# FINAL DESIGN EXERCISE

Permaculture Design Certificate (PDC) Course



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| **Submitted At** | 10-11-2019 16:19:07 |
| **Section 1** | |
| **--- Personal Details ---** | |
| **Name** | Daniel Tejido |
| **Email** | dtejido@hotmail.com |
| **What kind of property are you designing on?** | Your land |
| **--- Client Brief ---** | |
| **Describe the intended use of the property, i.e. the design brief provided by the client:** | This property shall be a place where the client can move on within 8 years and start to live with nature. The site shall deliver as much berries, fruits, veggies, eggs and meat for all of the residents of the side. The whole management of the garden and animals shall not use more than 4 hours a day. It shall be a place to enjoy and regenerate that harmonies with the surrounding. |
| **This property will primarily serve:** | More generation family site or cooperative. |

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| **Identify the level of food self-reliance required:** | Most |
| **Specify the client's priorities:** | healthy food<br>work with nature<br>sustainable farming<br>building up an abundance place |
| **In addition to the above priorities the client values visual privacy:** | Some |
| **The client has specific dietary restrictions effecting the design:** | None |
| **The client has specifically requested that the design provide: (list as appropriate)** | Easier management of the site (slope).<br>Maximizing window for harvesting different types of fruits and berries.<br>Crop security with a diversification of plantings.<br>Food for preserving<br>Easy setup for animal integration.<br>Meat production. |
| **What structures exist on site that we will not be designing and placing as part of the design?** | Access Street no changes<br>House with 3 flats and Barn only small changes |
| **What drives, roads, paths, or access exist on site that we will not be changing or placing as part of the design?** | Main access road is tarred |
| **We will be designing and locating:** | Outbuilding(s), Fence(s), Earthworks, Water storage, Roads/Paths/Access |
| **--- Client Notes ---** | |
| **Known advantages, resources, or limitations: (list as appropriate)** | Annual invest of about €5'000 for the starting phase<br>Spring on-site with ~3 Litters per minute and a pond with 5x7x1.5 m<br>Slope 20 - 30 degrees<br>Agricultural land with high regulations |

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| | Small forest for harvesting fuel wood in place<br>House that is builded in 2002, concrete, good isolation<br>High voltage lines over the whole site<br>Barn existing but quite old ~ 90 years<br>Chicken coop that needs renovation or different use<br>Acid soil PH 5 - 5.5<br>Small motorized track dumper<br>Chainsaws<br>Log spliter<br>4 x 1000l IBC Tanks<br>Tenant works in local community |
| **What is the largest limitation/obstacle that will need to be overcome as this design is implemented?** | Earthwork (Water and Access)<br>The agricultural regulations need to be respected. The design in respect of earthwork needs to be validated first with an local well known earth-worker, that will help to get the best tips and tricks. After that validation the local community need to get integrated, even if the regulations will be respected. That validation with the regulations is needed, as there may be some concerns from regional people the community is informed. If the regulatory aspects are not totally clear the government (agricultural department) needs to be involved to define the possible changes. If there are restrictions using machinery the second way would be to use pigs in narrow fenced strips to get to a terraced layout. |
| **What specific skills, abilities, or resources does the client personally bring to the situation?** | Technically experienced (woodworking, electricity, plumbing, IT)<br>Management and Accounting capabilities<br>Gardening, Aquaponic |
| **This client's familiarity with Permaculture is** | High |
| **--- Section 2a ---** | |
| **--- Location and Property Data ---** | |
| **Address:** | Buchholzstrasse 67, Reudlen / Reichenbach, Bern, 3713, Switzerland |
| **Latitude** | 46.63694444 |

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| **Longitude:** | 7.71194444 |
| **Altitude:** | 870 |
| **Units** | Meters |
| **What is the size of the property?** | 3 |
| **Units** | Hectares |
| **Where is the nearest mountain or range?** | 3,4 Niesen |
| **Units** | Kilometers |
| **What is the distance from the ocean (East and/or West coast)?** | 7 Lake of Thun |
| **Units** | Kilometers |
| **What is the distance to the nearest population center?** | 2 |
| **Units** | Kilometers |
| **What is the previous property use history?** | 1800 logged<br>1850 House and Barn build used as small Farm with some cows and pigs<br>Till 2000 use as small Farm some cows and pigs<br>2000 - 2002 House rebuild<br>2002 building of Pond<br>2002 lease of the land and rent of 2 flats |
| **What is the property currently used for?** | suburban home<br>land is leased by a farmer for grassland/ subventions |
| **Upload a Boundary map** | <br>FDE Weidli Boudaries.jpg |

