-subscription-a9597846.html

https://www.goodhousekeeping.com/uk/food/food-reviews/g35631524/best-fruit-veg-box/

https://www.standard.co.uk/shopping/esbest/food-drink/all-food/best-vegetable-delivery-boxes-a3724476.html

From our research we have found that customers like the following attributes and we will endeavour to incorporate as many, if not all in our boxes:

- A Facebook page or website to let customers know what to expect in their boxes in advance so that they can plan meals ahead. Also with news, updates and stories of what is going on at the land.
- Meal ideas either on-line or included in the boxes.
- A meal planner either on-line or included in the boxes.
- Different box size options.
- Customers able to specify contents (it may not be possible to specify all items due to availability).
- Allow customers to visit the land to see where and how the produce is grown.
- Customers tend to prefer not to be tied into a subscription.
- To be organic, seasonal, ethical and sustainable with minimal packaging and no plastic – the One Planet Development sticker may help encourage sales and it will help differentiate use against some competitors.

Many reports have stated that Covid has forced people to look at their purchasing habits and has resulted in sales of food boxes significantly increasing:

https://foodfoundation.org.uk/fruit_and_veg_affect/covid-19-uk-veg-box-report/

We have carried out some on-line research into prices of existing food boxes and it is clear that ours is priced competitively. See appendix Q for details.

5.1.7 Music Therapy Experience Sessions

Amy has a master's degree in music therapy and six years of experience delivering sessions. We would like to offer music therapy as part of an experience package where adults or children could visit the site, receive music therapy and have a lunch of food from the land. They could also have the option of working on the land and/or making woodwork items or/or doing art or craft projects. Steve has 14 years' experience of teaching woodwork, Amy has over five years' experience working as a learning support assistant and also has an A-Level in Art. I teach cookery and have a current food hygiene certificate, so we are well suited to this work.
Amy intends to run therapeutic sessions in the forest garden as it will provide a range of therapeutic benefits to people who visit the site in addition to meeting our needs as a source for food and increasing the biodiversity of the land. This section of the land will be set out in a way to evoke the senses such as taste, sight, smell, touch and sound within a multi layered system.

There will be a range of fruit and nut trees, smaller fruit plants, herbs and flowers that will provide a visual display of different colours. Clients will be encouraged to pick edible plants they want to taste as they move through the space whilst learning about them. Some plants will provide a range of smells to be enjoyed as you walk around the area, such as camomile (which gives off a scent when walked upon), lemongrass, dill, wild garlic, lavender, to name a few. Many of these plants will also protect the fruit trees from insects or pests. A large number of plants in this area such as raspberry leaves (for tea) will provide medicinal properties which can also be enjoyed by our visitors.

It's proven that forest areas have multiple benefits for our wellbeing. Trees produce phytoncides, an air born chemical which helps them fight off insects, that when we breath increases our levels of white blood cells and in turn kills tumour and virus infected cells in our body*. Looking at trees and being surrounded by them lowers blood pressure, reduces stress levels and improves mood. Trees also provide a tactile sense from the bark on the tree to the feel of the leaves and the branches.

We will use as many native fruit trees as possible, making links with the local grafting company 'Applewise Fruit Trees' in Llandeilo, to be sure we incorporate plants that are more suited to the land, and supporting a local business.

*https://www.dec.ny.gov/lands/90720.html

We own many musical instruments; however, we would buy different instruments for music therapy as they are prone to damage. We would purchase second-hand instruments and carry out many repairs on-site. For other repairs that we cannot do ourselves and for instrument purchases we will support local music shops including Trevada Music in Crosshands.

We anticipate that we would run no more than three sessions per week, for approximately 40 weeks of the year. We would only charge an average of £30 per session. Music therapy sessions are normally £50 to £75 for sixty minutes; however, we are passionate in ensuring it is accessible to all that may benefit from it. We would specialise in working with people who have additional learning needs as it is an area that we have significant experience in (Amy has 12 years' experience and Steve has 14). In addition, Steve has a master's degree in Special Educational Needs. We would not start delivering this until year three when the dwelling build would be complete.

According to the Counselling Directory the nearest Music Therapist is 36 miles away in Hengoed. However, we are aware there may be one or more who are not registered, so we will be sensitive in our approach to ensure that we don't infringe on an existing therapist's client base. There is a high demand for music therapy as it has been recognised as an effective therapy by the NHS and schools. It is also made as a statutory requirement for some pupils with additional needs.

5.1.8 Hiking Sessions

There are many beautiful walks and footpaths in the local area. Steve is the Duke of Edinburgh Award Manager at Ysgol y Deri in Penarth and has six years' experience delivering the award. He is a qualified Hill and Moorland Leader, has a qualification in Expedition Skills and has an Outdoor First Aid certificate. He is due to start his Mountain Leader training October 2020 (depending on COVID-19 restrictions). Steve would guide people on hikes, teach them about the natural environment and map reading skills and provide lunch grown from the land; either

a picnic or hot food heated on a gas stove. These could be one to one or group sessions. The clients would not need to visit the site, I would cycle to them.

5.1.9 Estimated Hourly Labour Distribution at Year 5

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Veg Plot	10	10	20	30	30	30	30	30	30	20	10	10
Mushrooms	25	25	25	25	25	25	25	25	25	25	25	25
Greenhouse	8	8	14	20	20	20	20	20	20	14	8	8
Chickens	20	20	20	20	20	20	20	20	20	20	20	20
Ducks	20	20	20	20	20	20	20	20	20	20	20	20
Energy systems	20	20	20	20	20	20	20	20	20	20	20	20
Forest Garden	5	5	7	9	10	10	10	10	7	5	5	5
Reed bed system	4	4	4	4	4	4	4	4	4	4	4	4
Hedge laying	0	0	0	0	0	0	0	0	0	70	70	70
OPD courses	8		8		8		8		8		8	
Music therapy	33	33	33	33	33	33	33	33	33	33	33	33
Hiking sessions	10	10	10	10	10	10	10	10	10	10	10	10
Waste management/composting	20	20	20	20	20	20	20	20	20	20	20	20
Maintenance	40	40	40	40	40	40	40	40	40	40	40	40
Apiary	12	12	12	12	12	12	12	12	12	12	12	12
Production of products	40	40	40	40	40	40	40	40	40	40	40	40
Willow	4	4	4	5	3	3	3	3	3	3	4	4
Wildflower meadow	10	10	10	10	10	10	10	10	10	10	10	10
Admin (inc buying and selling)	20	20	20	20	20	20	20	20	20	20	20	20
Total/year	3708	3612	3924	4056	4140	4044	4140	4044	4104	4632	4548	4452
Total/month	309	301	327	338	345	337	345	337	342	386	379	371
Total/week	71.3	69.5	75.5	78	79.6	77.8	79.6	77.8	78.9	89.1	87.5	85.6
Total/person/week	35.7	34.7	37.7	39	39.8	38.9	39.8	38.9	39.5	44.5	43.7	42.8

Table 5

The above table is based on two people working on the land. This demonstrates the need for two people to live on the land.

With all our businesses we will work with the community and ensure that we do not infringe on other businesses' customer base.

5.2 Land Management

What TAN 6 requires

- Preparation of a baseline assessment of biodiversity and landscape character with clear management proposals to enhance features of importance [4.20.1]

Land Management	
Essential Criteria:	How Criteria is Met:
Essential Criteria 1: 'All existing semi-natural and other important habitats on the site are conserved and enhanced through appropriate traditional management'	See section 5.2.1, under Essential Criteria 1 heading. (p.53)
Essential Criteria 2: 'All cultural heritage features (e.g archaeology) on the site are conserved and enhanced through appropriate management.'	See section 5.2.1, under Essential Criteria 2 heading. (p.58)
Essential Criteria 3: 'The landscape of the site is enhanced by the addition and traditional management of characteristic or once characteristic local landscape features that, amongst other things, may be used to screen and filter views to built elements of the proposals and to provide shelter and screening to horticultural areas.'	See section 5.2.1, under Essential Criteria 3 heading. (p.58)
Essential Criteria 4: 'Buildings and other structures and access tracks are located where they can be recessed into the landscape and do	See section 5.2.1, under Essential Criteria 3 heading. (p.58)

not stand out in views from public vantage points.'	
Contributory Criteria:	How Criteria is Met:
Contributory Criteria 1: 'Existing semi-natural habitats are extended or once characteristic habitats are recreated, ideally creating wildlife corridors across the site, linking to other habitats beyond the site.'	See section 5.2.2, under Essential Criteria 1 heading. (p.67)
Contributory Criteria 2: 'Populations of once characteristic farmland birds of the local area are increased through appropriate habitat creation.'	See section 5.2.2, under Essential Criteria 2 heading. (p.67)
Contributory Criteria 3: 'Soil organic matter is increased.'	See section 5.2.2, under Essential Criteria 3 heading. (p.69)
Contributory Criteria 4: 'Populations of pollinating insects are increased.'	See section 5.2.2, under Essential Criteria 4 heading. (p.70)

See section '3.0 Baseline' for further information.

The current quality of the land at Maes Digonedd and its biodiversity are poor. As previously mentioned, the field is mainly comprised of improved grassland. This provides us with an excellent opportunity to rapidly enhance the environmental quality. This section supports Carmarthenshire County Council's Local Biodiversity Action Plan by demonstrating how we will conserve flora, fauna and habitats. See section '3.9 Biodiversity' for further information.

5.2.1 Land Management – Essential Criteria

This section demonstrates how we will meet and exceed all the essential criteria.

Essential Criteria 1: *'All existing semi-natural and other important habitats on the site are conserved and enhanced through appropriate traditional management'*

The existing hedgerows will be conserved and enhanced by following all aspects of CCC's 'Good Practice Guide for Hedgerow Management'. I have commented on this below:

- *Look after all hedgerows on your land. They need not all be managed in the same way and ideally some should be allowed to become wide tall hedgerows.* – **We are keen to increase the height and width of hedgerows to improve biodiversity and to create more effective wildlife corridors. We will encourage this by applying organic compost regularly. We will leave them uncut as much as possible. According to DEFRA: '*It is estimated that every year a hedgerow is left uncut it will gain two species of breeding bird; whilst some insects, such as the brown hairstreak butterfly, only lay their eggs on new growth. If the new growth is cut off each autumn or winter the eggs will die; one reason why the brown hairstreak is now so rare.'***
- *Identify those hedgerows that may need to be laid, and aim to carry out a proportion of this work every year over a number of years, e.g.10 years.* – **We will practise this style of hedge management by doing a little each year as this will benefit wildlife and make the job less onerous.**
- *Retain existing hedgerow trees and identify and safeguard those that will be the trees of the future. Plant new saplings where none are present. Protect and mark these so that no one forgets what they are for! Birds will use these young trees as song posts.* **– There is currently a mature Ash and a mature Oak in the hedgerows, these will be retained. In areas where the hedgerow is weak, we will plant native species from cuttings.**
- *Stock can damage hedgerows by browsing and trampling. New re-growth after hedge-laying is particularly vulnerable. When fencing to protect a hedgerow from stock, place the fence at least one large pace from the base of the bank. This will allow the shrubby growth to develop on the bank while creating an area of tall grasses at its base. This is an important habitat for small mammals and insects, and one that is often lacking in tightly grazed fields.* **– We will not keep any stock**
- *Aim to avoid annual flailing of all your hedgerows. Where possible flail every 2 or 3 years. If you have lots of blackthorn in your hedgerows, there is a possibility that brown hairstreak butterflies may use these, so avoid flailing altogether or cut every 3 or 4 years to ensure a supply of 3-year-old blackthorn for the butterfly. Seek advice from Butterfly Conservation.* – **Where possible we will not flail. Not only will this improve the biodiversity, but it will also reduce the visual impact of the OPD.**

- *Hedgerows and dormice. If the hedgerow is rich in hazel and honeysuckle keep an eye out for signs of dormice – they eat their favourite food, hazel nut, in a particular way. Dormice are a European protected species. Seek advice from Natural Resources Wales.* **– The ecology report found no evidence of dormice.**
- *Leave some of your hedgerows uncut until February, so wildlife can enjoy this feast. The berries in the hedgerows provide an important source of food for birds and small mammals over the winter months.*
- *Look after nesting birds. Avoid carrying out any hedgerow work during the nesting season – March – July.*
- *Nest boxes placed in hedgerow trees are usually quickly occupied. Tie these on with an old bicycle inner tube or similar, rather than using nails.*
- *If you need to replant a section of a hedgerow, aim to use transplants grown from locally collected seed. Use a similar mix of species to that in other hedgerows nearby, these are the species most likely to thrive. Protect from stock and the flail.* **– In areas where the hedgerow is weak, we will do this.**
- *Create a 2m wide fertilizer and herbicide free buffer zone adjacent to your hedgerows.* **– We will not use herbicides and all fertilisers will be natural and organic and produced using traditional methods on-site.**

In addition to this, in order to further improve the quality of the hedgerows, we will add high quality organic compost (produced on-site).

The areas of improved grassland will be rapidly and vastly improved in the following ways:

- Rewilding: Some of the key benefits of re-wilding include:
    - *'Help nature recover - Our ecosystems are broken, and nature is struggling – 56% of species in the UK are in decline and 15% threatened with extinction. Biodiversity needs space to flourish.'*
    - *'Naturally functioning ecosystems are better at preventing floods, storing carbon, keeping us healthy, and providing us with clean air, water, food and fuel.'*

- *Many important species have disappeared from Britain over the centuries. This includes numerous birds and mammals. Rewilding can help bring them back.*

- *Rewilding offers a big opportunity to leave our landscapes and rural communities in a better state than they are today, for the benefit of future generations.*

(Rewilding Britain https://www.rewildingbritain.org.uk/rewilding/)

- New 150m hedgerow (and therefore a new wildlife corridor)
- A forest garden which will present the following benefits:

    - is resilient, withstanding drought and flooding through well-developed root and mycorrhizal networks;
    - maintains soil fertility and can be used to reclaim soils that have been polluted;
    - controls soil erosion and water runoff;
    - provides its own nutrient requirements, through annual leaf-fall, the planting of deep-rooting mineral accumulators (e.g. comfrey) and nitrogen-fixing plants and trees such as Eleagnus, alder and clovers, avoiding the need to constantly import materials, or use synthetic chemicals;
    - is low-maintenance once established – you're working with nature, not against her;
    - delivers nutrient-rich, diverse food that promotes good health;
    - is excellent for wildlife, creating a variety of habitats and attracting beneficial insects;
    - can prevent or remedy soil salinization and acidification;
    - utilizes sunlight far more effectively than monoculture systems;
    - is attractive, and provides great spaces for play, education and relaxation.

(Lowimpact.org https://www.lowimpact.org/lowimpact-topic/forest-gardening/)

- The horticultural area will create a diverse range of healthy habitats and improve soil quality through mulching and the application of organic

compost and fertiliser. The plants will help hold the soil together, which reduces erosion and helps conserve the soil. The decomposed plants add nutrients to the soil.

- The willow growth is excellent for bees as it provides them with beneficial nutrients. They will improve soil quality (as described above) and will reduce flood risks.
- The apiary is excellent for increasing pollination.
- The wildflower meadow will provide insects with food in the form of leaves, nectar and pollen, also shelter and places to breed. In return, insects pollinate the wildflowers, enabling them to develop seeds and spread to grow in other places. The insects themselves are eaten by birds, bats, amphibians, reptiles and small mammals, all of whom contribute to the cycle of life. During winter when there is less food available, wildflower seeds can also be an important food source for birds and small mammals. Wildflowers can also help to keep soil healthy. When they become established and spread their roots, they stabilise the surrounding soil. This prevents eutrophication where soil particles and nutrients stored in the ground are washed away into nearby water systems by heavy rainfall. This can cause algae to spread and make the water toxic to marine animals.
- Mulching will take place to improve soil quality, it serves to reduce the likelihood of weeds, fights soil erosion, and improves soil structure by providing the necessary nutrients.
- The addition of traditionally produced compost and fertiliser will also improve soil quality which by doing so will also increase adaptation and resilience of the natural environment to climate change.
- Chickens and ducks will scarify the ground and provide a natural fertiliser.

We will create an overflow pond, a series of grey water reed bed ponds and a wildlife pond. These will all be created in areas which are currently monoculture with very poor biodiversity. They will significantly improve biodiversity and in no way will they destroy any existing habitats. We will introduce a range of native aquatic plants. All life requires water and most of the UK's wetlands have disappeared, so we, as country, need more ponds. The pond's inhabitants and visitors such as frogs, toads, bats and dragonflies etc are highly beneficial in pest control.

All these improvements discussed above will result in the land becoming more similar to what it would have been before it was converted into a field for grazing.

Essential Criteria 2: ***'All cultural heritage features (e.g archaeology) on the site are conserved and enhanced through appropriate management.'***

There are no known cultural heritage features on the land. However, if any were discovered, they would be conserved and enhanced through appropriate management. See Landmaps in Appendix K for further details.

Essential Criteria 3: ***'The landscape of the site is enhanced by the addition and traditional management of characteristic or once characteristic local landscape features that, amongst other things, may be used to screen and filter views to built elements of the proposals and to provide shelter and screening to horticultural areas.'***

We will maintain the height of the hedges at a minimum height of 2.5 m above the ground. We have planted Poplar and Willow every 0.6 m around the entire perimeter of the land just on the inside of the hedge and will allow them to grow to full height more than 8 m high.

