

Permaculture Design Analysis
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Deer Crossing the Art Farm

“My art is not about Nature, it is Nature.”

Oliver Kelhammer, permaculturist

**Sara Dent
May 2009**

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A note to Sandy & Chad: Thank you for the excellent opportunity to be a farmer in residence at Deer Crossing. This type of opportunity is rare, and to practice my permaculture design skills and contribute to a project that fuses art, community and ecology is incredible. I loved my time here and look forward to watching the Art Farm grow over the years.

My reference bible: *Gaia's Garden, A Guide to Home-Scale Permaculture*, Toby Hemerway, 2000

EXECUTIVE SUMMARY

This permaculture design analysis of Deer Crossing the Art Farm (Art Farm) will include a general overview of the land, as well as recommendations for future land management directions. This report will build upon the ideas proposed for the site, detail permaculture methods for food production, and discuss the natural energy resources available on the land. It will add to the Art Farm's current planning documents and directions, designed by Diego Samper and artistic directors Sandy Buck and Chad Hershler.

This design report was undertaken during a two-week Art Farm residency. Goals as outlined by Deer Crossing the Art Farm are to: map and design new garden space, build raised beds and devise strategies for soil remediation around the farm. The residency included hands-on time in the garden.

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Permaculture and Ecological Gardening

Permaculture is a term coined by Bill Mollison and David Holmgren in the 1970's. It is a sustainable design methodology and land use practice philosophy based on observing Nature's patterns and mimicking them in human systems. It is an international movement of ecologists, farmers and practitioners who build living systems that create harmonious relationships between the human inhabitants and integrated fauna and flora.

Permaculture systems are generally low-input, closed-loop systems that use the resources available, without creating pollution or waste that cannot go back into the natural cycle. In permaculture, we think of the pollution as the solution. Wood ash is used to alkalize soil, human urine and feces enrich compost and are food for fruit and nut trees, newspapers and cardboard are good for mulching the garden, etc. Like nature, we become constant recyclers gleaned what can be re-used and over-time building systems that create ecological resiliency and food security.

Ecological gardening is another term or way of framing permaculture. Ecological gardening is about creating habitat for the full cycle of life in order to balance out the circle of life and make our food systems more sustainable over time- through perennial cultures, starting with the soil community and re-establishing habitat for the various creatures that make up our ecologies.

We have less pest problems when we follow the rhythms of nature, as the chain of life creates a system of checks and balances. Weeds become our friends, with useful purposes such as medicine, food, and nitrogen for our compost to create soil for the next generation of plants. Watering becomes less of a hassle because we build it into our land use practices through observing the flow and harnessing it in the soil.

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Deer Crossing the Art Farm

Deer Crossing the Art Farm “ is conceived (of) as a meeting place for artists who want to inspire humanity – through the gentle power of the arts – into a new healthier relationship with the planet.” The core values of the Art Farm are: art, education and food/farming.

The Land Story

The Art Farm is located in upper Gibson's (Sunshine Coast, British Columbia) at the foot of a mountain. It has a spectacular 320° mountain-view, including ocean

and forest. The immediate area was logged in the early 1900's, followed by a large forest fire, and then logged again in the 1950's. The surrounding forest is mostly made up of 3rd growth trees with some 2nd growth.

Surrounding the forest and to the west is forest moving up the backside of the mountain; this is Crown Land, and thus potentially subject to future logging/clear-cutting and development. BC Hydro electrical lines run alongside the mountain. There is a large trail that runs underneath the electrical lines, zoned for potential highway south to north. Running East to West on the South side of the property is a mountain-fed creek that dries up during the summer months. On the North side is a new gated-community housing development that is currently an un-built clear-cut with one lot sold (to the developer). On the East and South side are neighbours.

From West to East, the Art Farm is five acres, with two acres forested predominantly in Red Cedar and Douglas Fir, that abruptly turns into a 25-year old pioneer Red Alder forest (with an exciting understory), followed by a house with a small, enclosed raised bed garden, a fallow pasture, and a four-car garage with a significant amount of vegetated green space on the front end. The alder forest was the site of an industrial workshop, evidenced by the large amount of scrap metal and other artifacts to be discovered amidst the trees. The main house was built off-site and moved onto the land. It is a modest and comfortable one floor, 2-bedroom house with no basement due to the high water table.