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| **Upload a Contour map** | <br>FDE Weidli Contours.jpg |
| **--- Section 2b ---** | |
| **--- Climatic Factors ---** | |
| **What is the Koppen climate classification which applies to the region?** | Cfb |
| **What is the plant hardiness zone (if applicable)?** | 7a |
| **What hardiness metric are you using?** | USDA |
| **Average annual rainfall:** | 1007 |
| **Units** | mm |
| **Highest recorded annual rainfall:** | 1296.7 |
| **Units** | mm |
| **Lowest recorded annual rainfall:** | 727.3 |
| **Units** | mm |
| **Highest recorded 24-hour rainfall occurrence:** | 90.3 |
| **Units** | mm |
| **Highest recorded temperature:** | 33.3 |
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| **Units** | C |
| **Lowest recorded temperature:** | 14.8 |
| **Units** | C |
| **Average summer temperature (low):** | 11.5 |
| **Units** | C |
| **Average summer temperature (high):** | 16.5 |
| **Units** | C |
| **Average winter temperature (low):** | 4 |
| **Units** | C |
| **Average winter temperature (high):** | 2 |
| **Units** | C |
| **What extreme weather is likely on this site? (select all that apply)** | |
| **Prevailing:** | Northwest |
| **Seasonal variations:** | In Wintertime Northwest in Summertime Southeast winds |
| **Storms:** | All 5 years single storms with wind velocity peaks of 100 - 120 Kmh in autumn or spring. |
| **--- Geography ---** | |
| **What is the site's prevailing orientation?** | Southeast |
| **Are any of these present and of potential concern?** | Hills, Rock, Slip zones, Erosion |

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| **What is the most severe slope on site?** | 45 |
| **Unit** | Degrees |
| **What is the topographic position?** | Mid-slope |
| **What is the highest point (altitude)?** | 920 |
| **Units** | Meters |
| **What is the lowest point (altitude)?** | 835 |
| **Height Units** | Meters |
| **Is this area prone to slumps and landslides?** | Yes |
| **What areas of the site will require special care and attention due to this possibility?** | One Forest piece in Zone 5 in the southeast corner as there is the steepest place. The pasture is quite stable, also heard from the earth worker in 2001 when the house was rebuild and the base was excavated at hard raining time. |
| **--- Site Conditions ---** | |
| **Are any of these naturally (or currently) present on site?** | Spring, Pond |
| **Describe the temporary flow situation.** | |
| **This design adds or modifies:** | Farm tracks, Walking tracks, Animal laneway |
| **This drive or track will be:** | Farm and footpaths lawn (grass) |
| **Are any of these present?** | Native grassland/prairie, Old growth forest, Forest regrowth |
| **Are there pests, diseases or varmints of note?** | moderate precence of voles, mices, deers |
| **What plant species are on site?** | Nut trees Native One, Slowaski, Polanski<br>Apple trees, sweet and sour cultivated and wild ones |

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| | Pear Trees cultivated and wild<br>Cherry trees<br>Grapes red and white<br>Elderberries, ~30 at the edges of the forest<br>Blackberries<br>Nettles<br>Willows ~100 m hedge<br>Hazelnuts<br>Beech trees<br>European Spruce<br>Firs<br>Maple<br>Birch<br>Wide Plantain<br>Narrowly weighed<br>Different Grasses<br>Some different flowers<br>Wild Oregano<br>Bamboo ~6m height with rhizomes<br>Lilac<br>Juniper<br>Wild garlic a patch of 150m2 |
| **What are the soil types present on site?** | Silty Clay Loam, Somehow the soil test is quite homogeneous, I took out a lot of stones and than tried it with two probes but at both the layers where not clear. |
| **What is the soil pH ?** | 5 |
| **Are there any known toxins in the soil?** | No |
| **How well do the soils drain?** | Moderate |
| **Outline a summary of your plan to address this.** | |
| **Are there areas/soils in need of repair/remediation?** | Yes |
| **Describe the area, the needed work, and your plan to address this.** | For kitchen garden compost has to be generated and integrated.<br>Chicken Tractor to spread manure and fertilize the ground<br>18 Day Compost heap as carbon and green stuff is available |

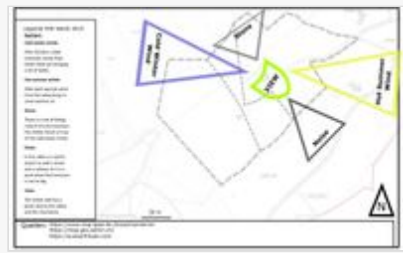
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| | and the farmers are more than happy to give away cow manure with straw<br>Rotational grazing |
| **Are we aware of heavy soil disturbance recently?** | Yes |
| **Describe the disturbance, how it effects the design work, and your plan to address this.** | In 2001 the house site was rebuild and the space for the house was made bigger, no slip occurred even heavy raining. This side of the valley is much more stable than the other side (statement of the excavator man). The base site for the house was made much bigger than the existing one. The new border of the house front (valley) is fixed with willows row 30 m (40-60 willows), minimal movement ~1 to 1.5 cm happened over the last 15 years. Biggest cut in the tar are 1 cm |
| **What building types are already on site?** | Barn/Livestock Housing, Coop/Poultry Housing, House, Shed/Outbuilding, Water tank |
| **What buildings are we adding or heavily modifying in the design?** | Coop/Poultry Housing, Shed/Outbuilding, Water tank |
| **Are any of these features already on site?** | Buried Pipes, Ponds and dams, Power lines |
| **What are we adding or heavily modifying in the design?** | Buried Pipes, Ponds and dams, Power lines, Terraces |
| **Is this site "off-grid"?** | No |
| **Is energy being harvested on site?** | No |
| **What methods are being utitlized?** | |
| **Are there additional technologies, innovations, infrastructure, or practices that will effect energy use on site?** | Yes |