Figure 14 illustrates tha a significant amount of screening will be incorporated. These will be planted as soon as possible (the current window of opportunity has been missed due to the COVID-19 lockdown) and will start well before the dwelling building commences. See Gantt chart in section 4.6 for schedule of planting.

The visual screening is comprised of:

- Poplar which grows at a rate of 2 to 3.5m/year and can reach approximately 20m in height. Hybrid willow which grows at a rate of 1.5m/year up to approximately 9m high. This will be planted as soon as possible (before planning permission is granted) to ensure that the site is screened as quickly as possible. Within only 3 to 4 years the entire built and horticultural area will be effectively screened off from all public viewpoints. We will also plant fast growing evergreen trees such as Leylandii.

- Increased height of existing hedgerows (also benefiting wildlife) (where safe to do so to ensure that high visibility is maintained at vehicle access point).
- Forest garden located to the south/east and north/west of the dwelling, ancillary buildings and horticultural area.
- All new hedgerows will be unbroken to reduce visual impact and existing hedgerows will be improved by planting native species.

- The new hedgerow/border between our land and our neighbours on the south/west side of the plot will comprise of a range of plants including: Native Willow; Bowles Hybrid Willow; Italian Alder; Autumn Olive; Red Alder; Cobnuts; Crab Apples; Elder; Thornless Brambles; Bulace Damson, Poplar etc.. We would also like to plant some native deciduous trees for future generations to benefit from such as Alder, Oak, Sweet Chesnut, Birch, Sycamore, Hazel and Hawthorn etc. These particular species have been selected to reflect those found in the local area. This will be allowed to grow tall to visually shield the build and horticultural areas.
- We will also plant further visual screening along the southern edge of the horticultural area and the dwelling. This will comprise of a similar mix of plants as above, however, there will be a greater mix of native willow as it grows quickly and to a significant height.
- The willow area to the north/west of the dwelling willow also provide very effective visual screening.
- These features will also act as windbreaks and will provide a whole host of benefits as shown below:

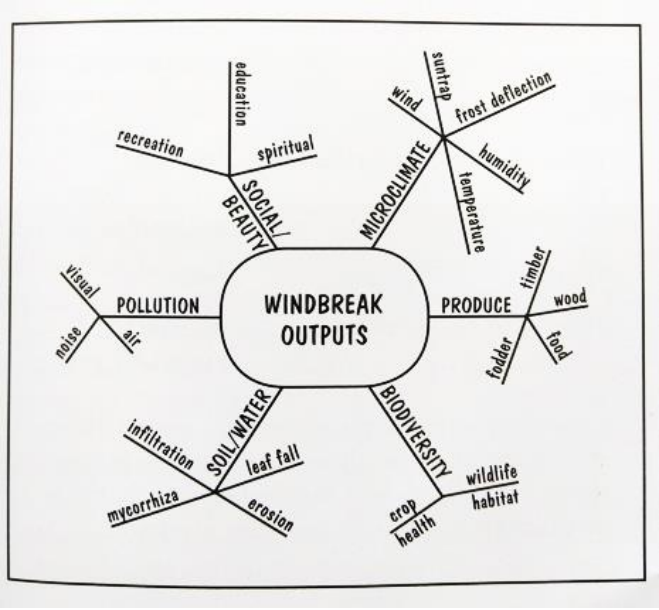


Figure 17 - Image from Patrick Whitefield's 'The Earth Care Manual'

As it says in section 3.74 of the planning guidance *'provide additional screening (using native species) where this will help the overall development blend into the wider landscape.'* The screening to be implemented as discussed above, along with the use a local and natural materials for buildings will certainly help the overall development blend into the wider landscape.

These features will be maintained using traditional techniques in the vast majority of situations. Some basic powered equipment will be required in certain circumstances. In these situations, equipment will be shared between other OPDs or hired where possible to avoid purchasing and thus using excessive natural resources. Ty Derwen OPD in the field adjacent keep horses and they are happy to share these with us to carry out more physically demanding jobs. The traditional use of horses on the land is significantly more sustainable than the use of tractors.

Essential Criteria 4: *'Buildings and other structures and access tracks are located where they can be recessed into the landscape and do not stand out in views from public vantage points.'*

Once the hedges, forest gardens, wildflower meadow and willow have matured, Maes Digonedd will be a beautiful oasis of flora and fauna which will provide a rich and diverse habitat for wildlife. It will significantly enhance the beauty of the immediate area**. Buildings and horticultural areas will be positioned carefully in the landscape so that their visual impact will be very limited because of existing screening and distance (from neighbours), however, we intend to reinforce planting and within approximately 3 to 5 years neither buildings no horticultural areas will be visible from public vantage points. This exceeds the requirements of the One Planet Development Practise Guidance which states in section 3.47 that *'the overall development blend into the wider landscape'. It also states in section 3.42 'In considering the addition of new features it will be important to take account of views to and from the site, helping blend the site into its surroundings and using a natural vernacular characteristic of its surroundings. This will help strengthen local landscape character rather than take away from it.'* Section 3.43 states: *'Choosing the right site for buildings (including polytunnels) and tracks and other access arrangements) will be an important aspect in assisting landscape 'fit'. Locations for buildings and access should be chosen where they will not be obtrusive in views from outside the site. Suitable locations will be those that are part screened by the lie of the land and /or existing tree and hedgerow cover or new planting. There will also be benefit in providing additional tree and hedgerow planting that further help filter views into the site, especially of built structures and areas of horticulture. These can often combine with shelter belts that can improve the micro-climate around dwellings and offer shelter to cropped areas.'***

We chose to locate the dwelling based on the following criteria to ensure minimal visual impact and that it blends into the wider landscape:

- Located on a lower flatter area of the land where it will be less prominent.
- Located 15m away from the road to the to the north/east (closest point to road), which is sufficient to allow the hedge, once allowed to grow higher, to provide effective visual shielding.
- The ancillary buildings and the horticultural area are located adjacent to the dwelling which places them fairly centrally on the land. This location provides significant space for the forest gardens either side to provide shielding, in addition to the new hedgerows and willow that will further shield the area.
- Once the hedgerows, willow and forest gardens have matured the built area and horticultural area will not be visible from any public viewpoints.
- Prior to the maturity of hedgerows, willow and forest gardens, the dwelling will be visible, however, it will be a low height, single story, built from locally sourced larch with a green mono-pitched roof (3.25m high), which will very subtly blend into the landscape. The shed will also be larch and the green house will be made from cob which is also a natural material that will be made from the earth and will therefore reflect the natural colour of the area. All buildings will therefore blend in well with the local environment.
- The short access track will be located on the inside edge of the hedge as shown in Figure 14 with further trees to shield it. It will therefore not be visible from any public viewpoints.

A series of scaled diagrams have been created to demonstrate how the dwelling (highest part of the built area) will be screened from three different locations points, A, B and C. Figure 19 below shows the locations of these.

Figure 18

The above architect’s impression of the built area viewed within the boundaries of the land. It demonstrates how effectively it will blend into the landscape. It will not be visible from any public view-points.

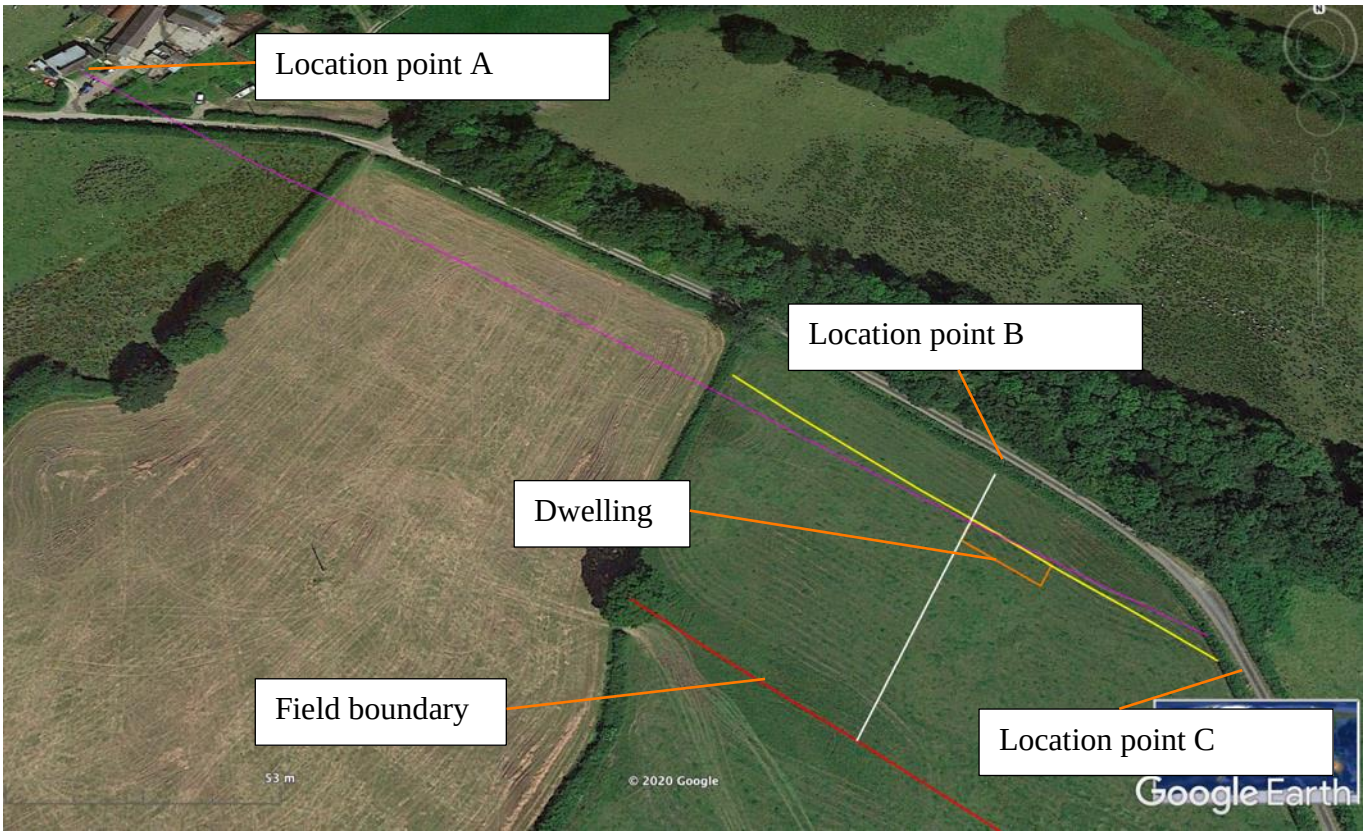


Figure 19

It is not necessary to include the view from Cwmwern Farm (second closest neighbour) as the views of Maes Digonedd from the farmhouse are blocked by their barns. It is also a distance of 320m away from the dwelling which is obscured by two hedgerows and trees.

The images below show the cross-sectional profile (generated using Google Earth Pro) of the land from the location points to the dwelling.

Figure 20 (magenta cross-sectional line on figure 19), below, illustrates that we would be required to plant trees along the existing hedgerow to at least 4m to obscure the view from the top floor window of Caegroes Farm. We will plant fast growing trees such as hybrid Willow and Poplar which grow at a rate of 2 to 3.5m per year. Therefore, in just over a year the line of sight could be obscured. These trees will be planted before planning approval for the OPD which could result in the view being obscured before the dwelling is built.

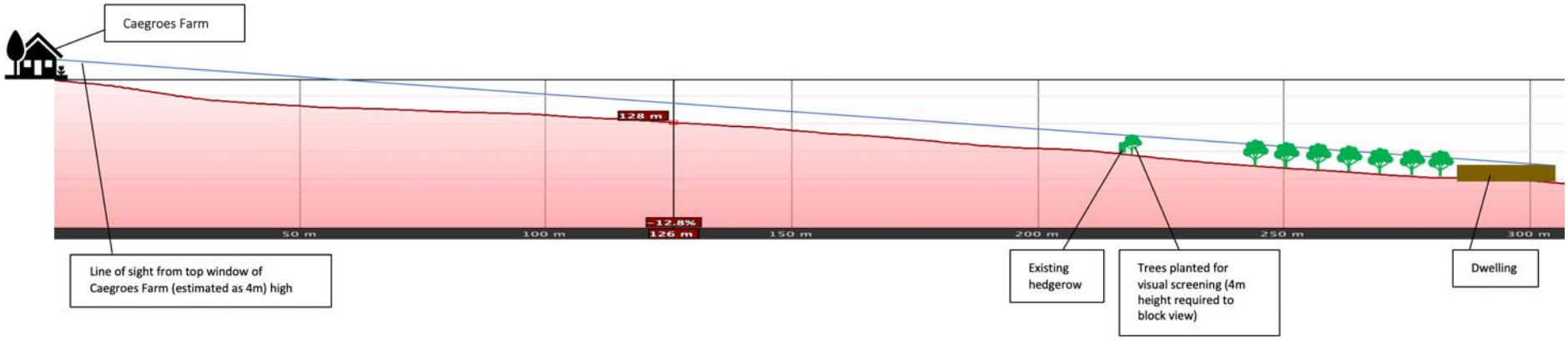


Figure 20

Figure 21 (white cross-sectional line in figure 19), below, illustrates that from location point B the existing hedgerow would obscure the view from a standard car window. We will, however, plant additional trees to further screen this, which would also obscure the view from the tallest of vehicles such as lorries and tractors.

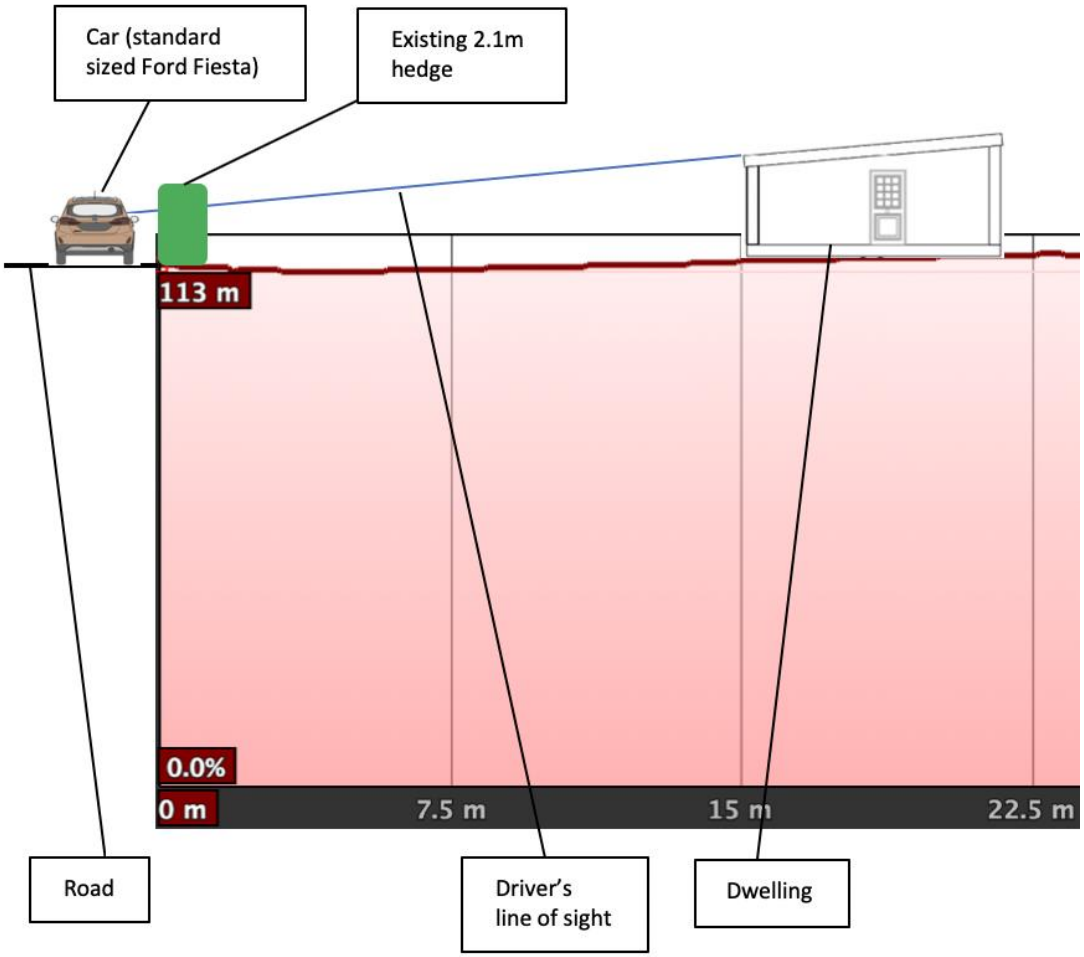


Figure 21

Figure 22 (yellow cross-sectional line in figure 19), below, illustrates that from location point C the existing hedgerow would obscure the view from a standard car window. We will, however, plant additional trees to further screen this, which would also obscure the view from the tallest of vehicles such as lorries and tractors.