The land has: good solar exposure, lots of wind, tons of rain, and a high water table for most of the year except in the summer when the creek runs dry and the leveled out pasture dries out.

The Art Farm was part of a 20 acres allotment owned by Storvold (the road namesake) that was divided approximately 20 years ago (1989) and pieces of it sold off. The Art Farm has since passed hands twice. In 2007, Hershfam Corporation purchased the land in support of the development of an art farm. Sandy and Chad currently live in the main dwelling with their little one Maggee and are setting up the infrastructure for the non-profit: Deer Crossing the Art Farm.

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Zone & Sector Analysis – Recommendations

What Are Zones & Sectors?

The Zone and Sector Analysis approach used in permaculture are design tools to: site buildings, food systems, animals, etc. by proximity depending on the frequency of use and needs; and determine what natural forces are at work (sun,

wind, rain, etc.) and how they can best be harnessed by the buildings / fauna / flora in each zone, in relation to the overall design.

Zone breakdown:

Zone 0 – The home zone, where you sleep

Zone 1 – Generally, this is the surrounding area outside of the dwelling. Also called the ‘fuzzy pink slipper zone’, if there are things that you need regularly, this is where to put them, such as the rosemary plant that you harvest daily for cooking or tea, or the bed of greens that you want to access at lunch and dinner.

Zone 2 – An area of frequent activity and usage, such as the garden and greenhouse.

Zone 3 – An area that needs attention but less frequently than zone 2, such as the orchard or berry bushes.

Zone 4 – An area that needs attention a few times per year, such as the red alder forest for harvesting firewood or the edible forest.

Zone 5 – This area is a ‘hands-off’ zone. It is the observation zone where nature’s patterns are studied. For some people this can be as small as a corner pocket in the garden that is used for attracting wildlife and birds (and left alone). For others, this is the forest zone for conservation purposes. The main idea is that somewhere on your land, you have set aside a space that you will not interfere with- a protected ecology at work.

The Zone design tool is flexible and conceptual. For example, in the case of the Art Farm, there are two Zone 0’s, one is the main dwelling and the other is the resident space(s) in the alder forest, which is also a Zone 3 – 4. For the person in the resident space, it is Zone 0. For the people in the main dwelling, it is Zone 3 – 4.

Art Farm Sectors

The Art Farm has much potential from the rain sector! Rainwater catchments on the farm would create an endless supply of irrigation water, as well as a back up emergency supply in case of fire. Filtration systems made of sand and charcoal can be designed to make rainwater safe for people to wash and cook with, and potentially drink.

The wind sector on the land requires that we put in a windbreak. Wind wicks water away from the soil, and causes enough ground turbulence that young plants not resistant to it will have a hard time getting going. A row of alder at the end of the field will capture run-off, fix large amounts of nitrogen into the field,

provide more habitat for birds, mulch the earth with its leaves in the fall and slow the intensity of the wind passing through the area.

The sun sector is strong on the farm with good solar exposure during the Spring – Fall months. Passive solar can be used for a Greenhouse. Solar panels could be obtained as an alternate energy source during the sunnier months for the Green Building area in the Red-Alder forest. A solar shower could be built and purposed for the higher volume of residents that will pass through the farm during the sunnier summer months.

There are a few spots where emergency fire systems could be put in place. The top of the alder forest is a good spot for large rainwater or creek fed catchments system. The water can be gravity fed downwards and used in the Alder forest where inhabitants will be. Fire likes to travel up hill, so another water catchments system by the workshop / potential performance space is ideal, especially as a public venue that needs an emergency system.

Notes on the Zone & Sector Permaculture Design Map.

After taking a look at the Masterplan for Deer Crossing the Art Farm, and having the opportunity to discuss it, here are some recommendations:

1) It would be ideal if events and buildings for the public could be on the front end of the property. This would centralize higher traffic activities in a concentrated area. Rationale:

Artists or farmers in residence will be living on the land, showering, cooking, sleeping, etc. This would enable them some privacy from the public.

If a 2nd septic system is invested in, it may make more sense financially to concentrate a larger building with high use above it, so that both the workshop / gallery space and performance / multi-use building can access the same system (without digging up the farm).