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| **List and describe as appropriate.** | The side has a great facing to the sun, even in autumn the site is over the mist. Mist boundary is mostly somewhere between 700 mas and 850 mas. This leads to the use of solar power. Photovoltaic on house and barn roof with a battery shed that can be placed between house and the garage.<br>From the house to the barn a underground electricity cable 380V is already in place. In the moment the barn get the electricity from the house but the cable can also be used the other way and fill the battery storage.<br>Additional solar energy patch for water warming on roof of the house.<br><br>With the setup of a wind tunnel a windmill can be installed to generate additional energy near the house.<br><br>The willow row on the south front of the house can be changed from bush to tree and produce some shade in summer. On the north side of the house trellis with grapes will also generate some shade in summer. |
| **Does this site currently serve in a larger social context which will need to be updated or maintained to continue serving the community?** | No |
| **What is the larger social context?** | |
| **How does this existing social context effect your design?** | |
| **Does your design include ways in which the site will serve in a larger social context than it currently does?** | Yes |
| **What is the larger social context?** | Mainly the setup is for a more generation family residence. But if this is not happening there is a possibilities to give handicapped or re-beginner a place to start and live in a |

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| | escorted way. Another possibilitie with this design it could be a place to give local farmers, permaculturists or the farmer school near by (20 Km) a place for different trainings and courses. |
| **How will this new situation effect your design?** | It is important that the structures are well sized and placed, that in any possible using a clear planning is possible. With the earth work planned, the management of the site will be also possible with some motorized helper like quads. The terraces can be used for gardening, animal grazing or crop production. |
| **--- Section 2c ---** | |
| **--- Sector Analysis ---** | |
| **What is the minimum sun angle in midwinter?** | 125 |
| **What is the maximum sun angle in midwinter?** | 235 |
| **What is the minimum sun angle in midsummer?** | 37 |
| **What is the maximum sun angle in midsummer?** | 305 |
| **What is the highest solar elevation midday midwinter?** | 20 |
| **What is the hisolar elevation midday midsummer?** | 66 |
| **What opportunities and limitations are manifested on the site by this?** | Early Sun in the morning<br>Mountains that eat up the evening sun |
| **Describe how the design takes advantage of these opportunities and how it will address these limitations.** | Sun Traps<br>Greenhous or Walipinistyle Catapillar growhouse will heat up early.<br>Fotovoltaic (Solar panels) can be perfectly used. |
| **From which direction do the strongest or most consistent** | Southeast |

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| **winds blow in summer?** | |
| **From which direction do the strongest or most consistent winds blow in winter?** | Northwest |
| **What categories of winds will need to be addressed in the design?** | Cold wind, Hot/Dry wind |
| **What is included in the design to address winds?** | Windbreaks with bamboo generating a tunnel to use wind-energy. Hedges fences to capture the leaves in autumn and winter (Biomass).<br>Additional the orchard setup on the edges of the terraces shall lift the dry winds in summer, and gather the leafs in winter. |
| **Are there examples of damaging erosion, temporary or seasonal flowing water, or large amounts of sheet run off during large rain events that will need to be addressed by the design?** | No |
| **List and describe these, as appropriate.** | |
| **What is inlcuded in the design to address this?** | |
| **Are there hot/dry winds that could increase fire risk?** | No |
| **Describe what will be most impacted in the design by this and how the design addresses this.** | Fire<br>Windbreaks with Bamboo<br>Tree orchard on the edges of terraces |
| **Are there hills, valleys, or other terrain features that increase wind force, speed, or create funneling effects?** | Yes |
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| **Describe what will be most impacted in the design by this and how the design addresses this.** | Wind-brakes and tunnels to capture the wind energy with a windmill to get additional energy. |
| **Are there concentrations of quickly regenerating wildfire fuels on site?** | Yes |
| **Describe what will be most impacted in the design by this and how the design addresses this.** | Grassland that need to be grassed or mowed, till now no wildfires happened at this region. Government is regulating or forbidding open fires when needed in summer. |
| **Do any of the energy effects moving across the sector map harmonize negatively with existing access?** | Yes |
| **List and describe as appropriate these negative effects and how the design will mitigate them.** | The main access road is generating a wind tunnel in summer, with some windbreaks the wind can even more tunneled and used with a wind turbine to generate energy. |
| **Provide 3-5 examples of where your design harmonizes positively with energy effects moving across the sector map to the benefit of the site.** | Wind tunnels along the main access road in summer can be used for energy capturing for a windmill.<br>Trees and bushes on terraces edge to capture the leafs from the forest in autumn and winter.<br>Sun angles are favorable to use for foil tunnel and greenhouse to extend growing season.<br>Willow trees to reduce the noise from the valley and generate shade in summer. |
| **Are there any negative energies coming onto the site?** | Noise |
| **How does the design address this?** | Noise reduction trough willow row in front of the house. |
| **Are there any aesthetics to take into consideration on the sector map?** | Yes |
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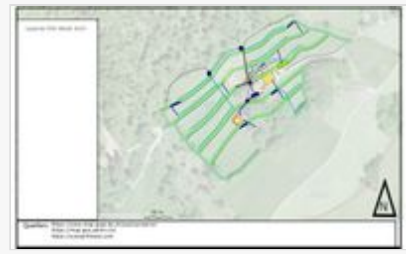
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| **What sort?** | Positive Views |
| **How does the design address this?** | Willow row needs to be shapened croped from bush to tree to get the nice mountain view and get some shade in the summer. |
| **Are there any native wildlife corridors moving through the site?** | No |
| **How does the design harmonize with this activity to the benefit of the design?** | Building clear zones for the deers |
| **Are there problems with wildlife?** | Yes |
| **How does the design address this?** | Young trees and bushes need to be protected with fences and sheep wool from deer, the roots of the fruits trees need to get placed in mesh bags that can rost to get protected from moles and voles. |
| **Upload a Sector Map** | <br>FDE Weidli Sectors.jpg |
| **--- Section 3a ---** | |
| **--- Mainframe Details ---** | |
| **Looking at your contour map, identify the following:** | 870 m is around 250 m long with a piece in between that is forested.<br>892m is the highest usable contour with grassland at 911 m mostly wild forest that is securing the site from stone fall etc. |
| **Is a (or are several) swales appropriate on this site?** | Yes |
| **Provide the results of your calculations for the following:** | As it is quite a slope I would see more terrace and swale combination. |