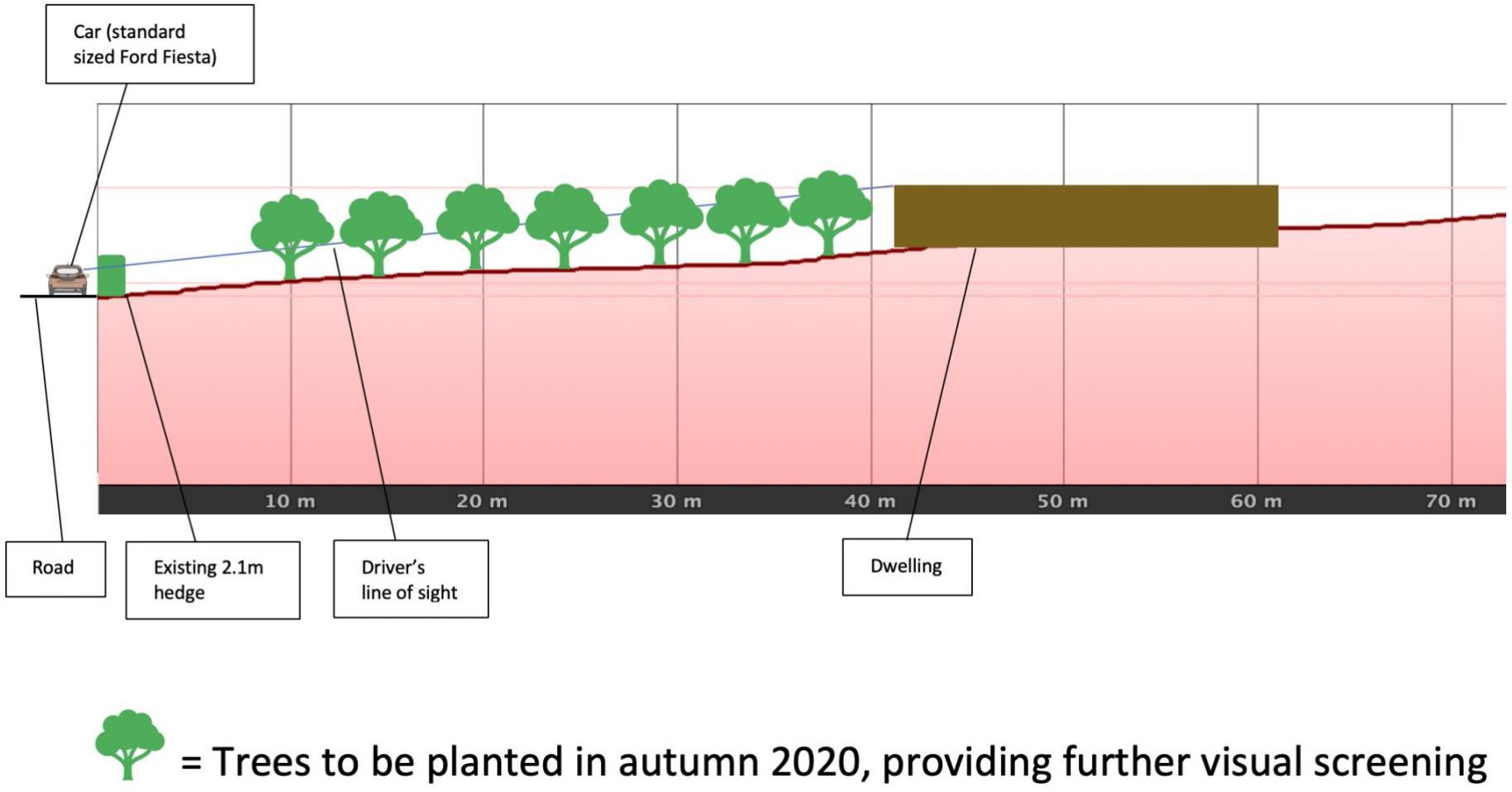


Figure 22. Figures 20 to 22 are drawn to scale.

5.2.2 Land Management – Contributory Criteria

This section demonstrates how we will meet and exceed all the contributory criteria.

Contributory Criteria 1: ***'Existing semi-natural habitats are extended or once characteristic habitats are recreated, ideally creating wildlife corridors across the site, linking to other habitats beyond the site.'***

The exiting hedgerows will be allowed to grow higher and wider and we will apply organic fertiliser and compost to encourage this and improve its structure.

A new 150m (approximately 4 m wide) hedgerow will be planted, which will comprise of a range of plants such as: Native Willow; Bowles Hybrid Willow; Italian Alder; Autumn Olive; Red Alder; Cobnuts; Crab Apples; Elder; Thornless Brambles; Bulace Damson, Poplar etc. Also, in the microclimate created by the boundary, soft fruit and shade or semi-shade tolerant plants like Rhubarb and Comfrey, Wild Garlic and so on will grow. We would also like to plant some deciduous trees for future generations to benefit from such as Alder, Oak, Sweet Chesnut, Birch, Sycamore, Hazel, Hawthorn etc. These particular species have been selected to reflect those native to the local area. Figure 14 shows that it will create a new wildlife corridor from one hedgerow to another. The forest gardens, rewilding areas, willow and the wildflower meadow will also provide further wildlife corridors. All these will link habitats within and beyond the site. The forest garden and new hedgerows will comprise of a mix of native plants which will re-create habitats characteristic of the region.

As previously discussed, the current field is a monoculture of improved grassland with very poor biodiversity. By implementing our scheme of development, the vast majority of the land will be transformed into a haven that will recreate once characteristic habitats of the region.

Contributory Criteria 2: ***'Populations of once characteristic farmland birds of the local area are increased through appropriate habitat creation.'***

Here are some examples of how Maes Digonedd can support birds which have been identified in the 'Carmarthenshire Nature Recovery Plan':

Anthus trivialis **Tree pipit** © Derek Moore		• Woodlands/Uplands/Lowland Grassland and Heathland • A breeding summer visitor to most parts of the county. • Birds of Conservation Concern in Wales 3 status: **AMBER**	• Wales BBS trend % (1995-2016): –18%* • Decline probably linked to habitat changes in farmland practises and forestry management.

The land will traditionally farmed and woodlands will be created and well managed.

Caprimulgus europaeus **European nightjar** © Dai Rees		• Woodland/ Lowland Grassland and Heathland/Upland • Scarce, though increasing, summer visitor, breeding in upland conifer plantations • Birds of Conservation Concern in Wales 3 status: **AMBER**	• Lack of suitable forest habitat (open and young tree age-classes) is a limiting factor for nesting. Large areas of continuous cover areas would be detrimental. • In Wales nightjar showed strong increases in range between 1990 and 2010 following declines in earlier Atlas periods.* • 2013 radiotracking survey of nightjars in Brechfa forest. Predation and inclement weather impacted on breeding success.

We will increase the presence of young trees significantly and the woodland will be in two discrete areas rather than ‘continuous cover’ which would be detrimental.

Emberiza citrinella **Yellowhammer** © Derek Moore		• Farmland/ Lowland Grassland and Heathland/Coastal/Uplands • A declining breeding resident with a patchy distribution, being absent from large tracts of countryside. Most frequently seen on dry bracken covered hillsides and arable land in coastal areas. • Birds of Conservation Concern in Wales 3 status: **RED**	• Wales BBS trend % (1995-2016): –58%* • Decline probably due to lack of seed food in winter because decline in arable farming.

We will be carrying out some arable farming which can help support the Yellow Hammer throughout winter.

Perdix perdix **Grey partridge** © Derek Moore		• Farmland • Rare. Most recent records probably relate to captive reared and released birds. • Birds of Conservation Concern in Wales 3 status: **RED**	• Declined in range by more than 50% in Wales (1970-2010).* • Decline in insect and seed resources in late summer and winter probably a factor.

The rich biodiverse habitats that we create will attract insects and the wildflower meadow will provide seeds that the Grey Partridge can feed off.

Sturnus vulgaris vulgaris **Common starling** © D. Moore		• Wetlands/Woodlands/ Farmland/Brownfield • Although still reasonably common this is a declining resident and numerous winter visitor. • Birds of Conservation Concern in Wales 3 status: **RED**	• Wales BBS trend % (1995-2016): −72%* • Breeding decline possibly due to grassland management regimes leading to a reduction in invertebrates, poor survival of young birds may be adding to the decline but the cause of decline yet to be identified.

Our land management plan will lead to significant increases in the soil's health, which will result in an increase in invertebrates which could provide an invaluable source of food for the Common Starling.

Tyto alba† **Barn Owl†** © M. Newton		• Farmland/Lowland Grassland and Heathland • A local resident breeding species which has declined due to habitat loss and pesticides. • Birds of Conservation Concern in Wales 3 status: **GREEN**	• Postcard campaign for records has been in place for some time. • A local project and NRW grant funding used to put up boxes in the county. • Surveys carried out for planning applications that may impact on barn owls. • Decline almost certainly linked to improved grasslands and intensification.

The land is currently classed as 'improved grassland'. This will be transformed into a rich biodiverse landscape which will be more suitable to sustaining Barn Owls. We will install a number of Barn Owl nesting boxes to support them.

We will allow our hedgerows to grow taller and wider**.** According to DEFRA: '*It is estimated that every year a hedgerow is left uncut it will gain two species of breeding bird'.*

This is not an exhaustive list of birds that will be may benefit from the development of Maes Digonedd and the improvements that will take place on the land will benefit many other species of birds too.

Contributory Criteria 3: *'Soil organic matter is increased.'*

Currently the soil quality is poor due to the monoculture of improved grassland.

The horticultural area will create a diverse range of healthy habitats and improve soil quality through mulching and the application of organic compost and fertiliser. The plants will help hold the soil together, which reduces erosion and helps conserve the soil. The decomposed plants add nutrients to the soil.

All the planting that will take place will greatly improve the soil quality as they recycle nutrients back into the soil. When they become established and spread their roots, they stabilise the surrounding soil. This prevents eutrophication, where soil particles and nutrients stored in the ground are washed away into nearby water systems by heavy rainfall.

Mulching will take place to improve soil quality, it serves to reduce the likelihood of weeds, fights soil erosion, holds in moisture and improves soil structure by providing the necessary nutrients.

The addition of traditionally produced compost and fertiliser will also improve soil quality by helping it hold onto nutrients and water.

We will grow plants that have nitrogen fixing properties like clover, peas, beans and lupins. Nitrogen-fixing plants are those whose roots are colonized by certain bacteria that extract nitrogen from the air and convert or "fix" it into a form required for their growth. When the bacteria are done with this nitrogen, it becomes available to the plants, themselves.

Contributory Criteria 4: '*Populations of pollinating insects are increased.'*

There has been a severe decline in pollinator populations throughout Wales over recent years. According to the Welsh Government's 'The Action Plan for Pollinators in Wales' there are four main reasons for this, and we have commented below on how Maes Digonedd will do its part in reducing these:

- Land use intensification

  Maes Digonedd will be highly biodiverse making it quite the opposite to what is classed as 'land use intensification' where as much of one species if forced to grow within a certain area. We will encourage companion planting creating plant communities which have mutual benefits to each other.

- Habitat loss and fragmentation

  As discussed in 'Contributory Criteria 1: We will create new habitats that will increase the amount of wildlife corridors.' This will link habitats thus reducing 'fragmentation'. We will also create many new habitats.

- Disease

  An increase in pollinator populations have been found to help reduce diseases and pests.

- Agro-chemicals

  We will not use agro-chemicals only organic compost and fertilisers.

- Climate change

  We will live a sustainable life on Maes Digonedd and fight climate change through living to and exceeding the requirements of an OPD lifestyle.

Bees are vital pollinators; we will start initially with two hives each consisting of approximately 10,000 bees each.

The highly biodiverse habitats that we will create will support an abundance of pollinating insects i.e. in the forest gardens, re-wilding areas, the wildflower meadows, in the diverse hedgerows and amongst the willow (which flower early providing an excellent source of nectar for bees).

We will create log piles in the forest gardens which will act as a bug house.

The wildlife pond will be useful for supporting the lava of many species.

The compost will support lava of many species as they will feed off the rotting organic matter.

6.0 Energy and Water

What TAN 6 requires

- Quantification of how the inhabitants' requirements for energy can be obtained directly from the site [4.17.1]
- There is the potential to have wider community carbon reduction benefits through the export of any surplus electricity to the grid [4.19.1]

Energy and Water	
Essential Criteria:	How Criteria is Met:
The energy needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.	See section 6.1 Energy. (p.73)
All of the energy needs of all activities shall be met from sources of renewable energy on site, with the exception of small amounts of non-renewable fuel for particular uses for which they are best suited and justifiable (para 3.60)	See sections 6.1.1 (p.76) to 6.1.4 (p.77), p78 – p80
The water needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.	See section 6.3 (p.81)
Rainwater harvesting from buildings and structures must be maximised.	See section 6.3 (p.81)
All of the water needs of all activities should be met from water available on site, unless there is a more environmentally sustainable alternative. Abstraction from water bodies (including groundwater sources) must be at levels that do not cause environmental harm. Harm would result from the lowering of surface and ground water levels.	See section 6.3 (p.81)

Contributory Criteria:	How Criteria is Met:
The embodied energy of renewable energy equipment should not outweigh its benefits from energy generation	See section 6.2 (p.78)
Human and animal labour should replace the use of non-renewable energy whenever possible and practical	See section 6.2 (p.78)
Any ponds / lakes created should maximise habitat creation and should not destroy important existing habitats.	See section 6.3 (p.81)
Any water pumping should be renewably powered.	See section 6.3 (p.81)

6.1 Energy

Essential Criteria 1:'*The energy needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.'*

Please see appendix R for a copy of Helyg Energy Services 'Demonstration of Zero Carbon' report. A SAP assessment has been carried out which results in a predicted negative Dwelling CO_2 Emission Rate (DER) of -9.64 kg/yr/m^2 , thus demonstrating Zero Carbon Emissions for the proposed dwelling. We will comply with Helyg Energy Services recommended specifications.

On average 56% of household energy usage is attributed to space heating (source: Patrick Whitefield's Earth Care Manual'). Therefore, we will invest in minimising this:

- The dwelling will be orientated to face south/west. This aspect will maximise the sunlight. It will be orientated this way (rather than south) to maximise the evening sun when we will want more warmth and light.
- It will have large windows on the south/west side to maximise heat and light.

- A large percentage of the heating will be achieved through passive solar design.
- The dwelling will be super insulated with 300mm of reclaimed Celotex thus reducing the need for heating. Insulation will be carefully installed to ensure there are no gaps for cold air to flow through.
- Measures will be taken to reduce any draughts such as well fitted, insulated doors.
- It will have a low ceiling to reduce volume of space required to be heated.
- The rooms will be relatively small, with plenty of doors to ensure we can keep heat where we need it.
- Thermal bridging will be minimised and eliminated if possible.
- Glazing will have low U levels.
- Windows will be regularly cleaned to ensure solar gain is maximised.
- We will also invest in some good jumpers and slippers, so we are not required to heat the space as much!

These factors above will result in a dwelling rarely needing any supplementary heating other than heat generated from cooking and from the bodies of occupants.

- A highly efficient solid fuel cooker will be used.
- The stove, fire and back burner will be located as centrally as possible to maximise heat distribution throughout the dwelling and reduce heat loss through external walls.
- Heat generated as a by-product of the stove will be used to heat other rooms and domestic water.
- We will build a solar water heating panel to reduce/eliminate further heating. See link for details: https://bigginhill.co.uk/solar.htm
- Any excess electricity produced will be used to power an immersion heater in conjunction with the solar water heating panel.
- Extra energy produced in the summer would be used to run an electric cooker to reduce the amount of biomass required.

- All wood used will be thoroughly seasoned to ensure high burn efficiency.
- We will use a highly efficient rocket-stove to cook on outdoors in the summer. This will reduce the amount of biofuel required and prevent excess heat indoors.
- We will use a pressure cooker to reduce cooking times.

- Mealtimes, washing up and showering will be co-ordinated to ensure that hot water produced will be used.
- When surplus electricity is produced on sunny days, we will use a low energy electric slow cooker.
- We will not use a dish washer, microwave, TV or a tumble drier.
- Instead of a TV we will use a laptop or tablet as these use less energy.
- For music/radio we will use a small low energy Bluetooth speaker.
- We will turn equipment off when not in use and not keep appliances on stand-by.
- We will minimise the amount we use electrical equipment.
- We will plan and manage peaks to avoid 'blackouts'.
- We will use the minimum number of very low voltage; super-efficient LEDs required to light rooms and will direct light at specific work areas rather than a high level of lighting for the entire room.
- All appliances will be highly efficient. A+++ where possible.
- We will use a cold store to utilise the natural regulating temperature of the ground to keep produce cool.
- The fridge/freezer will be located in a cool unheated area of the dwelling.
- We will build our own biodigester (I was going to attend a course at Bee View Farm in Pembrokeshire, however, it has been postponed due to COVID-19) to generate gas from compost. Please see link for details http://offgrid.vision/step-by-step-instructions-for-how-to-build-a-biodigester/

- We will follow the rule; reduce; repair; re-use; re-cycle.

