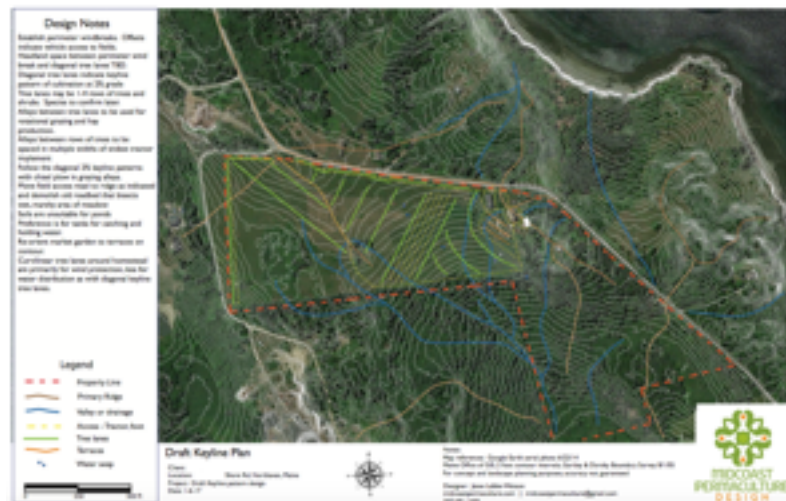




MIDCOAST PERMACULTURE DESIGN

Design Portfolio Overview
Detailed Design Process visual aid



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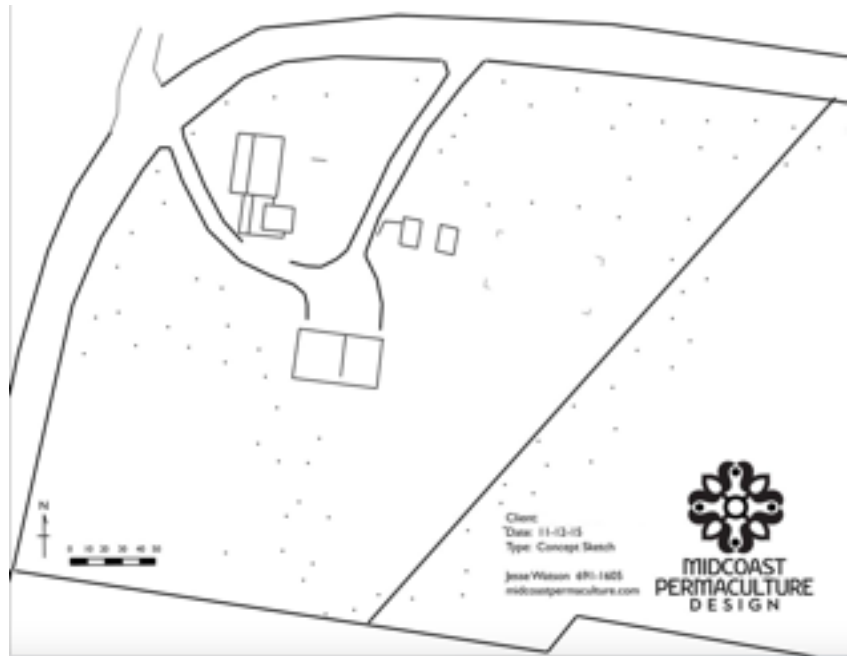