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| | Total I see about 5 terraces starting from the altitude 890 then in 10 m steps till 850 m. The most important one is the 870 as it gives the most value for the zone 1 and the house. The swale at hillside of the terrace should only be quite small about 40 cm with and 40 cm deep in a V shape. On the slope side no swale will take place. The terrace itself should be as wide as possible minimum 3,5 m. The hillside swales will gather about 27.6 m3 and discharge rates during extreme rain. The spillways of the swales go under the terrace to the underlying swale. The terrace itself that is on contour needs to have a (2%) fall to the valley to protect from slipping at heavy rain events. |
| **Describe the following:** | The highest of the fife is divided in the middle where the forest is placed, on each outer side a pond is planned. The ponds spillway will lead in the next swale. At the middle edges of the top swale/terraces water tanks for irrigation are placed that are connected and filled by a pump out of the middle cistern. Each swale/terrace is feeding the underlying one. The spill overs can be regulated with angle pipes, the feeding point of the underlying swale/terrace need a stone beed to avoid erosion at heavy rains. For the 884 m the spillway directs into the existing pond. The existing pond should feed the next underlying pond that sits on the 874m terrace |
| **Except for the smallest sites some control of water is nearly always needed. How are you planning to address this in the design?** | |
| **Are there ponds, dams, or other bodies of water on site or designated by the design?** | Yes |
| **Describe the following:** | Ponds<br>Capacity is heavy depending on the underground, meaning if we get on huge rocks, they will be smaller as handling with real big rock in that site is not to easy.<br>The head ponds on each end of the wings of the site, The goal is to get around 25 m3 for each 6mx2.5mx1.5m top ponds. The west Pond has a bigger land amount on top |

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| | (1300m2 x 90.3mm=120900l in 24 hours) 5'037.5 liters per hour. This is the absolute maximum as the soil does drain quite a lot and the calculation is like it would be a non absorbing surface. A DN 50 pipe can transport between 4'320 lm and 9'00lm that should be more than enough. The price for DN 110 is much cheaper that's why those will be used. To reduce cost all spillover pipes will be the same.<br>The existing pond (main pond) on the west side of the house has a capacity of 70m3 with the measurement of 7mx5mx2m.<br>A middle pond that is feed from the house roof will have about 30m3, 5mx3mx2m.<br>The fifth "ground pond" one under the barn is feeded by the barn roof and the spillover from the main pond. Capacity somewhere between 50m3 and 60m3 ~7mx4mx2m |
| **How will each body of water fit into your site water plan?** | The water bodies help to irrigate the land and change the micro climate. Each pond can be used to irrigate the underlying patches on the terraces and the spillovers are set that the water keeps as long as possible on the site. The Animal watering system is feeded by a pump from the cistern of the well. This ensures that also in very dry seasons the watering of the animals is secured. |
| **Describe the potable rainwater catchment opportunities which are presented on the site and the systems the design includes to take advantage of these.** | Rainwater catchment on each roof can be installed as for now the water gets in the regular community drainage. With small adjustments the water can be gathered in the ponds and used for irrigation. The overflow can be steered into the new water-flow on site. The household water in the moment is attached to the main water system of the government.<br>For the Barn a water tank that is feeded by the cistern over the buried pipe can deliver the needed water for the outdoor shower. For the house a pipe to the IBC water tanks (4000l) is already in place, but for the household a Tank that is buried will be needed as freezing occurs. |
| **Describe proposed new access on site.** | From the main access road on the east side two branches are already in place, those two branches need to be extended an connected to the new terraces systems. On the west side the forest way outside of the site can be connected to the new terrace 880 and permits also access to the other terraces that enhance the capabilities for the |