Essential Criteria 2: '*All of the energy needs of all activities shall be met from sources of renewable energy on site, with the exception of small amounts of non-renewable fuel for particular uses for which they are best suited and justifiable (para 3.60).'*

Please see a report in appendix R from Helyg Energy Services which states that 5.43m^3 of dry willow would be required to provide space and water heating for the dwelling. Please see appendix S for a letter from 'Crops for Energy' who have confirmed and demonstrated through calculations that we could grow sufficient wood fuel for our needs within the 3000m^2 allocated area.

6.1.1 Solar

The vast majority of our energy needs will be met through solar power. The solar panels will be located on the ground which will enable us to adjust the angles to maximise solar gain. We will use apps such as 'Sun Locator' to provide information on optimum panel alignment which could enable us to achieve an additional 20% power output. The land is south facing which will enable us to achieve higher levels of solar gain. They will be sited in a shade free location.

The table below details our estimated annual electricity usage:

Appliances	kWh/year	% Proportion for			
		Domestic use	kWh/year	Business use	kWh/year
Fridge/freezer A++	206.00	50.00	103.00	50.00	103.00
LED lighting*	84.00	70.00	58.80	30.00	25.20
Iron	175.00	100.00	175.00	0.00	0.00
Laptop	25.00	50.00	12.50	50.00	12.50
Bluetooth speaker	2.92	100.00	2.92	0.00	0.00
Wireless router	25.55	50.00	12.78	50.00	12.78
Mobile phones	23.00	50.00	11.50	50.00	11.50
Tablet	4.30	50.00	2.15	50.00	2.15
Washing machine	166.00	100.00	166.00	0.00	0.00
Food processor	24.00	20.00	4.80	80.00	19.20
Tools battery charging	70.00	50.00	35.00	50.00	35.00
Water pump	200.00	50.00	100.00	50.00	100.00
Guitar amp	2.70	50.00	1.35	50.00	1.35
Electric Bike	9.60	50.00	4.80	50.00	4.80
Totals	**1018.07**		**690.60**		**327.48**

Table 7

The values were derived using a 'Lowenergie' plug-in energy monitor, except for those denoted with * which were derived from sources on-line.

We anticipate that we will consume 1018 kWh/year of this 691 kWh/year will be for domestic use and 327 kWh/year will be for business use.

Our solar requirements have been derived in conjunction with Bobby Bazalgette – Director of Solar Wheel Ltd, Brechfa, Carmarthen. We shall purchase our solar equipment from him, thus supporting a local business.

6.1.2 Solar Panels

A rule of thumb for polyvoltaic panels in the UK is that you will get a 10% capacity factor. This equates to a 1 kW array producing 10% of 8765 (number of hours in a year), 876 kWh. Most of this will be generated in the summer although most is required in the winter. A way to estimate the winter production is to take one peak power per day, as an average. Which would result in the availability of an average of one kWh per day. There will be days with almost zero input, and there can be long periods with very little.

It is necessary to take into account the self-consumption of the system as inverters, charge regulators and batteries all consume in one way or another. An inverter might consume 30 watts just on standby, and that alone can add up to 0.75 kWh/ day (if left on).

6.1.3 Batteries

Batteries are required to provide what is required when there is insufficient sun.
To calculate how many batteries are required:

We estimate that we will consume 2.79 kWh per day (1008 kWh (annual consumption)/365). Therefore 19.5 kWh of storage would be required for a week without sun. Allowing for the extra consumption as discussed above, we should round this up to 25 kWh. We will purchase a sufficient quantity of batteries so that they can run autonomously for 7 days. We will also purchase the most eco-friendly batteries that we can afford such as lithium as opposed to lead acid.

6.1.4 Solar Generation and Storage

We will use a 48v system as this has more scope to upgrade in the future, requires less charge controllers and thinner cables for the same amount of power. You also get better invertor efficiency and regulation i.e. less losses converting to 240 VAC. Also, the inverter doesn’t have to work as hard to keep its AC output constant. There is also a reduced fire risk, due to lower operating temperatures.

Based on a maximum of 25 kWh/week we will require:

4KW panel array
An invertor (such as a Conversol 5 KW with solar charge controller)
48v battery pack
12v battery pack (for the lighting circuit)
Cables, fuses, switches etc
We will build the solar panel mounting frame ourselves.

Excess energy generated once the batteries are fully charged will be diverted to power an immersion heater which will work in conjunction with the hot water solar panel reducing energy required from the wood burner. This will be highly beneficial in the summer months when we want to keep the dwelling cool as we would not need to light the wood burner. We would also use an A+ electric cooker when sufficient solar energy is available. If necessary, we will use solar thermal panels for water heating, however, as stated in the SAP report (appendix R) a solar PV immersion heater divertor could potentially be used instead and this would be our preference.

We will utilise battery powered hand tools such as; chainsaw; drill; strimmer etc rather than petrol and we will charge these on days of extended sunlight. These tools will be required to be used more frequently in summer when energy required to charge them will be abundant.

6.2 Biomass

When there is insufficient sunlight, we will use biomass for space heating, water heating and cooking. A highly efficient solid fuel stove with back boiler which burns at 85% efficiency.

We will start planting willow biomass as soon as possible (unable to do so currently due to the COVID-19 lockdown) which grows at a rate of up to 1.5m/year. Please see appendix U for a copy of a quote from Crops for Energy which details the range of species we intend to purchase to achieve high yields and good resistance to disease.

We will not have sufficient biomass until year 3 to 4, however, we can also obtain additional biomass from the following sources if required:

- We have hedging around the perimeter of the site and can therefore utilise biomass from here.

- Our neighbouring OPD produce manure briquettes. We can either buy or barter for these.

- They have more manure than they require so we can therefore make our own briquettes.

- Both our neighbours own woodlands and have offered to provide us with some wood free of charge.

- In due course we will fell a mature Ash due to Ash dieback, this will provide us with a large amount of biomass to get started prior to when the willow grows sufficiently large enough to harvest.

- We will build a biodigester which will reduce the amount of biomass required for cooking.

5.43m^3 of dry willow per annum is required for space and water heating according to the SAP calculation. This figure is based on 2.3 people and a child and 21° in living rooms and 19° in bedrooms. For the vast majority of the time there will only be 2 adults and a child in the dwelling. Also, we will not heat the dwelling to these temperatures. It would be likely to be closer to 19° in the living room and 16° in the bedrooms. Also, the third bedroom would be used infrequently however the calculation does not take this into account. Therefore, in reality, it is likely that we would require significantly less than 5.43m^3 per year.

There is also the potential to increase the allotted area for biomass, if required, at a future point by reducing the size of the forest gardens and or wildflower meadows. However we do not anticipate this being necessary.

Please see a report in appendix R from Helyg Energy Services which states that 5.43m^3 of dry willow would be required to provide space and water heating for the dwelling. Please see appendix S for a letter from 'Crops for Energy' who have confirmed and demonstrated through calculations that we could grow sufficient wood fuel for our needs within the 3000m^2 allocated area.

Predicted monthly biomass requirements in tonnes:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.227	0.183	0.163	0.103	0.063	0	0	0	0.002	0.099	0.161	0.222

Based on figures from SAP output. See appendix T for workings.

Contributary Criteria 1: ***'The embodied energy of renewable energy equipment should not outweigh its benefits from energy generation.'***

We will purchase high quality solar panels and a high-quality charge controller so that they will last longer thus resulting in an improved ratio of energy generation to embodied energy. These will also be chosen for their high efficiency.

We have intentionally designed elements of our energy system to be low-tech so that it can be repaired rather than replaced, such as the utilisation of a stove and backburner, which is reliable and simple to maintain.

We will purchase the most environmentally batteries that we can afford such as lithium as opposed to lead acid. Lithium batteries are more efficient and last longer. Lead acid batteries require many times more raw material than lithium-ion to achieve the same energy storage, making a much larger impact on the environment during the mining process. The lead processing industry is also very energy intensive, leading to large amounts of pollution.

Contributary Criteria 2: ***'Human and animal labour should replace the use of non-renewable energy whenever possible and practical.'***

We will tend to the land using our own labour as detailed in table 23 which shows how many hours two adults will be required to work the land. We also have an agreement with Ty Derwen (adjacent field) where we can use their horses for heavy labour. We are passionate about sustainability and will therefore always strive to minimise/eliminate the use of non-renewable energy.

Whilst we are setting up the site, we will require gas for cooking and heating, however we won't be entirely dependent on gas as we will also use biomass and manure briquettes (from Ty Derwen OPD) for our rocket stove. The use of gas will stop when we have set-up the dwelling appropriately.

6.3 Water

All water used a Maes Digonedd will be harvested from rainwater and stored in water buts. Rainwater is a resource than can be harvested with minimal environmental impact.

Ecological advantages of rainwater harvesting:

- Rainwater harvesting can reduce stormwater runoff from a property. The elimination of runoff can reduce contamination of surface water with pesticides, sediment, metals, and fertilisers.
- By reducing stormwater runoff, rainwater harvesting can reduce a storm's peak flow volume and velocity in streams and rivers, thereby reducing the potential erosion of waterways.
- It is an excellent source of water for plants and landscape irrigation since it has no chemicals such as fluoride and chlorine.
- It reduces demand on groundwater which can result in water becoming less abundant or unavailable in other locations where it previously was present.

According to The Energy Saving Trust the average person in the UK uses 142 litres of water each day. We will use significantly less than this and are aiming to achieve a 50% reduction (71ltrs/day).

Essential Criteria 1: ***'The water needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.'***

We will put in place the following measures to reduce our water usage:

- Use of compost toilets (no flushing required). 33% of household water usage is used for flushing toilets. (please note that this compost will only be used on non-edible plants such as willow and will only be used once it has become fully composted)
- We will take short showers and only have baths very occasionally.
- Our grey water (from washing up and showering etc) will be assimilated on-site through a reed bed system and the output water will be used on the land. Soap and shampoo etc will be eco-friendly which will prevent harmful pollutants entering the system.
- Water used to boil food will be allowed to cool and be used on the land.
- We will use low-flow showerheads

- We will use faucet aerators (reducing the flow of water from taps)
- We will not use a dishwasher as these use more water than efficient washing by hand.
- Only use washing machine when fully loaded and use ecological zeolite washing balls and we will purchase the most water efficient model that we can afford.
- The distance from the boiler to the taps will be minimised to reduce 'dead-legging' (which requires cold water to be purged before the warm water arrives) and pipes will be lagged to reduce the rate of heat loss. Also, narrow pipes will be used which further reduces the volume of water in the pipes.
- We will increase the amount of humus in the soil by adding organic compost, as this greatly increases the soils ability to hold water and also reduces water run-off, thus creating conditions which require less water.
- We will remove as many weeds as possible to prevent them from consuming water.
- Mulch will be applied to growing areas to lock in moisture and reduce runoff. This can cut the need for summer watering by 50%.
- Our planting will follow a polyculture approach which makes better use of water in the soil than monocultures. The variety of root depths and shapes make more complete use of water and the variety of annual growth patterns make better use over time.
- The visual/windbreaks, by reducing the wind, will reduce soil evaporation and transpiration from plants' leaves.
- We will use efficient watering systems such as drip irrigation and seep hose which can significantly reduce water usage by targeting required areas accurately.
- We will direct water through the land using a system of swales.
- Where possible we will also grow plants in containers, as these require much less water than plants grown in open ground.

Essential Criteria 2: 'Rainwater harvesting from buildings and structures must be maximised.'

Water will be harvested from the roofs of all buildings on Maes Digonedd. The dwelling, shed, greenhouse, woodstores and even the chicken and duck runs will have sloping roofs with gutters and water buts to maximise the amount of water that can be harvested. We will use second hand reconditioned IBCs (intermediate bulk container) to store water. This system would allow us to add more IBCs if we find

that a greater volume of water storage is required. These will be clad with local/recycled wood to prevent algae growth, overheating and to improve the aesthetics. Any overflow will be directed to the 'overflow pond' to store water for irrigation use. This will also further benefit the biodiversity of the site through creating habitat for wildlife. Water used for drinking will be carefully filtered. If required, we will install a solar powered UV filter. We will use a 'first-flush separator' which will send the water from the beginning of the rainfall to a water butt for irrigation use. This acts as a cleaning process by removing organic matter from the roof and guttering.

Essential Criteria 3: 'All of the water needs of all activities should be met from water available on site, unless there is a more environmentally sustainable alternative. Abstraction from water bodies (including groundwater sources) must be at levels that do not cause environmental harm. Harm would result from the lowering of surface and ground water levels.'

All water used at Maes Digonedd will be harvested from rainwater. We decided to utilise rainwater as there are many ecological benefits (see under section 6.3 water). Also, there is an abundance of rainfall in the area.

The annual yield from the roof can be calculated as follows:

Area of roof in m^2

The runoff coefficient which allows for the proportion of rainfall which evaporates, leaks or overflows before it reaches the tank. The value for a pitched roof in the UK is 0.7.

The average filter efficiency is between 0.8 to 0.9. We will use 0.8 to err on the side of caution.

The average rainfall in the area is 1039mm/year according to ClimateData.org

The formula is:

Roof area in m^2 x run off coefficient x filter efficiency x rainfall in mm = annual yield in litres.

Dwelling:

136 x 0.7 x 0.8 x 1039 = 79130ltrs/year

Greenhouse:

24 x 0.7 x 0.8 x 1039 = 13964ltrs/year

Woodstores:

(15 x 0.7 x 0.8 x 1039) x2 = 17456ltrs/year

Shed:

8 x 0.7 x 0.8 x 1039 = 4655ltrs

Total amount of water harvested: 106477ltrs/year

We are aiming to use 70ltrs per person per day. There will be two adults and one child living on the land. Therefore 70 x 3 = 210ltrs/day. 210 x 365 = 76650ltrs/year. To err on the side of caution, we have not reduced the water consumption value for our child and have therefore allocated the full average adult consumption of water.

This would leave us with (115205 – 76650) 38555 ltrs/year for irrigation. Plus, water stored in ponds, plus rainwater that is not harvested and falls onto the land.

In the event of significantly lower rainfall we have legal rights to take water from a neighbouring field to the north/east of our land as they have a well.

Contributory Criteria 1: ***'Any water pumping should be renewably powered.'***

The water butts have been located uphill of where the water is required to reduce the need for pumping by using gravity. However, if pumping is required this will be down using solar power.

Contributory Criteria 2: ***'Any ponds / lakes created should maximise habitat creation and should not destroy important existing habitats.'***

We will create an overflow pond, a series of grey water reed bed ponds and a wildlife pond. These will all be created in areas which are currently monoculture with very poor biodiversity. They will significantly improve biodiversity and in no way will they destroy or harm any existing habitats. We will introduce a range of

native aquatic plants. All life requires water and most of the UK's wetlands have disappeared, so we, as a country, need more ponds.

7.0 Waste

What TAN 6 requires

- Quantification of how the inhabitants' requirements for waste assimilation can be obtained directly from the site [4.17.1]

Waste	
Essential Criteria:	How Criteria is Met:
All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways	See sections 7.1 (p.86) to 7.5 (p.82)
The only exception to this is occasional off-site 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	See section 7.6 (p.82)
All waste handling and assimilation on site must comply with Environment Agency guidelines.	See section 7.0 (p.77) & (p.85)
All waste handling and assimilation on site must comply with Environment Agency guidelines.	See section 7.2 (p.86) and 7.3 (p.88)
Contributory Criteria:	How Criteria is Met:
The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.	See sections 7.1 (p.86), 7.2 (p.86), 7.4 (p.89) & 7.5 (p.90)

Permaculture principles state that all waste is 'pollution' and therefore waste should be eliminated. The output of one element should be an input of another i.e. kitchen

waste ceases to be waste when it is used as an input to produce compost. This is the approach we will use to assimilate waste at Maes Digonedd.

The following forms of waste will be generated at Maes Digonedd: Kitchen waste from domestic and business activities, grey water, human waste, poultry manure, green waste and inorganic matter. How these will be assimilated is discussed below.

All waste handling and assimilation on site will comply with Environment Agency Guidelines.

7.1 Kitchen Waste (Essential Criteria 1: *'All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.')* (Contributary Criteria: *'The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.')*

All kitchen waste produced from domestic and business activities will composted using a wormery. We will build a vermin proof wormery from re-purposed plastic storage boxes simple and cheap to construct, they produce high quality fine compost and also generate concentrated liquid fertiliser. This will be used to provide valuable nutrients to plants and thus improve soil quality.

Here are details of how it will be constructed:
https://www.growveg.co.uk/guides/worm-composting-how-to-make-a-wormery/

Kitchen waste will also be used to feed the biodigester to produce gas for cooking.