Traffic from the venue will not be as concentrated throughout the site, including in the garden. The public can be educated or ignorant and it would be good to set up some visually beautiful buffer zones (such as the laurel equinox calendar) to direct the flow of people.

Wheelchair access can be created in this area with a couple of designated parking spots.

As a performance venue, it is quite appealing to have the big open view at that location. If some fruit trees are placed below, people will be able to sit on benches, contemplate the scenery and pick apples in the fall before seeing a

show or participating in a workshop. (Ideally a multi-stage system of food will be encouraged in this area so that there is always something to nibble on.)

2) I love the idea of a site specific performance stage sited in the cedar forest AND the conservationist in me thinks that this area should be protected as Zone 5 and not built in. On the one hand, people do benefit from being in the forest (especially if they don't have regular access). On the other hand, it opens up some liability issues having people back there because it is close to the Creek, and there is blow down and potentially dead standing trees. I am definitely of two minds about it. An alternate, safer location that could also double as a tent platform, is in the back of the Red Alder forest, close to the main path.

3) It may be an idea to concentrate the food forest (I am proposing), greenhouse and garden / growing space closer to the main dwelling area, simply for the sake of access and maintenance (whether its Chad and Sandy or other folks who are looking after it). This could make the systems less work in the long run and more natural to the lay of the land currently.

Please note that on the attached design document, I sited the food growing space according to the masterplan.

4) It is advisable to design a masterplan with Diego and a green builder for the Red Alder forest. As this will be an important zone on the farm, as a living space for artists and resident farmers, the overall systems should be looked at as a comprehensive design to maximize the potential of that area, preserve as many trees as possible, and still have resources left for the long run. The Art Farm has the goal of hosting up to 15 – 20 people during the summer months for workshops, etc. so this area will play an important role on the farm.

Residents will benefit from having a balance between communal / shared space and some privacy amidst the trees between sleeping spaces.

*Note – due to zoning restrictions, it is possible for 1 more large structure to be built on the land under permit. Any other buildings need to be maximum 100 square feet. The Art Farm will be applying to change their current zoning status.

Description of Zone & Sector Design Map

Starting from the West and moving East on the design map:

- Zone 5: leave as is
- Zone 4: wood harvesting, edible food forest, water cistern for fire system (line from creek)
- Green Building Zone:
 - o Family Sized Yurt (sleeps 5-6), rainwater / creek water for sink area, potential indoor kitchen, bucket outhouse

- Camping platforms for temporary residents
- 1 – 2 more 100 square foot sleeping spaces for longer-term residents
- Solar panels and battery bank, small office with Internet
- Solar shower for summer months
- Cob kitchen (underway summer 2009)
- Artist-in-residence building (current, too bad we can't re-orient the building so that it is south facing)
- Wood working shop
- Grey water wetland system, utilizing ditch between Alder forest and main dwelling, water could be used for garden irrigation
- Humanure composting / bucket system
- Zone 0 – 2: main dwelling
 - Put in grape vines and other food vines to cool deck in summer and provide food
 - Deciduous wind break tree(s) on East side of deck
 - Continue to develop perennial, deer proof foods @ house
 - Build wood shed
 - Continue to use mini shed as the recycling centre
 - Use mini Greenhouse for spring starts
 - Continue to build fertility in enclosed garden; test pH every spring and add lime accordingly if below 6.5
 - Build compost, enclose front area and make a cover
 - This site could potentially be developed into a food forest / garden that moves outwards towards the stable
 - Dig long swale from South to North before the Equinox Circle, fill with organic matter and gravel
- Zone 3: Laurel Equinox, Potential Greenhouse and Permaculture Garden
 - Alder south side of field and creating a sight line break from neighbours, capturing run-off, fixing nitrogen, etc.
 - Alder wind break on east end of field
 - Rainwater catchments from stable roof
 - Swale on east side of stable
 - Compost centre on north side of stable
 - Permaculture garden will consist of fruit trees surrounded by plant guilds (community of complementary shrubs and plants) and would be mostly perennials (specific plants would need to be selected for this site, depending on how the soil does after some concentrated remediation efforts)
 - The greenhouse would need to be assessed in terms of size, it could grow: starts in the spring for annuals (enclosed garden and a couple beds in the permaculture garden), tomatoes and peppers during the summer and act as a nursery for trees and other plants during the winter months; greens could also be grown in the winter with a little insulation