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| | whole site. This extension adds a great flexibility and usage for the whole site. |
| **Describe the existing access on site.** | Main access road is solid and tarred about 4,5 m wide and can also be used with trucks.<br>Some field ways are outlined but not really usable and need to be fixed that the access concepts is seamless. |
| **Provide examples of how the access (new and existing) in the design harmonizes with the water plans.** | The new terrace/swales and the new ponds are the basement of water management and access concept. With the water-system the land can obtain much more humidity and with the access system the whole site can be made productive. The existing access road will still be dry and also with heavy rain or snowfall the access is guaranteed. It is not possible to do one without another as they are in symbiosis. |
| **Are there existing structures on site?** | Yes |
| **Describe the existing structures on site.** | The house is in the middle of the site and contains three 3 1/2 room flats. It is build in concrete with a thick isolation that reduce the heating energy. As the house is fully connected to the community water and electricity system a rebuild to of grid can be quite expensive.<br>On the north side of the house a little bit higher a wood shed that include the water tanks for summer irrigation is placed.<br>At the border of the middle forest on the northwest side of the house a chicken coop is placed. This chicken cop needs some renovation but can be used further on.<br>On the west wing of the side, southwest of the house a barn is placed this building is old but still in quite good shape. On the ground floor is a cow barn and on top a hay shed. Possibly the manure hole and barn also need some renovation or changes to fulfill the actual regulations if cows would be placed. For smaller animals like goats or sheep it could be used. |
| **Describe proposed new structures on site.** | This wood shed is more or less camouflage for the water tanks. With diging out a hole behind the shed and place there a concrete water tank that will be covered with soil. This water thank can be used the whole year around and the |

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| | front wall is the back wall (N) of the shed. In front (S)a wooden wall can be placed and covered with a narrow wood pile to give the same look and feel as now . Adding a wooden wall on E and W with a door would create an additional small animal shed 25m2.<br>The chicken coop needs some exchanged windows and wood. With some extended fencing of three patches it would be a great chicken cop for about 6 to 10 hens. |
| **Provide examples of how the structures (new and existing) in the design fit within the context of the water and access to the benefit of the design.** | The structures are better reachable and manageable with the new access structure. House to chicken cop is easy reachable also for people that are not so fit in walking. House to the barn is also much easier as the access is secured.<br>Each Structure can be reached with a tractor or quad if material transport is needed.<br>The water systems grant a much better using of the water of the site and barn and chicken cop have their own water supply. The additional ponds will also influence the whole climate of the site. |
| **Upload a Water Map** | <br>FDE Weidli Water.jpg |
| **Upload an Access Map** | <br>FDE Weidli Access.jpg |
| **Upload a Structure Map** | <br>FDE Weidli Buildings.jpg |

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| **Upload the W.A.S. Map** | <br>FDE Weidli WAS.jpg |
| **--- Section 3b ---** | |
| **--- Zone Descriptions ---** | |
| **Describe the Zone 0** | As the main house already exists and is built in a urban standard style some modifications need to be done regarding additional energy gathering and saving.<br>- Modification of rainwater harvesting to get the catched water into watercontainers and storage tank<br>- Solar energy catchment for hot water and photovoltaic<br>- Battery shed between main house and garage to get better usage of the energy<br>- Glasshouse attachment on south east side to better insulate the entrance of mid flat and shelters the stairs to mid and top flat.<br>The house is well isolated, heating that is important in this clima is set up in high availability main heating is done with an central oil heating and each flat has an Swedish stove that can easy heat the whole flat. As the House is quite new the central heating can be regulated with thermostats, if heating is done with the Swedish stove, a Flat uses around 1 to 2 m3 of wood.<br>The basement Flat contains:<br>2 Sleeping rooms<br>1 Studio room with kitchen, eating and living sector an Swedish stov<br>1 Bathroom with shower<br>1 Laundry room with cellar<br>1 small cellar for storage<br>This flat is fully wheel chair accessible that will provide the possibility to integrate older or disabled members of a family or community. This Flat also has one~big (35m2) room with kitchen and integrated living room that could be used as a central eating and meeting place for all members |

of the site community, this ground flat has an integrated cellar and laundry room that allows to give full independence for elder or disabled people to run a independent household. The two sleeping rooms are attached to the corridor and can allow to have the needed privacy.
As a the whole back section of this flat is in the ground the insulation is quite good and the temperature is quite stable.
Middle Flat: is the biggest of the 3 Flats with about 100m2 of living space it contains:
2 sleeping rooms
1 bathroom with bath tube
2 small réduits
1 Kitchen with eating space
1 Living room with Swedish stove
The entrance is on the east side with some some stairs at the west side is an access to the terrace 30m2 and the lawn 40m2 that could be used for a kitchen garden. The laundry and the earth cellar are on the north side in the hill, the access is from the west exit of the flat. This Flat could be used from a whole Family of 4 to 5 persons.
Top Flat contains:
2 sleeping rooms
1 bathroom with bath thub
1 réduit with a laundry machine
1 kitchen with eating space
1 living room with Swedish stove
The access is on the north side accessible from the access to the middle flat or over a Path on the east side. The earth cellar is under the terrace of the top flat accessible from the stairs. This unit could be easy modified for a bigger group of people. one possibilite is to separate the open living room and also use it as a sleeping room. And the second possibilitie is to connect the two existing sleeping rooms and create a mass sleeping room. If the sleeping rooms stay in one a 4 bed (2 double beds) and in the other maximal a 4 bed (2 bunk beds) could be placed.