7.2 Grey Water (Essential Criteria 1: *'All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.')* (Essential Criteria 3: '*All waste handling and assimilation on site must comply with Environment Agency guidelines.')*

Grey water will be generated from the kitchen sink, bathroom sinks, shower and laundry. Only ecological toiletries and laundry products will be used to eliminate harmful content. A 'fat trap' will be used to prevent fat from entering the reed beds. It will be treated using a reed bed wetland system. Initially the water will flow via gravity down into a vertical flow reed bed such as shown below:

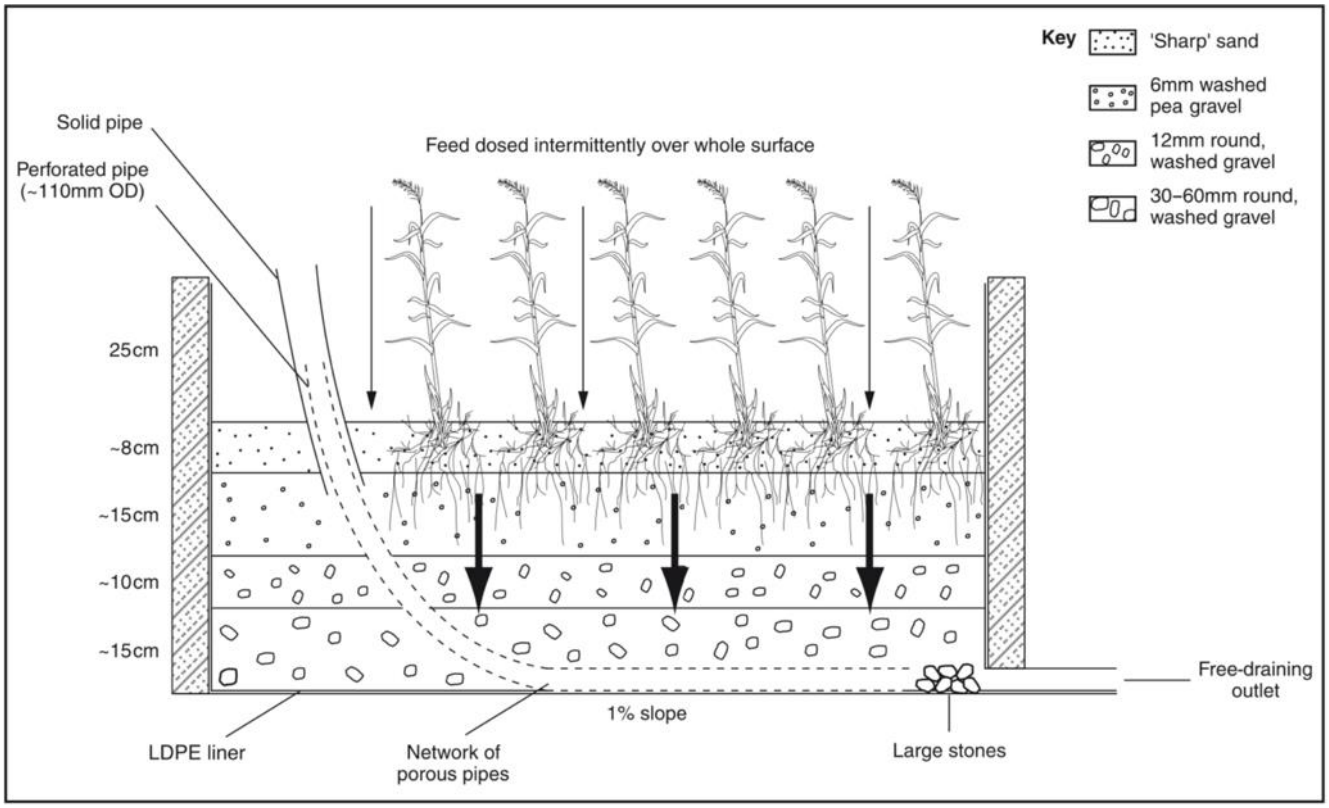


Figure 23

From here it will flow for further treatment into a horizontal flow reed bed such as shown below:

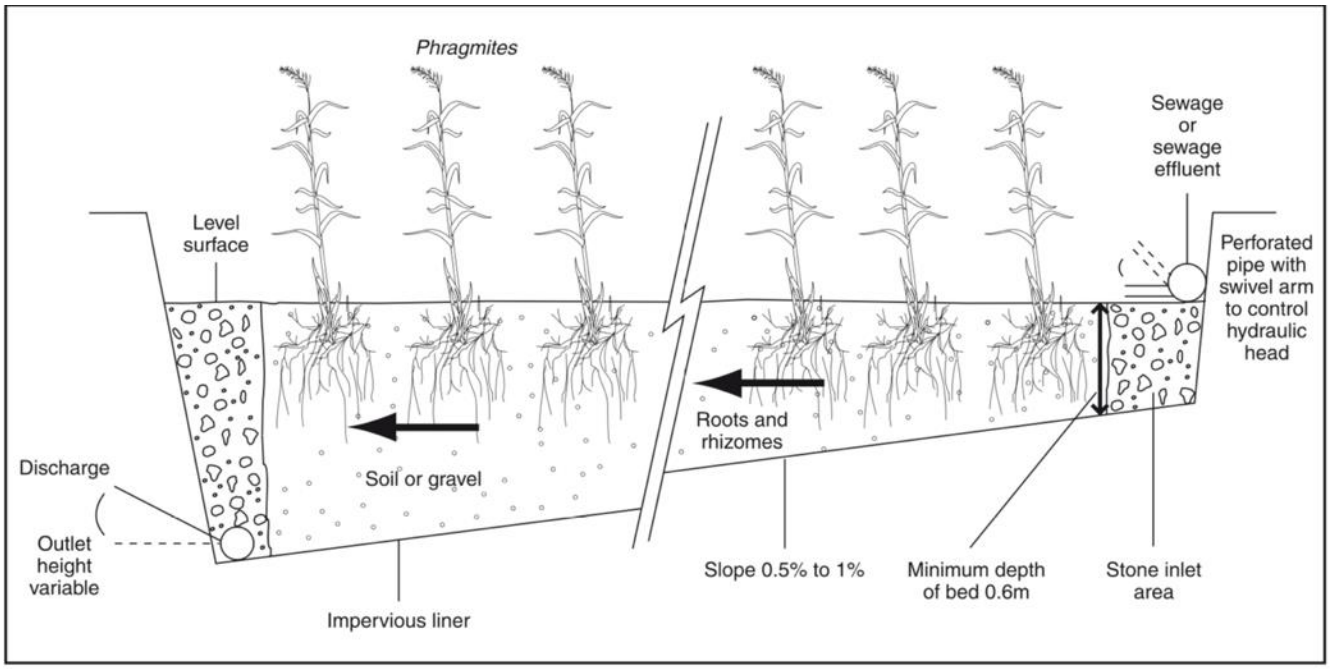


Figure 24

From here the water will run through a number of soakaway ditches through the willow plantation and wildflower meadow and onto a wildlife pond which will further purify the water and create a diverse habitat. Grey water will not be used on edible crops.

The reed beds will be located close to the dwelling so that the grey water treatment can start as close to its source as possible. It will be located on the south/west side of the dwelling in an unshaded location as sunlight improves reeds' growth and thus the overall effectiveness of the system.

We will use plants such as the common reed (*Phragmites australis*), reed maces (*Typha latifolia*), the rush (*Juncus effusus*), the true bulrush (*Schoenoplectus lacustris*) as well as members of the sedge family (*Carex*) and the yellow flag (*Iris pseudacorus*).

The minimum reed bed size recommended by the Environment Agency for a 1-3 bedroom house, serving up to five people is 12m2 (3.5x3.5m).

These designs comply with 'The Building Regulations 2010 Drainage and Waste Disposal Document H'. The document states that 'Reed bed treatment systems should be designed and constructed in accordance with BRE Good Building Guide No. 42.' We will comply with these guidelines.

7.3 Human Waste (Essential Criteria 1: *'All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.')* (Essential Criteria 3: '*All waste handling and assimilation on site must comply with Environment Agency guidelines.')* (Contributary Criteria: *'The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.')*

There will be no 'black water' at Maes Digonedd as all human waste will be treated via a compost toilet. We will build a twin chamber compost toilet:

'A reliable and robust approach for the UK climate is to alternate annually between two separate chambers. The active chamber fills with excreta and soak over the course of the first year. When it reaches capacity, the pedestal is moved across to the resting chamber for the second year. The contents of the first chamber then have a full year to compost with no fresh additions. By the end of the second year the contents of the original chamber are fully composted and can safely be

removed. To continue the cycle the pedestal is moved back above the empty chamber while the other matures. This batch processing means there is no contamination of mature compost with fresh faeces.'
https://www.cat.org.uk/info-resources/free-information-service/water-and-sanitation/composting-toilets/

We will build the toilet ourselves, however, we will purchase a urine separator which will allow aerobic decomposition which prevents unpleasant odours and methane production. The contents will be stored in suitable sealed containers.

The fully decomposed 'humanure' will only be used on non-edible crops to ensure that there is no risk of cross-contamination (such a willow).

The urine will be diluted 1:12 parts water and applied to willow. We will also use it to fertilise Comfrey which will be used for compost, mulch and to produce Comfrey fertiliser.

The Environment Agency have a responsibility to prevent contamination of waterways and the movement of potentially hazardous wastes with regards to compost toilets. This would not arise on our site as no soak away will be used, and it is not close to a well or a borehole. As we will not use a soakaway and all our 'solid' waste will be kept in sealed containers for two years until it is fully decomposed, then it is not an issue. Also, urine will be stored in sealed containers and diluted with water to a ratio on 12:1 (water:urine) before being used as a fertiliser on the land for non-edible crops. All the waste will be assimilated on-site, so there will not be any issues with the movement of potentially hazardous waste.

7.4 Poultry Manure (Essential Criteria 1: *'All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.')* (Contributary Criteria: *'The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.')*

The manure from the ducks and chickens will be added to activate compost. Chicken manure fertilizer is very high in nitrogen and also contains a useful amount of potassium and phosphorus.

Ducks produce a large amount of manure and, being high in nitrogen, phosphorus and potassium, we will utilise it to fertilise plants and vegetables.

Both Chicken and Duck manure will be added to the biodigester to produce gas to cook with.

7.5 Green Waste (Essential Criteria 1: *'All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.')* (Contributary Criteria: *'The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.')*

A large amount of household waste in the UK could be composted but unfortunately ends up in landfill. None of our organic waste produced through business and domestic activities will go to landfill as it will be composted and re-used on site.

Composting saves money, saves resources, can help to improve the quality of soil and reduces environmental damage. Composting at home for just one year can save global warming gases equivalent to all the CO2 produced by a kettle annually, or a washing machine in three months.

Compost is a nutrient-rich food product which helps improve soil structure, maintain moisture levels, and keep the soil's pH balance in check while helping to suppress plant disease. It includes nitrogen, phosphorus and potassium and helps buffer soils that are very acidic or alkaline.

We will follow the excellent guides on composting from the 're-cycle now' website.
https://www.recyclenow.com/reduce-waste/composting

Ash from the stove will be added to the compost as this is an excellent source of lime and potassium.

Organic waste will also be used to fuel our biodigester which will provide us with gas to cook with.

The dwelling and shed will be built using wooden panels, when these start to decay making them unsuitable they will be removed, replaced, dried and then burnt for fuel.

7.6 Inorganic Matter (Essential Criteria 2: '*The only exception to this is occasional off-site 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.')*

Inorganic waste at Maes Digonedd will include:

Packaging (plastic and metal), paper, clothing or footwear, broken hardware, chemicals and spent rechargeable batteries etc.

Our first priority will be to minimise the use of inorganic matter. As previously mentioned, we will follow the rule: reduce; repair; re-use; re-cycle.

Reduce: Living a One Planet lifestyle results in a significant reduction of the acquisition of inorganic matter. For example, well will grow the majority of our food from the land which, unlike if it was bought from the supermarket, will not utilise any packaging. When we buy in food stuffs such as rice and pasta we will buy in bulk. We will also try to set up a system where we purchase items in conjunction with Ty Derwen to further reduce the amount of packaging.

Repair: Steve is an experienced engineer and is keen and capable of repairing many items instead of disposing them.

Re-use: We will re-use materials such as cardboard and some paper for mulching and glass jars for preserving food. Large containers can be used to store produce grown/made on-site.

Re-cycle: The small amount of waste that we cannot assimilate on-site will be processed through the CCC's recycling facilities.

8.0 Zero Carbon Buildings

What TAN 6 requires

- OPDs should be exemplars of Welsh Government's zero carbon aspiration and achieve zero carbon status in terms of construction and use of the development [4.19.1].
- Planning applications should be accompanied by supporting information confirming that the development will be zero carbon in construction and use [4.19.2].
- Plans should be monitored as part of the annual monitoring report [4.19.2].

Zero Carbon Buildings	
Essential Criteria:	How Criteria is Met:
Domestic and ancillary buildings will be 'zero carbon' in construction and used as explained in this guidance and using the up to date Welsh definition of zero carbon.	Sections 8.1 (p.94) to 8.1.6 (p.103) describe how the dwelling will be zero carbon. Sections 8.2 (p.104) to 8.4 (p.106) describe how the ancillary buildings will be zero carbon. Section 8.0 (p.91) discusses the Welsh definition of Zero Carbon.
Proposals will identify which structures require Building Regulations approval and that this approval is obtained either before or during construction.	No buildings require building regulations approval.
All structures identified for removal in the Exit Strategy are capable of removal with low environmental impact.	Section 8.5 (p.106) to 8.5.4 (p.107) describe this.
Contributory Criteria:	How Criteria is Met:
The construction of buildings should make as much use of recycled materials possible so long as this does not affect their ability to satisfy the essential criteria.	Throughout section 8 (p.91) it describes how we will recycle timber, glass, tyres etc. It is not possible to determine exactly what recycled materials will be available at the time of build, however, they will be utilised as much as possible and a record of their use will be kept.
Existing buildings are re-used where this would have an overall lower environmental impact than new buildings, or where they are of particular value in landscape or heritage terms, but provided that they are not unsightly or have a negative impact on the surrounding landscape.	There are no existing buildings on the site.

Table 13

Section 3.89 of the OPD Guidance requests that OPD applicants follow the Welsh Government's definition for 'zero carbon in use for buildings in Wales'. Unfortunately, they do not currently have a definition for this. The Welsh Government's TAN 12 'Design' provides guidance on environmentally sustainable design solutions:

'4.7 An appraisal of an area's natural resources is a prerequisite to providing ***environmentally sustainable*** *design solutions. An appraisal should identify the opportunities offered by a particular site (e.g. decentralised energy) and recognise the site's constraints (e.g. flooding, limitations of public transport links). It should focus on site assets and resources such as the development form, soils and geology, slope/topography, drainage, landscape, solar and wind energy as well as wildlife, biodiversity and natural habitats. New development should harness the intrinsic resources or "natural capital" of the site or area to help create the conditions for more environmentally sustainable development and in particular to consider measures to help reduce effects related to climate change and to build in resilience to the measures (mitigation and adaptation). An appraisal of the effects of* ***climate change*** *(such as increased temperatures, risk of flooding and extreme weather events[7]) can highlight where a design response is needed to minimise vulnerability to the effects of climate change.'*

[7] *United Kingdom Climate Change Impacts Programme (UKCIP) (www.ukcip.org.uk/)*

The dwelling design and construction will follow the guidelines set out in TAN 12 (which has now superseded TAN 22) and the Welsh Government's L1A of the Building Regulations regarding conservation of fuel and power in a new dwelling.

The primary requirements of a One Planet Building 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.

All buildings at Maes Digonedd will comply with these requirements.

Maes Digonedd will comprise of the following buildings:

Main dwelling, cob greenhouse, shed and wood store. The location of these are shown in Figure 14.

Figure 25

The above architect's impression of the built area viewed within the boundaries of the land. It demonstrates how effectively it will blend into the landscape. It will not be visible from any public viewpoints.

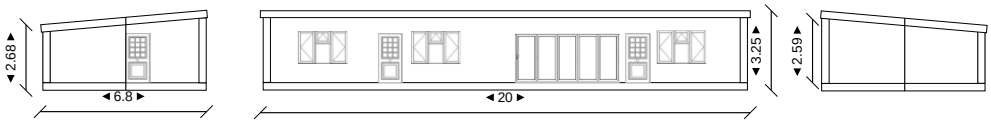
8.1 Main Dwelling

Please see appendix R for a copy of Helyg Energy Services 'Demonstration of Zero Carbon' report. A SAP assessment has been carried out which results in a predicted negative Dwelling CO_2 Emission Rate (DER) of -9.64 kg/yr/m^2 , thus demonstrating Zero Carbon Emissions for the proposed dwelling. We will comply with Helyg Energy Services recommended specifications.