Detailed Design Process Description

Process	Product	Benefit
Intake	Questionnaire: Paper, Email, Online form	Clear goals articulated, design elements considered
Base map	Cursory or detailed - letter format, concept sketch; 24x36, master plan	Base map unit to draft ideas and easily make revisions
Field data collection	Measurements, photos	Accuracy of map product improved
Summary Observations and Analysis	Summary O/A maps - ecological analysis of existing conditions. Letter or Tabloid.	Clear understanding of existing conditions as limiting factors
Concept Sketch	Concept sketch with a summary of findings: Letter, Tabloid and Poster (Arch D)	Provides a working plan for the initial first steps
Draft design. Review/revision	Pattern concept maps bubbled out. Design from patterns to details.	Incremental design in collaboration with client and land base
Polyculture designs	Spreadsheets w/ element dimensions & nursery sources	Clarity of communication & planning
Layout of elements: access, earthworks, trees/shrubs, hardscaping, water resources, etc	Master plan using combination of hand drawn and digital tools	Master planning makes easy mistakes on paper, making installation smoother and cheaper on the ground.
Guild details, label	Detail drawing to show planting/earthworks layout & construction details	Clearly communicate construction details visually
Report details, phasing	Design details in narrative report form, phasing considerations	Clearly communicate construction and management details in narrative form. Establish a workflow to the build out of the entire project.
Final Design Package	Poster (Arch D: 24x36) sized drawing, supplemental drawings with details, narrative report of findings	Concise package laying out the vision of potential for the project (residence, farm or other), forming an “institutional memory”.
Costing	Cost estimates, spreadsheets, reports	Easily budget resources. Use this as a fundraising tool.

Base mapping

Minimal visual noise on base map for sketching out ideas. Usually on letter-sized paper.

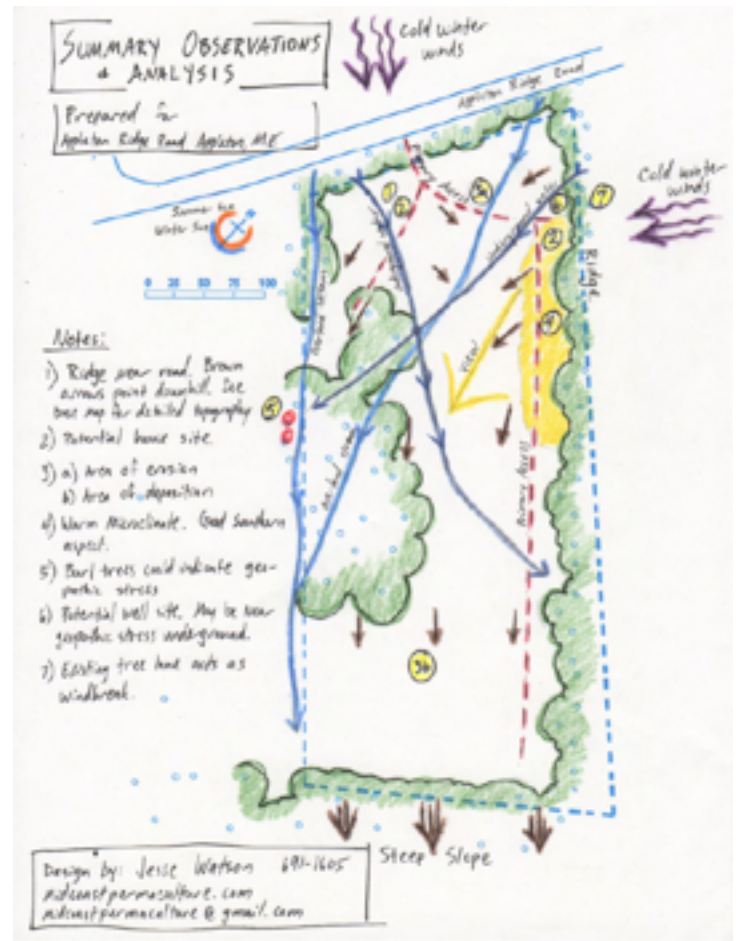


Some base maps include multiple layers like color aerial photos, property boundaries and topographical data. Design work then proceeds as overlay images. This example is 24x36 or Arch D sized paper.