The whole house has porch roof(canopy) to give needed shelter of the snow in winter and a "dry" access surrounded the house can be reached. In the roof are about 5 roof windows that bring in some light into the top flat. A

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| | photovoltaic or solar installation could generate a big amount of the needed energy. To connect the Photovoltaic installation a tube from the roof to the heating room (oil tank and heating) that is attached on the west side of the house is already installed and could be connected direct to the switch boar. A connection from the heating room to the possible battery storage on the east side between house and garage could be realized through the earth cellars from middle and top unit that are on the north side. |
| **Describe Zone 1** | There will be like 3 Zone 1 for each Flat and some common Zone 1 at the main-pond.<br>- some terraces are mainly for zone 1 and 2<br>Elements that need to be placed on each Zone 1 are:<br>- herb garden<br>- kitchen garden raised beds<br>- compost piles<br>- wood shelter<br>- water containers for garden irrigation<br>- greenhouse on top of garage for plant nursery<br>At the common Zone 1:<br>- sitting possibilities on the main-pond<br>- barbecue place<br>- Wood deck around the main-pond<br>- cats and dog<br><br>On one edge (W) is the chicken coop for the egg hens and on the other (E) the chicken tractor for the meat chicken. The main-pond at (SW) with the duck house for the snails. This Zone should generate the Salad greens for all three units. The surplus of the kitchen garden can directly get to the chickens, the deep litter from the laying hens can directly used for mulching and fertilizing the kitchen garden. The compost piles will go from time to time get to the chickens to get turned and cleaned from bugs and flies.<br>On top of the garage in Zone 1a a greenhouse or geodesic dome greenhouse needs to be placed for garden, tree and bush nursery.<br>The main-pond shall be a place to get together and enjoy the evening sun with a nice barbecue place.<br>As each living entities has an own entrance door that is faced to another direction each resident has the necessary |

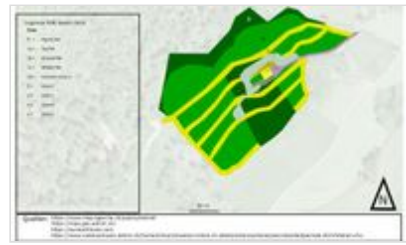
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| | privacy.<br>To get nice temperature Zone 1 a (N) needs some grape shading for the summer. Zone 1b (S) there are willows that have to be cut in high, that they give some shade but not cover the nice view in summer time. In the moment the willows grow in bushes and produce quite a lot of carbon material each autumn. Zone 1c (W) has already a good shading and wind shelter from the near forest strip. Here the lawn could be modified into a kitchen garden and on the terrace some raised beds could be set. Zone 1d is the common Zone 1. Here are the main accesses and the parking spaces for all units also for visitors is enough space for parking.<br>On the East side a veg garden has to be build up on the terrace that is prepped by the meat chicken tractor. There a caterpillar walipini/hub house can be placed in the winter that will be half garden and half chicken house so the veg can benefit from the chickens warm and the deep beading can be used for the veg after the chickens went. The feathers from the chickens can be used as nutrition for the gardens and the bones can be burned and also used for for the compost. Naturally also the eggs will be used from the the community.<br>This should cover quite a good ration of the needed green food and also generate eggs and chicken meat with low working input. All the elements can benefit from each other and no waste will be produced. Zone 1b and the common Zone 1 around the main pond are wheel chair friendly and flat that also disabled or old people can use and enjoy this Zone. |
| **Describe Zone 2** | - terraces<br>- veggies garden<br>- caterpillar green house<br>- chicken tractor<br>- mobile sheep/goats shed<br>- earth cellar<br>Animals:<br>- Chicken / Gees<br>- Ducks<br>- Fish<br>- Sheep |

- Goats
- Piggs

In Zone 2  at the edge of Zone 1a and 1c the chicken barn is placed. For the egg hens there are 3 to 4 fenced and partially shaded patches with different bushes with a lot of seeds and berries are planed, that helps for predator security and gives a surplus of food diversity for the chickens. At the edge of 1a and 1d on the east side the chicken tractor is placed. The barn (SW)for the bigger animals need a renovation/cleanup but can be used. The hay barn on top of the barn needs some renovation/cleanup too but can used for multiple activities. Water catchment on the barn roof with additional water tank to be installed. The terraces above and on the same level of the main house are partial Zone 2.  On the Terrace above the house the meat chicken tractor can be set that the fertility can go down to the terrace at house level. The house level terrace will be the place for a bigger veggies garden and a caterpillar foil greenhouse.
The edges at the valley side of the terraces will be the place for fruit and nut tree orchard.  As the soil is quite poor we plan strong vigorous trees with a lot of various fruits that bloom at different times in spring. The various blooming periods shall help to have a security of harvest even when late frosts harm some fruit trees. The strong vigorous need cropping early that the tress don't get bigger than 10 m in height, that would fit with the next terrace as they are planned in 10 m height difference. At the line of the orchard beneficial plant guilds and berries will take place, that helps to gather the leafs in autumn and are beneficial to the soil life . The goal is that the terraces can be maintained with tractor or quad and also be used as access roads.
Harvesting of the fruits can be done from the terrace and at the valley side harvesting wit a net can be achieved where the fruits get tunneled directly into containers that can be gathered from the lower terrace. At the edges of Zone 1 to Zone 2 a big variety of berries will take place as the soil is quite acid. In first years test with different bushes and wild berry will guide what is appropriate for this site.
The wood shed on the upper side of the house where 4 IBC Tanks are placed could be modified as a sheep shed, if the we