The main dwelling will be the permanent sole residence of the occupants and will comprise of the following features:

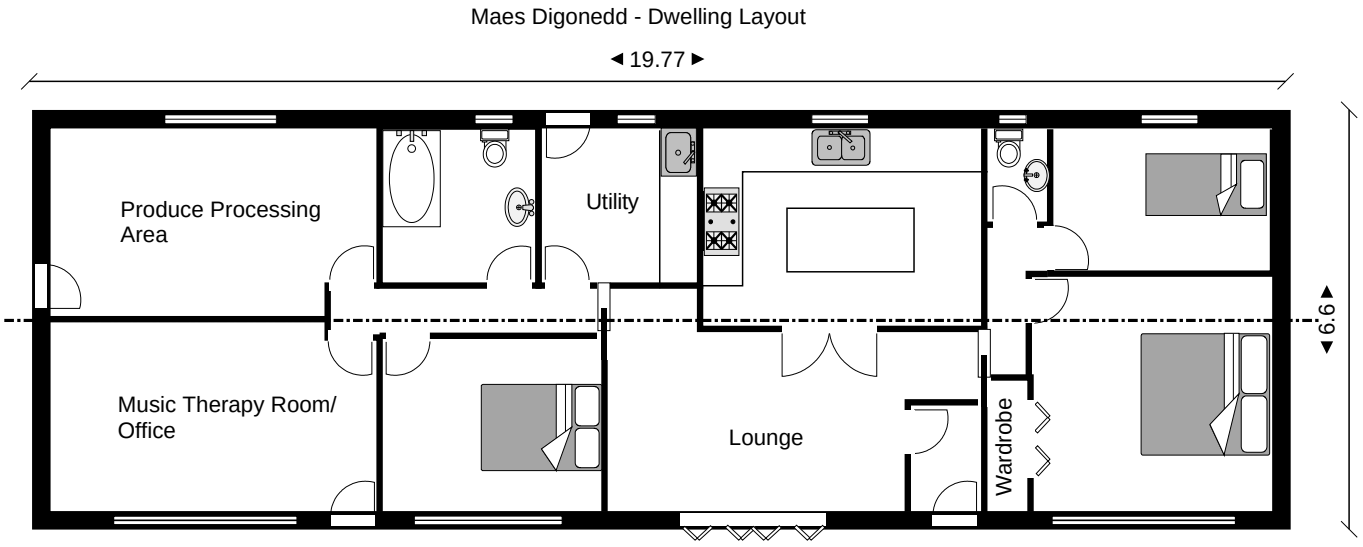
- Compliant with the legal definitions of a caravan (therefore exempt from building regulations). This will also enable the building to have a significantly lighter impact on the site. (see Appendix D)
- Single storey – overall height 3.25m
- Three bedrooms

- Timber framed and timber clad
- Mono-pitch live green roof which will harvest rainwater (see section 6.3). The green roof will minimise visual impact and improve biodiversity.
- Built in two halves which can be un-bolted, de-mounted from footings and transported off-site.
- Designed and located to maximise solar gain
- Located to blend into the landscape (see section 5.2.1)
- Highly insulated (300 mm reclaimed Celotex in external walls, floor and roof)
- Utilise materials with low embodied energy
- Utilise recycled and recyclable materials
- Utilise as many local resources as possible
- All energy sources will come directly from the site (see section 6.1)
- There will be no permanent outdoor lighting and all windows will be fitted with blackout blinds.
- The dwelling has been designed so that it is simple to construct to reduce the need for equipment and techniques which are associated with high carbon footprints.



Site: Maes Digonedd	Drawing: 1	Project: 0000416	Drawn: S. Morris		Maes Digonedd, Pen-y Banc Llandeilo SA19 7TA
Title: Main Dwelling	Scale: 1:200 (dimensions in meters)	Date: 31/05/2020	Third angle projection		

Figure 26



Measurements in meters

Figure 27

The figures below illustrate how the dwelling's aesthetics.

Figure 28

Figure 29

Figure 30

The vast majority of the dwelling construction will be carried out by hand by the occupants with minimal reliance on machinery and equipment. We will have support from friends and family who have experience in construction (both our fathers are qualified civil engineers).

As stated in the OPD Guidance the dwelling must comply with category three of the code for sustainable homes. There are five elements from this guidance that are applicable to OPDs:

- Roof
- Internal walls
- External walls
- Floors
- Windows

At least four of these must have a rating of at least A. Below we have demonstrated how all of these elements exceed rating A.

8.1.1 Roof

The roof will be constructed in a mono-pitch, warm deck format. A typical example is shown below. This is preferable to the cold deck format as condensation can form in the void between the ceiling and the roof. There will not be a void in this design. This will be insulated with 300mm of reclaimed Celotex.

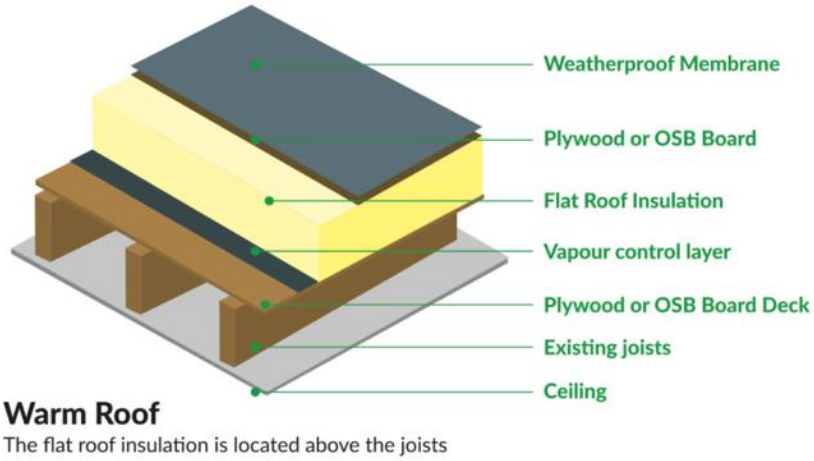


Figure 31

The information below from the BRE Green Guide is for a flat roof, however we will use the same format on a mono-pitch with the addition of a live green turf on top which will further improve on the overall rating of this roof format which is rated at A+.

Building type >	Domestic
Category >	Roof Construction
Element type >	Flat Roof: Warm Deck

Element	Timber joists, plywood (temperate EN 636-2) decking, vapour control layer, insulation, EPDM single ply waterproofing membrane
Element Number	1212540028
Summary Rating	A+
Climate Change	A+
Water Extraction	A+
Mineral Resource Extraction	A+
Stratospheric Ozone Depletion	A
Human Toxicity	A+
Ecotoxicity to Freshwater	A
Nuclear Waste (higher level)	A
Ecotoxicity to Land	A
Waste Disposal	A+
Fossil Fuel Depletion	A+
Eutrophication	A+
Photochemical Ozone Creation	A+
Acidification	A+
Kg of CO_2 eq. (60 years)	31.0

Table 8

8.1.2 Internal Walls

The internal walls will be ‘framed partitions’. The BRE Green Guide rate these as A+. We will improve this rating by utilising reclaimed wood. Gardd Darna OPD purchased a large two storey house constructed from Welsh untreated Larch. Steve helped them dismantle it and we shared half of the wood. It is likely that there will be enough to build the dwelling and some ancillary buildings. Also, we will use Fermacell (or similar) lining boards as opposed to pasteboards because they are manufactured to a high ecological standard using re-cycled materials.

Building type >	Domestic
Category >	Internal Wall
Element type >	Framed Partitions

Element	Timber stud, plasterboard, paint
Element Number	809760003
Summary Rating	A+
Climate Change	A
Water Extraction	A
Mineral Resource Extraction	A+
Stratospheric Ozone Depletion	A+
Human Toxicity	A
Ecotoxicity to Freshwater	C
Nuclear Waste (higher level)	A+
Ecotoxicity to Land	A+
Waste Disposal	A
Fossil Fuel Depletion	A+
Eutrophication	A+
Photochemical Ozone Creation	A+
Acidification	C
Kg of CO_2 eq. (60 years)	15.0

Table 9

8.1.3 External Walls

The external wall construction will be timber framed which is rated at A+. We will use reclaimed Welsh grown untreated Larch, as this has natural resins which resist decay. These will be insulated with 300mm of reclaimed Celotex.

Building type >	Domestic
Category >	External Wall Construction
Sub-category >	Cladding on Framed Construction
Element type >	Timber Framed Construction

Element	Canadian cedar weatherboarding, OSB/3 sheathing, timber frame with insulation, vapour control layer, plasterboard on battens, paint
Element Number	806210048
Summary Rating	A+
Climate Change	A+
Water Extraction	A+
Mineral Resource Extraction	A+
Stratospheric Ozone Depletion	B
Human Toxicity	A+
Ecotoxicity to Freshwater	A+
Nuclear Waste (higher level)	A+
Ecotoxicity to Land	A+
Waste Disposal	A+
Fossil Fuel Depletion	A+
Eutrophication	A+
Photochemical Ozone Creation	A
Acidification	A
Kg of CO_2 eq. (60 years)	14.0

Table 10

8.1.4 Floors

The suspended timber floor is also rated at A+. We will not require aggregate or a sand blinding. It will be super-insulated using 300mm of reclaimed Celotex. This would result in strengthening the floor's A+ rating.

Building type >	Domestic
Category >	Ground Floor Construction
Element type >	Suspended Timber

Element	OSB/3 decking on timber joists with insulation, over 50mm fine aggregate on polyethylene dpm laid on sand blinding
Element Number	820470015
Summary Rating	A+
Climate Change	A+
Water Extraction	B
Mineral Resource Extraction	A+
Stratospheric Ozone Depletion	A+
Human Toxicity	A
Ecotoxicity to Freshwater	A
Nuclear Waste (higher level)	A
Ecotoxicity to Land	A+
Waste Disposal	A
Fossil Fuel Depletion	A
Eutrophication	A+
Photochemical Ozone Creation	A
Acidification	A+
Kg of CO_2 eq. (60 years)	7.1

Table 11

8.1.5 Windows

The windows we intend to use are rated as A+, however we may deviate from this if we are able to source good quality reclaimed or ‘mis-fits’ double-glazed windows which would lower the embodied energy and cost.

Building type >	Domestic
Category >	Domestic Windows
Element type >	Windows

Element	Durable hardwood window, double glazed, water based stain (TWAS)
Element Number	813100005
Summary Rating	A+
Climate Change	A+
Water Extraction	A
Mineral Resource Extraction	A+
Stratospheric Ozone Depletion	D
Human Toxicity	A+
Ecotoxicity to Freshwater	A+
Nuclear Waste (higher level)	A
Ecotoxicity to Land	A+
Waste Disposal	E
Fossil Fuel Depletion	A+
Eutrophication	E
Photochemical Ozone Creation	A+
Acidification	A
Kg of CO_2 eq. (60 years)	140.0

Table 12

8.1.6 Rammed Earth Tyres

The footings for the dwelling will be constructed from salvaged tyre stacks and rammed earth. They will be dug down into the ground to the appropriate depth.

This is a highly sustainable method of building as old tyres can be re-purposed and the earth will come from pond excavations on-site. These will be built using manual labour without the need for machinery and therefore no fossil fuel consumption. The tyres will be boxed in with cladding to improve the aesthetics and shield the rammed earth from the weather. This also eliminates the need for concrete which, according to the Chatham House report: 'Each year, more than 4 billion tonnes of cement are produced, accounting for around 8 per cent of global CO2 emissions'.

See example below:

Figure 32

8.2 Cob Greenhouse

We have decided to build a cob green house as opposed to the use of polytunnels for the following reasons:

- It would blend into the landscape more effectively than a polytunnel
- Produced from natural renewable materials which can be returned to the land at the end of its use.
- Will last significantly longer than a polytunnel
- Will weather storms better than a polytunnel
- Cob has a high thermal mass which keeps the growing area warm
- Built using low-tech traditional techniques and therefore has a very low embodied energy.

The footprint will be 8 x 3m and the height will be 2.3m. It will comprise of a timber frame (either locally sourced or reclaimed), reclaimed glass panels and cob walls. It will have a mono-pitch roof and will be used to harvest rainwater. The footings and stem wall (cob walls must not start at ground level as resting in water for long periods would shorten its life-span) will be made using the salvaged rammed earth tyres. All external walls will be used to grow plants, thus increasing productivity and biodiversity and reducing visual impact by blending well into the natural environment.

It will provide us with an essential propagation area for seeds to grow and will allow us to grow fruits etc that would not grow outdoors. This will therefore provide huge benefits in meeting our needs from the land.

Here is an example of a cob greenhouse that Steve helped to build on a week-long cob building course at Llamas.

Figure 33

8.3 Shed

This will be used to store materials, tools and equipment and carry out maintenance. The shed will have a footprint of 8 x 5m and the overall height will be 2.3m. It will be constructed from a timber frame and timber clad with locally sourced or reclaimed timber. We will utilise reclaimed glass for windows. It will have a mono-pitch turf roof to minimise visual impact and improve biodiversity. It will be used to harvest rainwater. When the wood comes to the end of its useful life as part of the shed it will be replaced and either composted or used as biomass

fuel. The footings will be salvaged rammed earth tyres. All external walls will be used to grow plants, thus increasing productivity and biodiversity and reducing visual impact by blending well into the natural environment.

8.4 Woodstores

Both the woodstores will have a footprint of 5 x 3m and a height of 2.2m. They will be constructed from a timber frame and timber clad with locally sourced or reclaimed timber. They will have a mono-pitch turf roof to minimise visual impact and improve biodiversity. They will be used to harvest rainwater. When the wood comes to the end of its useful life as part of the woodstore it will be replaced and either composted or used as biomass. The footings will be salvaged rammed earth tyres. All external walls will be used to grow plants, thus increasing productivity and biodiversity and reducing visual impact by blending well into the natural environment.

All materials for all buildings will be responsibly sourced, and all timber will be legally sourced.

8.5 Removal of Buildings

All buildings at Maes Digonedd will be capable of being removed with minimal environmental impact.

8.5.1 Dwelling Removal

The dwelling will be built in two halves which can be un-bolted, de-mounted from footings and transported off-site. The earth within the rammed earth tyres would be returned to the ground and the tyres would be re-purposed or would go to the appropriate recycling facility.

8.5.2 Cob Greenhouse Removal

The cob would be returned to the ground as it is fully biodegradable with not harmful substances. The timber frame and glass would be dismantled and either re-purposed or taken to the local re-cycling facility. The earth within the rammed earth tyres will be would be returned to the ground and the tyres would be re-purposed or would go to the appropriate recycling facility.

8.5.3 Shed Removal

The timber frame, cladding and glass would be dismantled and either re-purposed or taken to the local re-cycling facility. The earth within the rammed earth tyres would be returned to the ground and the tyres would be re-purposed or would go to the appropriate recycling facility. The turf would be returned to the earth. The weatherproof membrane (from the roof) would also go to the appropriate recycling facility.

8.5.4 Woodstores Removal

The timber frame and cladding would be dismantled and either re-purposed or taken to the local re-cycling facility. The earth within the rammed earth tyres would be returned to the ground and the tyres would go to the appropriate recycling facility or would be re-purposed. The turf roof would be returned to the earth. The weatherproof membrane (from the roof) would also go to the appropriate recycling facility.

8.6 Existing Buildings

There are no existing buildings on the site.

8.7 Static Caravan

During the set-up phases of Maes Digonedd we would like to utilise a static caravan on-site. This would be removed when the dwelling is complete. This would be located sensitively to minimise visual impact. See figure 14 for details of location.

8.8 Vehicle Movements During Construction Phase

We will ensure that the number of vehicle journeys to and from Maes Digonedd during the construction phase will be minimised. Deliveries will be grouped as much as possible as opposed to lots of small deliveries.

9. 0 Community Impact Assessment

What TAN 6 requires

- Identification of the potential impacts on the host community (both positive and negative) and the identification and implementation of any mitigation measures that may be necessary [4.16.1 & 4.21.1]

Community Impact Assessment	
Essential Criteria:	How Criteria is Met:
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.	Section 9.2 (p.110) demonstrates the positive impact we will have with regards to the local community from a social point of view. Section 9.3 (p.111) demonstrates the positive impact we will have with regards to the local community from an economic point of view. Section 9.4 (p.113) demonstrates the positive impact we will have with regards to the local community from an environmental point of view.
Any negative impacts are mitigated.	Sections 9.2.2 (p.111), 9.3.2 (p.112), 9.4.1 (p.113) detail how we will mitigate any negative impacts. Section 5.2.1 under 'Essential Criteria 3' (p.58) heading details mitigation of visual impact as does 4.2 Distribution of Land Uses (p.27) (discusses visual screening), 8.0 Zero Carbon Buildings (p.91) (discusses blending buildings into the landscape)
Contributory Criteria:	How Criteria is Met:
OPD children attend local schools and residents support local groups, clubs and events.	Our youngest son (Steve's older son will not live with us) will attend Ysgol Gynradd Llandeilo. Section 9.2.1 (p.110) details how we will support local groups, clubs and events.

There are open days, permissive footpaths and other access, as well as the hosting of local events on-site.	We will hold up to three open days a year for locals to attend our land, sample and buy our products, socialise, learn about OPDs, sustainable living and to have fun.
Residents shop locally and use other local businesses.	This is detailed in section 9.3.1 (p.111)
Residents sell food and other produce locally.	We will set-up a food box scheme and sell at local markets, to local shops, pubs, restaurants, cafes, individuals and at events such as the Festival of Senses in Llandeilo.

Table 14

The location on Maes Digonedd is perfect to enable us to have a positive impact on the community as it is close enough to Pen-y-Banc and Llandeilo for us to become an integral part from a social and economic stand point, but also there is enough space between us and our neighbours to ensure that we do not over impose ourselves on their lives.

Amy went to secondary school in Llandovery and has many friends in the area. Over the last ten years with have visited Llandeilo regularly to meet up with friends from the area. We have also already built up friendships with the owners of the three immediately adjacent fields all of whom fully support our application and have helped us develop our plans.

We have a young child and are aware that it is a high priority of rural towns like Llandeilo to support and encourage families with children to maintain the future health of the community.

9.1 Local Consultation

We will be absolutely transparent with our plans and intentions for Maes Digonedd as we are proud of what we are planning and know that our proposals will be beneficial to the community from a social, economic and environmental point of view. Once we have submitted our plans for approval, we will hold an open afternoon to discuss our plans with locals if they wish.