- Small orchard planted below potential multi-use building
- Rainwater catchments for emergency fire system
- A graywater / blackwater system could be designed, but I am concerned with the volume if large numbers of people frequent the area; potentially even a large composting toilet unit (@ \$6K) could work and be a better solution than a \$20,000 septic system (although there are new and improved more environmentally friendly septic systems out there these days)
- Fencing, the posts in place are good infrastructure and over time an edible thicket could be encouraged to replace the fence system on the north side, keeping animals out, providing food, fixing nitrogen and habitat for the birds and the bees
- Zone 4: Sculpture Garden
 - Sculpture garden and area to grow materials like bamboo and willow
- Zone 5: Forest
 - I suggest letting the margin running around the farm on the North East side continue to go wild!

Other potential structures:

- drying room, for herbs and fruit, potentially in the enclosed space in the stable barn
- root cellar for food storage
- food safe kitchen for processing foods or preparing food for farm events
- chicken tractor, designed to be used over top of garden beds, chickens are great for cleaning and fertilizing the soil and are useful in any mulching system, plus they produce eggs and meat

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Soil

The good news is: soil building will be an on-going activity on the Art Farm!

A couple of tips: 'Feed the soil not the plants'; healthy soil makes healthy plants and animals, and healthy humans make healthy soil.

The Art Farm soil is a combination of sand and clay, with a clay hardpan. Clay holds nutrients well because of its fine particle size (increased surface area to hold micro-nutrients). It seems that the soil is more sand than clay. Sand does not hold onto nutrients well, but is good for drainage. The orange clay hardpan (seen at the bottom of the raised garden beds) indicates that water is moving through the area, and because of the sandy quality of the soil low organic matter content and regionally acidic soils, nutrients are leached regularly out of the soil.

In the forest, water moves through the soil consistently. Our forest wisely grows species of plants that prefer lower pH's than our annual vegetable gardens do. Acid loving Cedar trees hold the nutrients they need through a healthy soil community of organisms, bacteria and fungus. Organic matter abounds in the forest above and below ground, retaining nutrition for growth. Constant additions of organic matter are added (regular, natural mulching), leaf litter, animal poo, etc. Deep root systems hold the soil and sub-soils together, preventing erosion and creating channels for life to thrive.

The Art Farm soils need some of that organic matter (OM). I don't recommend using woody material to mulch the soil. Often it is acidic and the carbon/nitrogen ratio is too high and will burn out the community of soil critters in the short term, instead of building up a stable humus level that will regulate pH over the long term, and feed plants fast instead of slowly over time, in a stable manner. Compost and sheet mulching are the best ways to do this. A little bit of woodchips in the compost is fine (not a lot) because the humus (soil structure) built by the soil critters will regulate the pH.

Compost: Making good compost is like baking a cake. The more the ingredients can get mixed together and layered in, the faster soil will be made. The process of composting is complex and amazing. Compost heats up because of little creatures in the soil that get excited, eat the organic matter and either poo it out or die and become food for other decomposers.

Here are a few tips: enclosed compost areas keep larger critters out. Composts need rain proof lids to maintain the balance of moisture inside and ensure that nutrients aren't being leached out. If composts are too dry they won't decompose optimally (like a wrung out sponge is a good level of moisture) and if they are too wet then decomposition will get stinky and anaerobic.

Composting is the process of adding / layering in carbon and nitrogen. Examples of carbon are leaves, newspaper, cardboard, dead grass, etc. Examples of nitrogen are fresh greens, manure and kitchen waste. Different materials have different carbon to nitrogen ratios (C/N). In the end, once materials have gone through the composting process, the C/N levels, pH and nutrient levels are balanced out because of the cycles of soil building creatures. Materials that are large and woody will take longer to break down, and may need 2 – 3 years to fully decompose.

Sheet Mulching: This is composting in place instead of moving materials to and from the compost pile and back out onto garden beds. Sheet mulching is an excellent way to build up layers of balanced, happy soil on top of areas that need remediation (like the horse pasture, see details below and Appendix for more info).