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| | place a concrete Tank behind the shed in the earth.<br>Generally the access to Zone 2 shall be flat and accessible with atv or with wheeled wagons. The slope / hang between the terraces are for grassland for sheep and chickens. The forested edges of zone 2 can be maintained with goats or pigs.<br>The barn that is in Zone 2 need some rainwater harvesting installed and possibly also some photovoltaic on the western side of the roof. The Barn can be used, to over winter some flock, the 2nd floor for hay storage can be modified that there also other usage as perhaps sleep in hay commendation. A compost toilet would be needed as no sewage is installed. As sleep in the hay is only for the summer season a outdoor shower with a reed bed need to be installed. As the terrace is right over the barn the sanitary installation could also be used if a guest with a mobile home is visiting or a mobile tiny house could take place there. As the farm land restrictions are quite hard in Switzerland a mobile solution would fit. |
| **Zone 3** | - terraces<br>- better grassland<br>- orchard on valley side of terraces<br>- mushroom culture<br>- bird houses<br>- wild trespassing corridor<br>- wild birds<br>At the main house terrace we will have the orchard for nut, fruits and berries that need less attention than Zone 1 and 2. The orchard line shall contain a variety of apples pears nuts and plums that can handle that climate and soil. Between the treeline different wild and domesticated berry bushes and herbs will take place. With the time that line will grow to a natural fence that makes it easier to separate the pasture. That orchard line in the middle of the property brings in a real diversity of crop and a place for a lot of wildlife to establish. On the other ends of the teraces at the edge to zone 4 some grain fields can be placed, those will bring grains that can be used for the chickens as food.<br>The terraces and slopes can be mowed with machinery or as daily rotated pasture depending on the availability of co |

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| | workers (animals).<br>To benefit from the insects bird houses and insect Hotels will be placed.<br>Also the lower pond and ground pond are in this Zone, here some fishes prawns and water veggies can be placed. All ponds can feed tank system for the watering of the animals and the cultivated crops.<br>At the edges that faces to the forest varieties of mushroom cultivation can be placed. The terraces are for access, cultivation and soaking water with the V drain swales. Like the orchard terrace the other terraces can have a bush line on the valley edge of the terraces that holds the soil and generate a natural fence within time. |
| **Zone 4** | - Pasture<br>- Forest Garden between the two wings<br>- Sheep<br>- Goats<br>- Lamas, Alpacas<br>- Pigs<br>- Mobile animal shelers<br>- Wind break<br>- Elder berries at the edge to zone 5<br>This Zone is mainly used to feed the Animals.<br>As it is quite sloppy side the zone between the terraces, is ideal to use it as a pasture for Sheep, Alpaca, Lamas, small Cows and or Goats.<br>With the Terraces in between there is a natural segmentation that allows to implement grazing zones which can be daily or weekly rotated. Some keyline plowing in the first two years could help to build up humus soil faster. With a bigger husmooid ratio the whole site can absorb more moisture and will be more robust in the dry season. With the introduction of mob grazing the soil can be buil ed up and a variety of weeds can be established. This process needs some time as the soil is quite poor, but within 5 years the result should be visible already. With the V-drain at the terraces and the ponds between some of the patches the micro clima can also improve the general diversity of the site. The goats and pigs can be used to clean and browse the edges between Zone 5 and 4. The sheep would be the main grass mowers and meat producers. As sheep wool is a |

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| | predator for deer the sheep wool can be used to pack in the stems of the trees that would also give some protection from the sun and when the wool is attached with blackberry tendrils may be also from some mice. The patches at the bottom of the site that are less steep can be used to harvest hay for a small flock that will be in the barn over winter.<br>At the East end of the site a Bamboo wind break takes place to tunnel and break the summer wind. |
| **Zone 5** | That is the Forest that surrounds the site. It is the shelter from stones up slope.<br>-Beech trees 70%<br>-Firs 20%<br>-Maple<br>-Oak<br>-Hazel<br>Here only all 10 to 20 years some management is needed mostly to cut out some timber wood. |
| **Upload a Zone Map** | <br>FDE Weidli Zonen.jpg |
| **--- Section 4 ---** | |
| **--- Species List ---** | |
| **Species List** | The Orchard is planned with a changed NAP system.<br>NAP guild:<br>N= Chestnut or Walnut<br>A= Apple<br>P= Plum<br>This should help that if a tree out of a family gets sick always 2 trees from other families stand between the next tree of the same sort.<br>Between the NAP guild or at each tree of the guild other supporting species are taking place that can be chopped and dropped over time.<br>Ground cover mix (depending of the availability and price):<br>White and Red and Yellow Clover, white and blue lupin, |

lucerne, seradella, horsebean, comfrey, oatgrass, fals flax, lentils, summer vetch

Shrubb  Layer assembly of different berries:
As the soil is quite acid it is the ideal site for berries, the first test plantigs are already set and will give guidance for the mix.
Blueberries, Aronia, Gooseberries, Mulberries, Goji Berries

Tree layer:
Ash (as they are pioneering already)
Willow (holding the terrace and growing already good)
Robina (on the black list, need check)