9.2 Supporting the Local Community: Social

We are keen to embed ourselves into the local community and simply to make friends and enjoy living in the beautiful area.

9.2.1 We will support the local community from a social aspect through the following ways:

- Our youngest son will attend the Ysgol Gynradd Llandeilo
- We are both highly experienced and qualified in education and are keen to work with and support the local schools and youth groups
- Our expertise is in additional learning needs and we are aware that 32% of pupils attending Ysgol Gynradd Llandeilo have these needs which is well above the average for Wales
- Steve is a qualified and experienced Duke of Edinburgh Award Manager, leader and assessor. He has a Hill and Moreland leader qualification and he is currently working toward his Mountain Leader qualification. Steve is keen to support DofE and other outdoor activities in the area
- Steve is a qualified and experienced 'Outdoor First Aider' (including defibrillator trained) and would always help those in need and would also happily provide basic training especially to young people.
- Amy had a degree is music and is a highly accomplished singer who specialises in folk. Steve plays the guitar. We would be keen to perform at events in the community
- We would both like to join singing groups/choirs
- Amy would like to join a local yoga group, such as PadmaSamBhava, Rhosmaen St, Llandeilo.
- Steve is a keen runner, cyclist and hiker and would therefore be keen to join any associated groups such as Dinefwr Ramblers and would like to eventually plan and lead walks
- We would encourage our youngest son to attend local groups such as Scouts, sports, music etc
- We already have a family membership to the Permaculture Tywi Group
- We will hold open days for locals to attend our land, sample and buy our products, socialise, learn about OPDs and sustainable living and have fun.

- We will join the East Carmarthenshire Beekeepers Association when we set up our colonies
- We both know some basic Welsh and have subscribed to Duo Lingo and practise our skills daily
- Amy will run Music Therapy experience sessions and Steve will run hiking/outdoor sessions, at affordable prices so they are financially viable to all. These have the potential to help improve wellbeing and behavioural issues.
- We are keen to attend local events such as; Christmas markets, the Cwmdu apple and cider tasting weekend, bonfire night and the Festival of Senses where we would like to sell produce and perform music.

9.2.2 Mitigation of Potential Negative Impact: Social

The only potential negative impact related to the social impacts is increased transport. We would always opt to use bicycles where appropriate as we are keen cyclists who currently cycle to our place of work whatever the weather! We would also minimise journeys by organising our time so that we attend locations for multiple purposes. We would share car journeys with our neighbours as much as possible. We would coincide open days with Ty Derwen to limit any increased traffic to one day and to also share their horse and cart for transport which I am sure local children would thoroughly enjoy. All locals would be invited and would be informed well in advance.

9.3 Supporting the Local Community: Economic

We are enthusiastic about supporting the local economy and have always been advocates of supporting small independent businesses as these provide towns with character, individuality and also (unlike many chains) pay their fair share of taxes and re-invest into the local economy.

9.3.1 We will support the local community from an economic aspect through the following ways:

- We will shop locally for produce we cannot produce ourselves
- We will shop locally for building materials and tools etc
- We will buy plants, seeds etc from local garden centres such as ‘The Works’ in Llandeilo.

- Amy's parents will buy a property in the Llandeilo as they want to be close to us and their grandson
- We employed a local solicitor to carry out the conveyancing for the land purchase
- We employed Carmarthenshire based permaculture expert Dr Paul Jennings for advice and will continue to do so in the future
- We will employ and have liased with Bobby Bazalgette – Director of Solar Wheel Ltd, Brechfa, Carmarthen
- We have a contact at Y Pantri Glas, Zero Waste shop in Llandeilo who have shown an interest in trading with us
- Ty Derwen OPD have agreed to work together with us to support the local economy with produce
- We will provide locals with the opportunity to purchase sustainable and ethical produce
- We will provide services including; training, music therapy and outdoor activities
- We will use local public transport and we will actively encourage visitors to do the same
- We will be additional council taxpayers
- We will pay for and join sports groups
- We are paid up members of the Permaculture Tywi group in Llandeilo
- We would encourage our youngest son to attend local groups such as Scouts, sports, music etc
- We would support the local library to help safeguard it from closure and encourage the sharing of resources
- We will support local markets and buyers and sellers such as those in Llangadog, Llandeilo and Myddfai
- Visitors may wish to stay in local B&Bs/hotels, such a Llwynhelig Manor which is only a 15 minute walk away.

9.3.2 Mitigation of Potential Negative Impact: Economic

The only negative impact could be increased traffic. We have explained in section 9.2.2 how this will be minimised. Furthermore, deliveries and collections will be grouped and shared with Ty Derwen to minimise the number of trips. We will also limit the number of visitors to the site. We would run no more than three Music Therapy sessions a week. We would run up to three open days per year. We will run no more than six training courses a year for up to five people per day and,

where possible coincide these with Ty Derwen. We will encourage visitors to use public transport and will offer to collect them from bus stops and train stations in groups. To encourage this, we will offer discounts.

9.4 Supporting the Local Community: Environmental

Maes Digonedd OPD will provide benefits to the local and wider community from an environmental point of view by:

- Improving biodiversity
- Improving soil quality and structure
- Attracting wildlife
- Improving air quality
- Sequestering carbon
- By planting a diverse range of native trees, bushes and flowers etc and visually shielding the built and horticultural areas the aesthetic of the site will be transformed from a fairly barren monoculture of improved grassland into a beautiful, rich and diverse natural landscape
- The environmental benefits will extend far beyond the site's boundaries by increasing local populations of wildlife
- These environmental improvements will be generational as the biodiverse improvements will exist and manifest in perpetuity
- By providing the local community with sustainable food with a carbon negative footprint
- Our nearest neighbour is 'Caegroes Farm' which is approximately 120 m away from the edge of our boundary to the edge of theirs. Once we have grown visual screening, they will be unable to hear us or see our site.
- The nearest village is approximately 500 m away, again they will not be able to hear us or see our site
- We intend to inspire and educate others to live sustainable lifestyles

9.4.1 Mitigation of Potential Negative Impact: Environmental

Increased traffic: see sections 9.2.2 and 9.3.2 for details of how this will be minimised. A small amount of smoke will be generated from the stove, however we will use a super-efficient stove and its use will be minimised, as detailed in section 6.1. Section 8.0 on zero carbon buildings details how the set-up process will be as low-impact as possible.0There is no doubt that the overall social, economic and environmental aspects of Maes Digonedd will have a net positive effect on the local

community. We will do all we can to build positive and purposeful relationships with the local community and to ease any concerns they may have through friendly open dialogue.

10 Transport Assessment and Travel Plan

What TAN 6 requires:

- Planning applications should be accompanied by an assessment of the traffic generated from the use of the site by its residents and visitors [4.22.1]
- The travel plan accompanying the planning application should clearly identify a preference for low or zero carbon modes of transport including walking, cycling and car sharing schemes [4.22.1].

Transport Assessment and Travel Plan	
Essential Criteria:	How Criteria is Met:
The management plan must be accompanied by a Transport Assessment and Travel Plan (which may be combined)	The Transport Assessment and Travel Plan can be found in section 10.3 (p.118)
Overall the development should achieve a significant reduction in transport impacts from all activities on site (residents, enterprises and visitors) in comparison to what would be the 'norm' for such activities.	This is detailed in section 10.4 (p.120)
There should be detailed monitoring of all trips to and from the site in terms of purposes, distances, modes, and any transport sharing.	See monitoring report in Appendix F
Contributory Criteria:	How Criteria is Met:
The use of low and zero carbon modes of transport should be maximised.	This is detailed on the strategy column in section 10.3 (p.118)
On site vehicle numbers should be controlled and vehicle pools used	N/A – Only one household

for One Planet Developments of more than one household.	
Connections between the site and local suppliers and customers for goods and services requiring travel, should be maximised opposed to those at a greater distance.	This is detailed on the strategy column in section 10.3 (p.118)
Visitor travel should be the subject of proactive management to reduce transport impacts.	This is detailed on the strategy column in section 10.3 (p.118)

Table 19

10.1 Objectives

We will significantly reduce our environmental impact with regards to transport primarily through reducing the need to travel and also by using low carbon and zero carbon modes of transport.

There are three types of activity that will generate transport movements:

- Residents
- Enterprises
- Visitors

Each will be discussed below.

10.1.1 Residents

There will be two adults and a child living on-site. We will do all we can to reduce travel at each stage of the development and by year 5 we will do so as detailed below:

- We will produce as much as we can on-site to reduce the number of required journeys
- Cycle or walk into Llandeilo town and for shopping, attending groups/clubs/fitness activities and for our son to attend school
- We will shop locally
- Only drive in poor weather or when we have large deliveries/collections
- We will ensure journeys are multi-purpose

- We will use the Heart of Wales train line to visit family once a month
- We will car share with the owners of Ty Derwen and we will look to car share with other parents for school runs
- If possible, we will have any additional groceries which we can't produce delivered

10.1.2 Enterprises (year 5)

We will set a specific day per week to deliver items to shops, restaurants and customers in general in the local area. These will be delivered either via bike (we intend to purchase an electric bike with a trailer), on-foot or via sharing Ty Derwen's horse and cart. If the weather is poor, we will deliver by car, but will ensure these journeys are multipurpose. We will visit Llandeilo Farmers' Market no more than one a week. When selling/buying in Carmarthenshire we will endeavour to travel by bus.

10.1.3 Visitors (year 5)

We will encourage all visitors to the site to utilise public transport where possible. For those attending open days, training or music therapy experiences from further afield we will offer discounts for those who use public transport. We will run no more than three music therapy experiences per week. We would run up to a maximum of six training days for up to five people at a time per year. We would run up to a maximum of three open days per year. We intend to visit friends and family outside of Pen-y-Banc and Llandeilo once a month and will have guests visiting no more than once a month on average. Steve's son will be 20 by year five and we hope that he will visit us every other month and that we will visit him on alternate months.

10.2 Transport Baseline

The site is situated next to the U4038 which runs north from Pen-y-Banc. At the time of writing the site did not generate any traffic due to the COVID-19 lockdown, however when this is lifted we will visit weekly by car if we require to bring items with such as tools, otherwise we will use the Heart of Wales train line to Llandeilo and cycle/walk to the site. We have the option to stay at friends who live locally, and we are considering the possibility of purchasing a camper van so we have a useful base for eating, drinking and resting on the site before we achieve planning permission.

There is excellent public transport links to and from Llandeilo via buses: 280 and 281 from the A40 junction and 280, 281 and 284 from the White Heart Inn. The figure below shows the cycle and walking route to the site from the A40 bus stop.

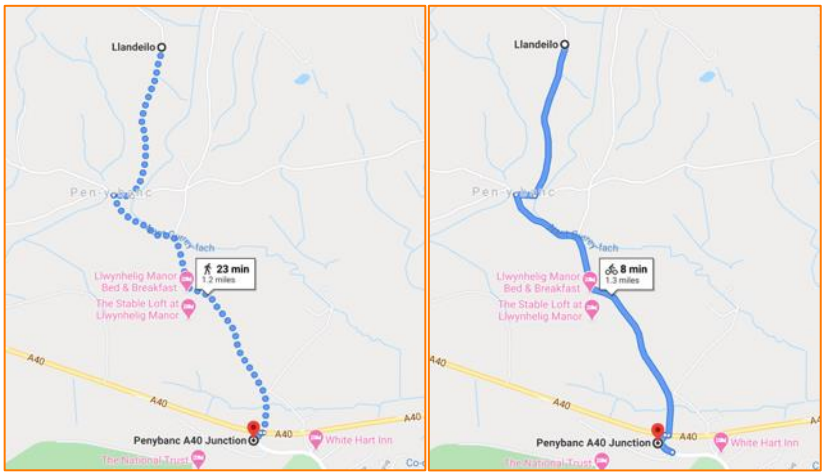


Figure 34

There are also excellent train links to Llandeilo southbound to Swansea and northbound to Shrewsbury with four trains each day in both directions. There is a peak time service between Llandeilo and Swansea. On a Sunday there are two trains in each direction. The figure below shows the cycle and walking route to the site from Llandeilo train station.

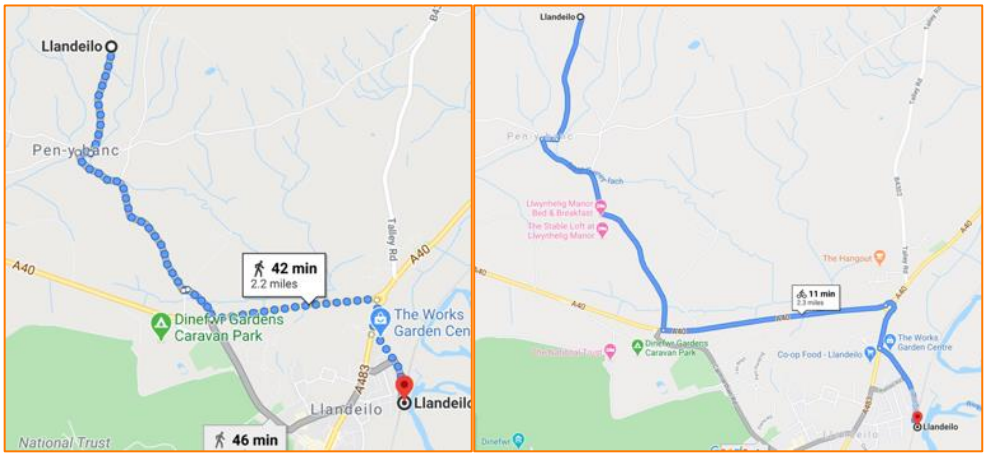


Figure 35

On approval we will live on-site which will significantly reduce the amount of travel. There is fibre optic broadband in the area so we would have excellent internet connection and there is a good 4G ‘phone signal at the site. This will reduce the need to travel as some meetings, social ‘chats’ and courses could take place on-

line. We can also order items on-line. This will also be useful to promote our products and events.

10.3 Transport Assessment and Travel Plan

Below we have set-out our transport assessment and travel plan in table format for residents at year 5:

Description	Estimated Journeys per Year	Distance (individual return journeys)	Strategy
Local collection/delivery to/from Llandeilo of groceries that we could not produce on-site.	52	2.8m	Cycle/electric bike with trailer unless poor weather. Car share/multipurpose journey. Some groceries may be delivered, this is preferable as it results in less vehicles on the roads. We will purchase non-perishables in bulk to reduce journeys.
Carmarthen collection/delivery of groceries that we could not produce on-site.	6	30m	Estimate 3/year by bus and 3/year car share/multipurpose journey. Some items may be delivered, this is preferable as it results in less vehicles on the roads.
Local social journey to see friends/family/clubs	104	3m (average estimate)	Cycle, walk or car if poor weather. All car journeys will be multipurpose to reduce mileage.
Non-local social journey to see friends/family (mainly Cardiff and Mumbles)	6	117m (average estimate)	Estimate 3/year by train and 3/year car multipurpose journey.
Journey to school for son	390	3.4m	Cycle or car if poor weather. Car share/multipurpose journey where possible.

Table 15

Below we have set-out our transport assessment and travel plan in table format for our enterprises at year 5:

Description	Estimated Journeys per Year	Distance (individual return journeys)	Strategy
Local delivery/collection of materials and/or equipment to/from Llandeilo.	12	2.8m	Cycle/electric bike with trailer unless poor weather. Car share/multipurpose journey. Some groceries may be delivered, this is preferable as it results in less vehicles on the roads.
Carmarthen delivery/collection materials/equipment.	3	30m	Car share/multipurpose journey. Some items may be delivered, this is preferable as it results in less vehicles on the roads.
Delivery of produce locally (i.e. local houses, farmers' markets and post office)	52	3m	Cycle/electric bike with trailer unless poor weather. Car share/multipurpose journey where possible. The vast majority of our produce will be sold locally. Produce sold to customers further afield will be sent via the local post office during a multipurpose journey.

Table 16

Below we have set-out our transport assessment and travel plan in table format for visitors at year 5:

Description	Estimated Journeys per Year	Distance (individual return journeys)	Strategy
Local social visitors	52	3m (average estimate)	Local friends will be encouraged to walk or cycle.
Non-local social visitors	12	50m (average estimate)	Friends from further afield will be encouraged to use public transport.
Music Therapy Experience Visitors	144	5m (average estimate)	We will offer discounts to customers who walk, ride or use

			public transport. We will also offer discounts to local people.
Open Days	30	5m (average estimate)	We will offer an incentive such as a free drink if people walk, ride, lift share or use public transport.
Training courses	30	25m (average estimate)	We will offer discounts to customers who walk, ride or use public transport. We will also offer discounts to local people.
Volunteers	10	50m (average estimate)	All volunteers will be encouraged to use the most sustainable modes of travel available. Volunteers will be welcome to use our bicycles to travel to and from our site.

Table 17

10.4 Evaluation of Transport Assessment and Travel Plan

Type of Journey	No. of Journeys	Miles/year
Residential	558	2665.6
Estimated residential car miles		887
Enterprises	67	279.6
Estimated enterprises car miles		145.8
Visitors	278	2876
Estimated visitors' car miles		875.6
Estimated total miles/year		5821.2
Estimated total journeys/year	903*	
Estimated total car miles/year		1908.5
Estimated % of 'low-carbon' miles/year		66%

Table 18

Further details of how these figures were derived can be seen in Appendix E.