The Pasture

Soil samples taken from the pasture and workshop areas were amalgamated and sent off to a lab for chemical analysis, revealing low Ph (5.4) and low phosphorous, potassium, calcium and other micro-nutrient levels (see analysis attached). As well, the soil has been compacted by the previous owner's horses. Again, this area will need a significant amount of organic matter / compost added in order to make this a fertile food growing area. It would also be ideal to put in some accumulator plants that will send their roots deep into the earth to pull up specific micronutrients.

For remediation of the pasture soil, we would begin (ideally in the Spring) by cutting down all standing vegetation, forking down into the soil to aerate and break up the soil (no digging, just forking), applying a thick layer of nitrogen (manure, seaweed), adding layers of cardboard (moistening the cardboard), another thick layer of nitrogen, and a top layer of carbonaceous mulch (moisten). This will build up the soil and by the time the fall rolls around, a top layer of added compost will enable you to sow a fall cover crop (specifically selected for your soil) that will add more organic matter and hold in nutrients over the winter. By the following spring, this can be cut down and specific accumulator plants (specifically selected for your soil) sowed to bring up precious micro-nutrients from below to the upper regions of the soil. Accumulator plants can be composted and the nutrition returned back the ground. Chickens could also be useful in this process, breaking up organic matter and fertilizing the ground. In year 3, we can begin planting a garden.

- Year 1: Plant Alder wind break
 Spring, cut down grass and leave in place
 Sheet Mulch 8 – 10 inches
 Fall, add some soil and sow winter cover crop
- Year 2: Spring, cut down cover-crop, add 3-4 inches compost, sow
 accumulator plants
- Year 3: Cut back accumulator plants, leave on ground, add 3-4 inches
 compost
 Being planting in fruit trees, shrubs and developing beds

I suggest that this area be a Permaculture Education Garden. The focus would be perennial foods that will take a little while to establish but in the long run will be less work. It could also serve the purpose of a research site, as perennial food systems are generally regarded as experimental and are contrary to the mainstream annual growing culture. Its location would engage the public coming in for art activities.

Here is a sample list of bio-accumulator plants that are particularly good at getting certain nutrients from the environment and keeping them in their tissues for you to compost:

Phosphorus (P): Alfalfa, Barley, Braken Fern, Buckwheat, Caraway, Chamomile, Chickweed, Chrysanthemum segetum, Clovers, Dandelion, Docks, flax seed, Garlic, Hemp seed, Horseradish, Lambs Quarters, Lemon Balm, Lupine, Marigold flowers, Millet, Mustards, Parsnip, Pigweed, Plantain, Purslane, Rutabaga, Savoy, Sorrel, Sweet Clover, Turnip, Vetches, Watercress, Yarrow

Potassium (K): beet, Borage, Braken Fern, Carrot leaves, Chamomile, Chickweed, Chicory, Clover, Comfrey, Dock, Fennel, flax, Lambs Quarters, Mullein, Oak Bark, Orange and Banana skins, Parsley, Peppermint, Pig Weed, rice hulls, Silverweed, Sow thistle, Stinging Nettle, sweet clover, Watercress, Yarrow

Iron (Fe): beet, cleavers, bedstraw, oak, parsley, parsnip, pine, radish, salsify, Stinging nettle

Enclosed Garden

Due to its sandy nature, we went with the bio-intensive method and double dug five of the six beds (except for the strawberry bed) in the hopes of increasing food production in the years to come (by doubling the surface area available for plant's roots and increasing the amount of active, fertile soil). We layered in purchased compost and worm castings to boost soil activity and long-term fertility.

For this area, I recommend that a significant amount of compost be added on each year. This can be done in a combination of ways: sheet mulching in the fall and compost building throughout the year for the harder to mulch perennial beds.

Please see Garden Plan in Appendix for a rotation plan. Rotation plans help to keep pests and diseases in check by moving crops annually to a different location. Also, some plants, like beans and peas, fix nitrogen and make the bed ideal for next year's brassicas (broccoli, cauliflower, kale, etc.).

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Water

Being at the base of a small mountain (approx. 300 feet elevation) the water table is quite high. Water flows from the west end of the property through the land, and whatever isn't being retained by the soil and vegetation is flowing out the east end. Water is directed via a series of gradients and some drainage ditches.

The current source of water used on the land for household and irrigation purposes is the 75-foot well. As the users on the land and potential irrigation demands increase, a priority is capturing the other potential water resources available.