Apples:
Here the goal is to use different Apples that are hardy enough and have different blooming and harvest times. The underlays are middle and hard growing species that can handle the conditions and soil that is present. A detailed excel with a lot of facts is present pruning of around 150 Apple trees was done in spring 2019 and a good ratio did mad it till now. The cultivates on top of the underlays are:
Rubinola Goldparmännen Kidds Orange Galiwa
Cox Orangen Boskop Sirius Rubinette
Jonatan Sauergrauer Solaris Schweizer Orangen
Prim Rouge Golden Delicious Prim Rouge Berner Oberland
Plum:
Here also the focus is on hardness and different blooming and harvest times. About 50 where pruned in spring 2019.
The cultivate are:
Prunus cerasifera 'Unika' Prunus dom.'Auerbacher'
Prunus dom.'Opal' Prunus dom.'Kandeler Zuckerzwetsche'
Nuts:
There are already some Walnut trees in place, additional to the existing some new hard species are planed.
Walnut:
-Slivenski -Perustinski -Mars

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| | Chestnut Castanea sativa:<br>-Bouche de Batizac -Marigoule -Brunella<br><br>Besides that trees a common cherry is placed and some quince trees and wild quince trees will be placed.<br>Quince:<br>-CYDORA ROBUSTA -KONSTANTINOPEL Apfelquitte<br>One quite old quince that is newly discovered that is very tolerant to the most disease is ordered but not named till now.<br>Different tests:<br>As some stone walls and sun traps are already set some test with some special cultivate and wild fruits are planned.<br>Bushes:<br>Medlar Rose hip Khaki Paw Paw Grapes (red/white) Kiwi<br>Sea buckthorn<br>Blueberries Raspberry<br>Bamboo:<br>As one Bamboo with rhizomes is growing good (6m) at the west side of the main pond. More Bamboo sorts get some patches at the entrance of the site. This mainly to defend the wind and push it into a tunnel.<br><br>Mushrooms:<br>Different Oyster mushrooms and Shitake |
| **--- Detailed Description ---** | |
| **The Detailed Description (1000-1500 words)** | The main goal of the design is to install a framework that can be used in about 5 - 8 years. To address the financial resources, the first steps are the earthwork and water system. At the time the terrace building is going to take place the trees and cover crop need to be ready to plant as they are needed to stabilize the terraces/swales. Therefor a huge amount of pruned trees are in the nursery to stay ready as soon the earthworks begin. Right after terracing and planting/seeding the fencing of the orchard needs to take place to avoid deer damage. A good planning and coordination is necessary.<br>The plant system is laid out that after 5 years there are plenty of nuts, berries and fruits to cover the needs of 10 to |

20 people. With the selection of all of the trees and bushes the harvest time is spread over some month as it is not planned to have full time people managing the site. Whit that in mind a constant harvest can be granted. Even if early frost destroy some blooming, a crop is secured.
The design takes care of the steep site and with the terrace/swale system the management is much easier as without. The access is possible with an quad (atv) and grants the management for older people .
Additional the design is set up that a integration of mobile and fix fencing for animals is easy to achieve. The fix fencing gives the structure that between the fixed fences three mobile fences with 3 wooden gates give the possibility to rotate the mowing animals with a small amount of input.
The water system with a T ball valves each 15 meters, grant an easy possibility to water the animals and not carry water around the site.
The setup of the grain and berry bushes at the chicken house will deliver additional food and predator security for the egg laying chickens.
The fruit trees generate enough crop that the surplus can used for storing or be feed to the sheep or pigs.
The setup of the orchard will deliver a canopy and the needed shade for the underlying garden, pasture and animals.

As the Site is still used by a Farmer that only cuts the hay, his work will be easier as the terraces allow to access an manage the site with his tractor and hay cutting machines.
The seeded ground cover will deliver better soil fertility, support the orchard and the hay has a lot of proteins. The management of the planted orchard and shrubs should not take more than 10 days a year. The pruning of the orchard needs around 3 days per year. Mowing around the house in zone 1 will take about 2 days. Fencing of the trees and bushes  will take about 3 days.
The terrace water system is targeting to a management, that can be done with some motorization and is definitely easier as today. Additional the site can hold more moister and with the silver pasture the whole micro clima is more resilient to the changing weather conditions (drought periods).
On top this design enriches the whole biodiversity of that

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| | site and may be also of the region.<br>This framework can demonstrate, for the local farmers that it is possible, to have more diversity and better working conditions. With an one time invest of planned design and earthworks for terraces and ponds a rich diversity can be achieved. On top the cooperation with nature will enrich their crop and life.<br>For the Farmers that are in the milking industry the rotation grazing can show up that it is possible to build up soil and grassland and having healthier animals. |
| **Upload the Final Drawing** | <br>FDE Weidli Pflanzplan.jpg |
| **--- Plant Purchase List ---** | |
| **Plant Purchase List** | Trees<br>The existing ones are numbered on the plan, additional.<br>Nuts 15x<br>8x Chestnut<br>7x Walnut (Mars)<br>Nuclear Fruits 18x<br>100 Apples and 50 Pears already in nursery<br>Stone Fruits 17x<br>20 Plums already in nursery<br>2 Avocados<br>2 Mirabelle<br>2 Peach<br>Support trees<br>30 Willows (can be nursed from the 100 existing willows)<br>30 Ashes (taking the wild growing and replant)<br>Bushes:<br>33 Elder already on site<br>10 Mulberries<br>10 Blueberries<br>Weeds:<br>50 comfrey<br>2 clumping bamboos |

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| | 4 rhizome bamboo<br><br>Seeds:<br>Leguminous seed-mix amount depending on mix but 4 times as needed on the new terraces. |
| **Submission ID** | 5dc87ecb0807da1b0109c8dd |