* This equates to an average of 2.5 journeys per day to and from Maes Digonedd most of which will be low carbon (ie walking, cycling, public transport, lift sharing).

A significant proportion of these journeys will be travelling to and from school for our son, which we estimate will be made up from 75% cycling and the rest car/car share.

Due to the fact that 66% of journeys will be low carbon, it is estimated that less than one car journey per day will be taken from Maes Digonedd, therefore having a negligible impact on traffic.

According to ‘statistica.com’ the average motorist in the UK drivers 10,000 mile per year. We have estimated that Maes Digonedd OPD will generate 5821 miles per year at year 5. This is almost half of the average motorist, but also encompasses a family of three, enterprises and visitors. Furthermore, of those 5821 miles 66% will be low carbon (ie walking, cycling, public transport, lift sharing). This is a hugely significant reduction in carbon generated by travel compared to ‘normal’ travel activities.

In the future we would like to purchase an electric car and have discussed sharing one with Ty Derwen OPD.

11 Ecological Footprint Analysis

In this section the EFA Calculator (REAP 2 tool) has been used to estimate the global hectares (gha) per person living at Maes Digonedd. At the application stage, three figures are required: the current pre-application gha, the year of first habitation gha and the year 5 gha. A detailed breakdown of the EFA calculator can be found in Appendix G. In the practice guidance it states that the average per capita Welsh gha was 4.88 (currently, it is likely to be higher than 5 gha) and the target at year 5 for an OPD is 50% of this figure; 2.4 gha. The practice guidance states that the ultimate aim is to achieve 1.88 gha per capita as this is the global average available of resources.

11.1 Ecological Footprint Analysis Results

Ecological Footprint Analysis Results (gha)		
Pre-application (2019-20)	Year 1 OPD Habitation	Year 5 OPD Habitation
4.24	2.14	1.48

Table 20

Please be aware that at pre-application there was an average of four people living in our home. From year one of OPD habitation onwards there will be three.

11.2 Interpretation of Results

The above figures show that at pre-application we are below the Welsh national average by 0.68 gha per person. This is because we make an effort to minimise our environmental impact ie cycling to work. In addition to this our electricity and gas are supplied by Good Energy (renewable energy supplier) this is not taken into consideration in the EFA calculator. Also, we buy as much local, seasonal, organic fruit and vegetables as possible. Again, this is not taken into consideration, our actual gha per capita is lower than 4.24.

Due to a carefully thought out strategy we are confident that we can significantly reduce our gha in the first year of habitation at Maes Digonedd. The projected figure is 2.14 gha which exceeds the year 5 target of 2.4 gha. The main reasons for this reduction are:

- Less car travel
- More food grown and consumed
- The majority of energy will be generated on-site through solar
- All our water requirements will be harvested on-site from the rain
- We will not be paying a mortgage for the dwelling

By year 5 we will be able to reduce our gha significantly to 1.48 gha. This exceeds the ultimate target of 1.88 gha which concludes that we would be consuming less than the global average available resources. This would be a significant milestone in our journey to achieving a sustainable lifestyle. This is an on-going process that we will continue to refine and hence reduce our gha over time. The reasons for this further reduction are:

- Minimal car travel
- 44% of basic food needs grown from the land
- The vast majority of our energy will be generated on-site by solar
- The majority of energy will be generated on-site through solar
- All our water requirements will be harvested on-site from the rain
- We will not be paying a mortgage for the dwelling

Post year 5 we will strive to further reduce our gha as a continually evolving process. For example, improvements in soil structure and quality and established matured forest gardens will result in higher yields.

11.3 Other Footprints

Although the EFA is a comprehensive tool it is not possible for it to take into consideration all footprints associated with the OPD.

Positive footprints not accounted for in the EFA:

- We will provide local, seasonal organic food to the local community, thus reducing food miles and improving people's health
- We intend to inspire others to lead sustainable live
- We will share knowledge and help educate those who attend course and open days
- We will significantly improve the biodiversity of the area (on-site and the surrounding area)
- We will improve the aesthetic of the area by planting trees and hedgerows
- We will help the local economy through buying local and supporting local schools for example

Negative footprints not accounted for in the EFA:

- There will be visitors to the site in the form of social, residential and business. We have included a detailed travel plan on how these will be minimised in section 10. This includes promoting the use of public transport, cycling, walking and lift sharing.
- The EFA only takes into consideration the main dwelling, however we will build ancillary buildings including a shed, cob greenhouse and two

woodstores. As detailed in the Zero Carbon Buildings Section 8, these will be built using sustainable materials and techniques.

12 Phasing, Monitoring and Exit Strategy

12.1 Phasing

The phases required to set-up Maes Digonedd have been carefully sequenced to ensure the process is as effective as possible and at the same time resulting in minimal environmental disruption and the mitigation of inconvenience to our neighbours. See Maes Digonedd OPD – Stages of Implementation Gantt Chart in section 4.6.

The table below details the time frame in which we propose to achieve the essential and contributory criteria:

LAND BASED ACTIVITY: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The minimum food needs of all households are met from produce grown and / or reared on the site or purchased using income derived from other products grown and reared on the site.	Year 5 – We will strive to achieve this as soon as possible which will be by year 5 or earlier.
The basic domestic needs of all households are met from income derived from produce grown and reared on the site, including processing and adding value, and other income streams derived from the productive and regenerative capacity of the site, such as from training and education courses, or consultancy directly linked to land based activities on the site. These latter activities should be clearly subsidiary to the primary activity of growing and rearing produce.	Year 5 – We will strive to achieve this as soon as possible which will be by year 5 or earlier.
The number of occupants is directly related to the ability of the site to support their minimum food and income needs	Year 1

and the number of people needed to run the site effectively.	
LAND BASED ACTIVITY: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The land-based enterprise provides food and other products to local markets, reducing local footprints.	Year 2
Facilities for processing produce are made available to other local producers.	Year 1
Training / courses / consultancy are offered as components of the land-based enterprise to share best practice of One Planet Development.	Year 5
LAND MANAGEMENT: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
All existing semi-natural and other important habitats on the site are conserved and enhanced through appropriate traditional management.	Year 1
All cultural heritage features (e.g archaeology) on the site are conserved and enhanced through appropriate management.	N/A – No known cultural heritage features on the land.
The landscape of the site is enhanced by the addition and traditional management of characteristic or once characteristic local landscape features that, amongst other things, may be used to screen and filter views to built elements of the proposals and to provide shelter and screening to horticultural areas.	Year 1

Buildings and other structures and access tracks are located where they can be recessed into the landscape and do not stand out in views from public vantage points.	Year 3 – However the vast majority of the site is currently screened due to the height of the hedgerows and in addition we will plant further screening in autumn/winter 2020.
LAND MANAGEMENT: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
Existing semi-natural habitats are extended or once characteristic habitats are recreated, ideally creating wildlife corridors across the site, linking to other habitats beyond the site.	This will commence pre-planning approval as soon as the land is purchased.
Populations of once characteristic farmland birds of the local area are increased through appropriate habitat creation.	This will commence pre-planning approval as soon as the land is purchased.
Soil organic matter is increased.	This will commence pre-planning approval as soon as the land is purchased.
Populations of pollinating insects are increased.	This will commence pre-planning approval as soon as the land is purchased.
ENERGY AND WATER: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The energy needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.	Year 1
All of the energy needs of all activities shall be met from sources of renewable energy on site, with the exception of small amounts of non-renewable fuel for particular uses for which they are best suited and justifiable.	Year 1

The water needs of the site will be minimised through suitable design and use of technology, including that which enables re-use.	Year 1
Rainwater harvesting from buildings and structures must be maximised.	Year 1
ENERGY AND WATER: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The embodied energy of renewable energy equipment should not outweigh its benefits from energy generation.	Year 1
Human and animal labour should replace the use of non-renewable energy whenever possible and practical.	Year 1
Any water pumping should be renewably powered.	Year 1
Any ponds / lakes created should maximise habitat creation and should not destroy important existing habitats.	Year 1
WASTE: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
All biodegradable waste produced on site is assimilated on site in environmentally sustainable ways.	Year 1
The only exception to this is occasional off-site 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.	Year 1

All waste handling and assimilation on site must comply with Environment Agency guidelines.	Year 1
WASTE: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The re-use of organic waste on site should increase overall site fertility and productivity so long as this is not at the expense of important semi-natural habitats dependent on low soil fertility.	Year 1
ZERO CARBON BUILDINGS: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
Domestic and ancillary buildings will be 'zero carbon' in construction and use as explained in this guidance and using the up to date Welsh definition of zero carbon.	All buildings will be 'zero carbon'. All buildings are due to be completed by year 5 or before.
Proposals will identify which structures require Building Regulations approval and that this approval is obtained either before or during construction.	No buildings will require buildings regulations approval.
All structures identified for removal in the Exit Strategy are capable of removal with low environmental impact.	Building will commence in year 1 and are planned to be completed by year 5. All buildings will be capable of removal with low environmental impact.
ZERO CARBON BUILDINGS: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The construction of buildings should make as much use of recycled materials as possible so long as this does not affect their ability to satisfy the essential criteria.	Building will commence in year 1 and are planned to be completed by year 5. All buildings will make as much use of recycled materials as possible.

Existing buildings are re-used where this would have an overall lower environmental impact than new buildings, or where they are of particular value in landscape or heritage terms, but provided that they are not unsightly or have a negative impact on the surrounding landscape.	N/A – There are no existing buildings on-site.
COMMUNITY IMPACT ASSESSMENT: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
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.	Achieved as part of the management plan. See sections 9.2 (p.110) to 9.4 (p.113)
Any negative impacts are mitigated.	This will be an on-going process which will start pre-approval with planting trees/hedges as visual screening and will continue throughout the life of the OPD.
COMMUNITY IMPACT ASSESSMENT: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
OPD children attend local schools and residents support local groups, clubs and events.	Year 1
There are open days, permissive footpaths and other access, as well as the hosting of local events on-site.	To start in year 3 and throughout the life of the OPD. There are no permissive footpaths or other access on-site.
Residents shop locally and use other local businesses.	Year 1
Residents sell food and other produce locally.	Year 2

TRANSPORT, ASSESSMENT AND TRAVEL PLAN: ESSENTIAL CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The management plan must be accompanied by a Transport Assessment and Travel Plan (which may be combined).	Achieved as part of the management plan. See section 10.3 (p.118)
Overall the development should achieve a significant reduction in transport impacts from all activities on site (residents, enterprises and visitors) in comparison to what would be the 'norm' for such activities.	To start in year 1 and throughout the life of the OPD.
There should be detailed monitoring of all trips to and from the site in terms of purposes, distances, modes, and any transport sharing.	To start in year 1 and throughout the life of the OPD.
TRANSPORT, ASSESSMENT AND TRAVEL PLAN: CONTRIBUTORY CRITERIA	
Criteria	Proposed Date of Criteria Achievement
The use of low and zero carbon modes of transport should be maximised.	To start in year 1 and throughout the life of the OPD.
On site vehicle numbers should be controlled and vehicle pools used for One Planet Developments of more than one household.	N/A – Only one household on-site.
Connections between the site and local suppliers and customers for goods and services requiring travel, should be maximised opposed to those at a greater distance.	To start in year 1 and throughout the life of the OPD.
Visitor travel should be the subject of proactive management to reduce transport impacts.	To start in year 1 and throughout the life of the OPD.

Table 21

12.2 Monitoring

See Appendix F for a copy of the annual monitoring form that we will use.

We will adhere to the requirements as stated in the OPD Guidance:

'The phased requirements for monitoring will be:

- *an annual monitoring report, reporting on the criteria being monitored*
- *as part of the annual monitoring report, a short commentary on changes made since the previous year that are likely to increase or decrease the Ecological Footprint of the OPD household and other footprints, equivalent to a short EFA progress report.*
- *a re-run of the Ecological Footprint Analysis in year three (36 months) after habitation of the site to assess whether the Ecological Footprint of the site is on course to meet the identified target of 2.4 global hectares per person (gha) by year five after first habitation on the site.*
- *a resubmission of the Management Plan in year five after first habitation accompanied by a separate EFA that identifies if the target of 2.4 gha has been achieved.*

Thereafter this sequence should be retained with (a) an annual monitoring report and accompanying EFA progress report; (b) a full EFA in the third year (36 months) after the last management plan; and (c) a revised management plan and accompanying EFA at year 5 (60 months since submission of the last management plan). In each case the EFA should indicate an Ecological Footprint below 2.4 global hectares per person.'

12.3 Responding to Emerging Problems

The OPD Guidance specifies that:

'Most identified problems will not be critical to the future of the site and will need to be remedied by the next monitoring report. Some will be critical though, for example, those that threaten achievement of the essential criteria for One Planet Developments or undermine an EFA of 2.4 gha or less. These will require attention in a shorter, specified timescale.'

and

'The site should not carry more than a small number of critical problems at any one time, although more noncritical problems would be acceptable. These problems may be described using a system of yellow and red cards – too many yellow cards become a red card. The management plan should identify what would be considered critical failures (red cards) and specify how quickly they should be dealt with.'

We will employ a system which utilises a red and yellow warning card system.

Potential causes of yellow cards:

- Higher levels of traffic than predicted
- Failure to work towards achieving the required income from land-based businesses to meet minimum needs
- Failure to achieve predicted ecological footprint gha
- Failure to improve biodiversity of the site
- Failure to increase land-based sustenance (for food) towards the minimum needs target

Potential causes of red cards:

- An increase in the ecological footprint which takes it above the maximum allowable value for OPDs of 2.4 gha

If a yellow card is identified in an annual monitoring report, an action plan must be implemented to resolve the issue prior to the following report. If the same yellow card remains in the following year's report, it will become a red card.

A red card must be resolved over a period of two years. If a red card remains for two years, without an action plan, this may result in the triggering of the exit strategy. However, a critical issue such as *'those that threaten achievement of the essential criteria for One Planet Developments or undermine an EFA of 2.4 gha or less. These will require attention in a shorter, specified timescale.'* (OPD Guidance). Such issues will be dealt with and reported in the shortest possible timescale.

12.4 Failure of the Site

The failure of the site is detailed in the OPD Guidance as *'failure to achieve one or more of the essential characteristics of One Planet Development in the open*

countryside over a period of two years without instituting clear and effective measures to address the identified problems.'

Essential characteristics of an OPD are:

- Have a light touch on the environment – positively enhancing the environment wherever possible through activities on the site.
- Be land based – the development must provide for the minimum needs of residents in terms of food, income, energy and waste assimilation in no more than five years.
- Have a low ecological footprint – the development must have an initial ecological footprint of 2.4 global hectares per person or less with a clear potential to move to 1.88 global hectares per person over time – these are the Ecological Footprint Analysis benchmarks for all One Planet Development.
- Have very low carbon buildings – these are stringent requirements, requiring that buildings are low in carbon in both construction and use.
- Be defined and controlled by a binding management plan which is reviewed and updated every five years.
- Be bound by a clear statement that the development will be the sole residence for the proposed occupants.

12.5 Exit Strategy

It is necessary to have an exit strategy in the event of the site's failure.

The OPD guidance states that:

'aspects that should generally be expected to be removed include:

- *All residential use and associated buildings.*
- *All other elements of the development which would otherwise cause harm or potentially become derelict should they remain.'*

The entire site has been carefully designed to have a 'light touch' on the land and to be removed quickly and easily with minimum waste and disruption.

See section 8.5 for details on the removal of buildings.

All tracks will be made from shale from the land (if present and sufficient), this can be buried, and the membrane will be disposed of at the recycling centre.

The ponds could remain as these create beneficial habitats; however they could be filled in if CCC prefer.

The solar panels would be removed as their frame will simply rests on the ground and can be re-purposed.

The horticultural area could be left to be re-claimed by nature or it could be planted with grass seeds.

The patio slabs could be easily removed and re-purposed and the ground below could be planted with grass seeds.

The reed beds will use a plastic container such as an IBC, these would be removed and re-purposed and the holes would be filled with earth.

The duck and chicken coups will be portable and could therefore easily be re-purposed.

The beehives will also be portable and therefore could be re-used elsewhere.

The cold store's liner could easily be removed and disposed of at a re-cycling centre or re-purposed and the holes could be filled with earth.

The compost bin could be dismantled, and its materials could be re-purposed.

Positive benefits post exit strategy: We will plant a significant amount of plants including forest gardens, wildflowers and hedgerows and we will create ponds. These will create increased biodiversity, an increase in the area of habitats, wildlife corridors and will improve soil quality, soil structure and improve the aesthetics of the land. It would remain entirely transformed and enhanced from the current monoculture that the field is currently comprised of.

12.6 Enforcement

In the event of the failure of the site we will co-operate with CCC and follow the exit strategy as detailed above.

12.7 Five Year Management Plan Review

As specified in the OPD Guidance the management plan will be reviewed every five years and will:

'harness further improvement in the environmental performance of the site by learning (from the Annual Monitoring Reports and the Environmental Footprint Analyses) what has worked well, less well, and to introduce innovation from elsewhere, as well as responding to changing circumstances'

It will identify how the qualifying criteria and associated Ecological Footprint Analysis results will be met.