The creek that runs on the south side of the property is a potential source of drinking water that could be used in the artist and temporary resident zone. Currently, two of the neighbours have water lines running off of the creek. I believe that a community-use license must be obtained to do this. I suggest that a water cistern be built at an elevated level in the alder forest that would be gravity fed. Filters would need to be used, including an electric or solar powered UV filter.

During the summer months before the creek dries up, the cistern can be filled, the intake valve turned off, and act as an emergency water supply in case of fires, etc.

Rainwater harvesting will be the wave of the future! Utilizing the surface area of the roofs on a few key buildings, directed into a cistern or water tank, that can then pressure feed irrigation systems (filters necessary) or filtered for human usage, will increase the available water on the farm by hundreds of liters. Why would you use precious water from an ancient underground aquifer when you can have the heavens deliver water to your door?

It is advisable to have someone with water expertise come and design the catchments systems on the Art Farm. It is possible to do this yourself with some research and time spent figuring out materials and volume.

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Humanure

I suggest using Humanure Composting (the bucket system) in the Green Building Zone as an educational tool for residents. It is an excellent life skill to have and I think that getting in touch with one's shit is an important thing to do in our culture. There are few places in the world where people can afford to poo into clean drinking water. There is an educational learning curve, and residents would need something to read or a hands on demo before doing it themselves.

Different folks compost humanure in different ways. Human feces has a small percentage of pathogens in it that can survive the compost process and are dangerous for human consumption. These can enter our food systems through groundwater seepage through uncontained waste sites (like pit outhouses) or through premature additions of composted feces to food. This is why people usually use humanure only on fruit trees, where the compost is not directly touching the fruit. To be on the safe side, humanure compost should sit for up to two years, before applying it in the garden. An even safer method for removing pathogens is hot composting, a method used by many organic farmers to make sterile soil for starting plants in the spring and heating up greenhouses.

Below is information from a previous client design project that was cut and paste from the Humanure Handbook website. As well, there is a pathogen death chart (see Appendix) to help us wrap our minds around using humanure and be part of the solution for closing a very important waste loop in our society (black water).

“How to fix the soil:

Make compost because the world needs more stewards ready to actively take on the task of recycling nutrients rather than moving them along. The water that comes to your property from all around is a gift that should be appreciated before it will move on to other systems. We know that pathogens from feces are harmful to us and can cause unwanted impacts on aquatic environments like the one on your land. Government code says that sewage should be dealt with in a manner that I do not agree with because:

- Effluent is not actively monitored or treated by the steward
- Periodic “removal” of sludge is in order and this breaks the cycle of active participation by the land stewards in taking care of their own shit.

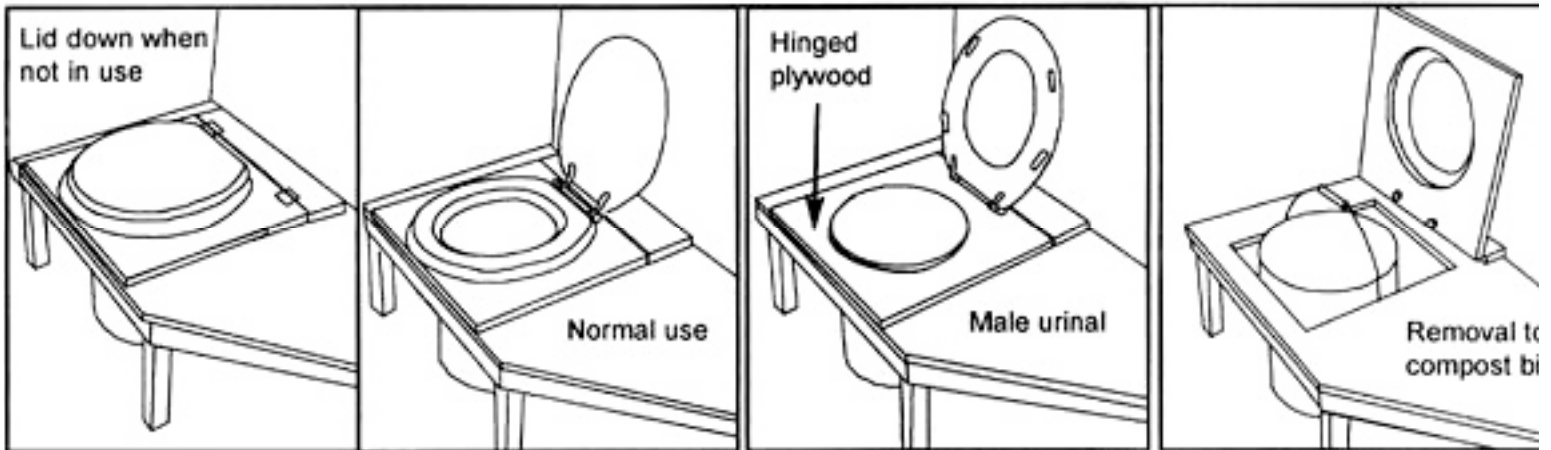
If you would still like to learn what has to be done for a system that is to code see your regional district for help.