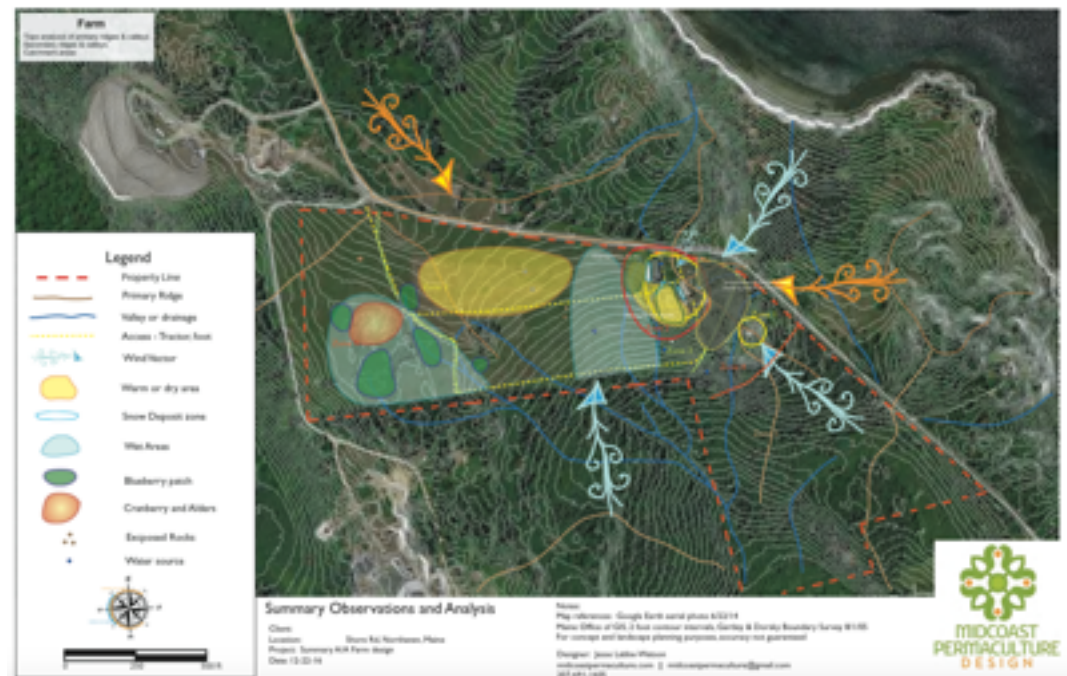


Summary Observations and Assessment (O/A)

The summary O/A map shows the ecological context for a site. Once the site conditions are fully appreciated, the design begins to emerge and suggest itself. Depending on the complexity of the project this may be one map or a series of maps drafted by hand or on the computer.

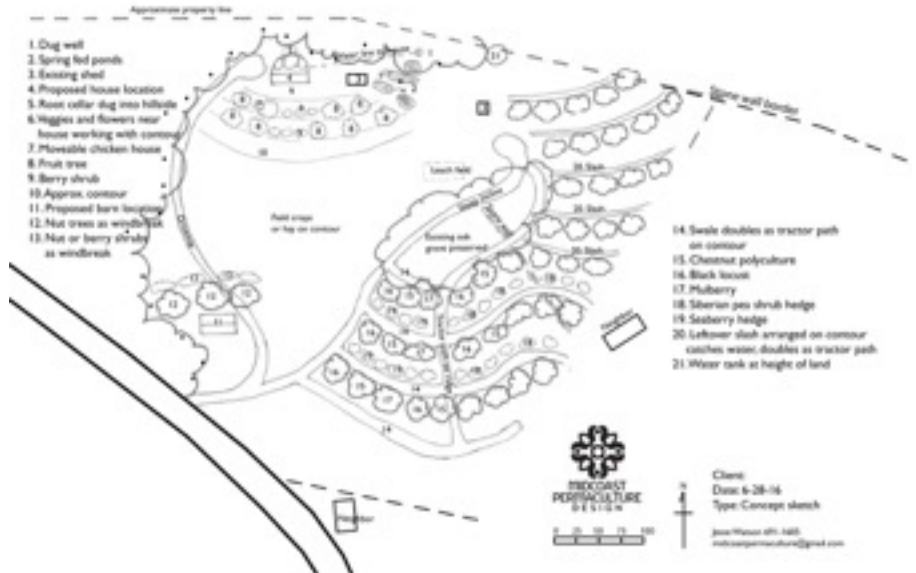


The ecological context for a site includes mapping of hot/cold spots, prevailing wind directions, movement of sun and shade, plant communities and other noteworthy observations.