For the purposes of this project I advocate the Sawdust bucket method of human manure or “humanure” composting as described in “The Humanure Handbook” by J.C. Jenkins and on the net at:

<http://ersson.sustainabilitylane.com/sawdust.htm>

Build a 3 bin compost because you can use the central bin for storing large volumes of mixing materials like weeds, clippings, floor sweepings, leaves... anything organic. The two side bins will be used for layering in other plant materials with your humanure. A bin made from old 4X4 foot shipping pallets is cheap and easy to assemble. See picture.

Build a sawdust composting bucket toilet system. See:
<http://ersson.sustainabilitylane.com/sawdust.htm>



Gather organic compost materials.

Cover material to eliminate odors and insects ideally sawdust from your local lumber operation.

Alternatively use: local peat moss, dried leaves, plain dirt or ground newsprint.

Humanure: eat an organic diet and avoid medications that you don't want in your environment. Buy food in bulk and avoid packaging waste. Start your toilet with a 15cm layer of spongy materials like sawdust, dried broken up leaves, peat moss or ground straw or newsprint. Leave your poop and apply cover material.

Start your hot composting pile. Think of water, air and a balanced diet. Start with 15 to 20 cm of absorptive carbonaceous material. Things like leaves, dried plant matter paper and cardboard are good absorbers. Sticks and twigs are good for letting air move through the pile, which is important for the aerobic decomposition of everything. You are trying to make a sponge with air spaces and good water holding capacity. Then add about 20 to 30cm of a mixture of plant materials including weeds with a little soil bacteria still on the roots, grass or leaves, vegetable scraps, floor sweepings, hair...and mix them well. They should be moist to the consistency of a wrung sponge. If too dry, add a little water. Now you should have 20 to 30 cm of well-mixed food for the composting bacteria on top of 15 to 20cm of carbonaceous material. You only have to do those steps in

the creation of your first pile. After wards follow these steps for every subsequent addition of humanure.

Add to your hot composting pile. Make another 10 to 15 cm layer of mixed carbonaceous and nitrogenous materials and make sure the moisture is like a rung sponge. With the addition of some time and beneficial thermophilic (heat loving) organisms this pile will heat right up and kill all pathogens (50 C for 1 day) while absorbing moisture and keeping effluent out of the water table and your bog. Next add your 5 gallon bucket of humanure and cover material. Within this humanure are a plethora of thermophilic bacteria that will go to work and heat things up given the right conditions. These are the good guys and are not considered pathogenic. Rinse the bucket and pour this onto the pile as well. Mix everything into the top 10 to 15 cm of the pile. Add another 10 cm layer of carbonaceous material mixed with 10cms of nitrogenous material and top it all off with about 5 cm of light carbonaceous material like leaves and/or straw and/or sawdust to keep gases down. Finally check that the moisture is like a rung sponge and if you are anticipating a lot of rain cover your pile. Your pile should be about 60 to 75 cm thick now and this mass is critical for its insulating and cumulative heat effect. You are making a hot compost pile and the heat created will kill any pathogens that could potentially make you sick. See the diagram to better understand the influence of heat on pathogenic bacteria. If you don't have enough materials on hand gather more before you add humanure. This system is not hands free and it is much different than flushing feces into water. It is a system that requires thought and appreciation from the user. This system hugs three birds with one stone by creating a soil amendment, recycling humanure and keeping our water systems pathogen free. Many people think it impossible to make a hot compost pile without animal manure and it's true, that animal is you. Good luck and when in doubt use a compost thermometer.

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