Concept sketches and draft designs

A concept sketch is a rough first draft of design ideas that seek to address challenges while enhancing the strengths and assets of a site. This step in the design process is strong on patterns and slim on details. The design principle is to design “from patterns to details.”

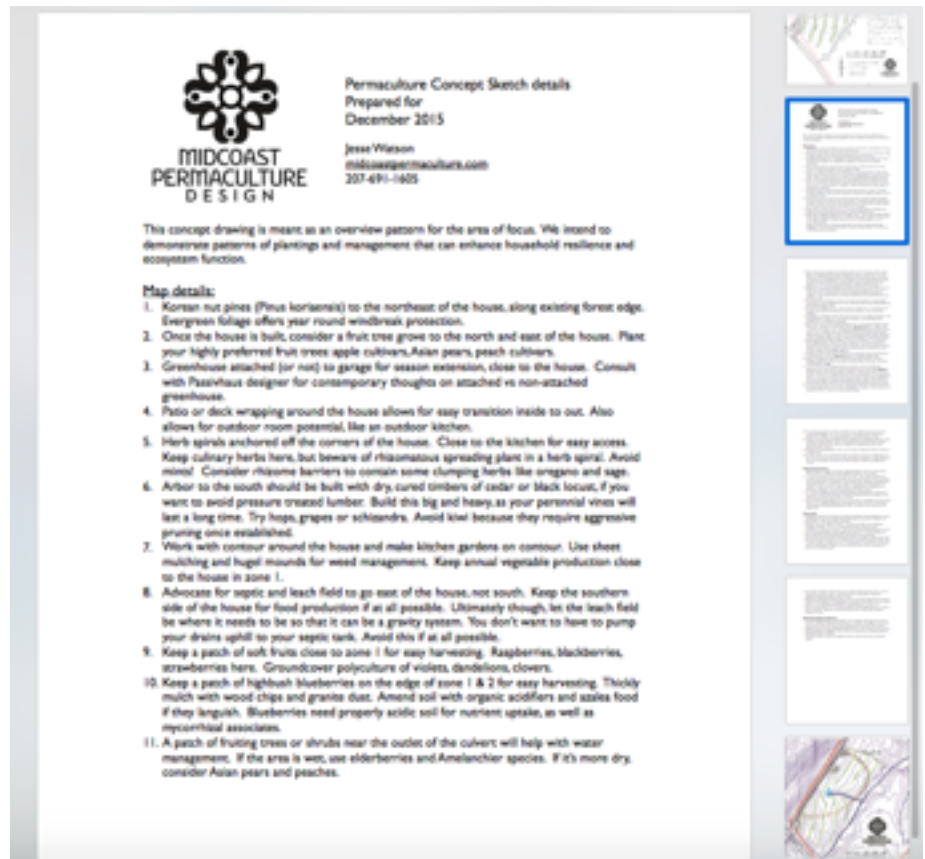


We will often work out design solutions by hand and then make labels on the computer. Some clients are satisfied with a broad pattern first draft sort of product. Some clients prefer another round of detailed and refined ideas. We call the next stage the master planning phase where we move from these patterns into more details.



Concept sketch and draft summary report

As part of the design product we include a written report in addition to any drawing we make.



MIDCOAST PERMACULTURE DESIGN

Permaculture Concept Sketch details
Prepared for
December 2015

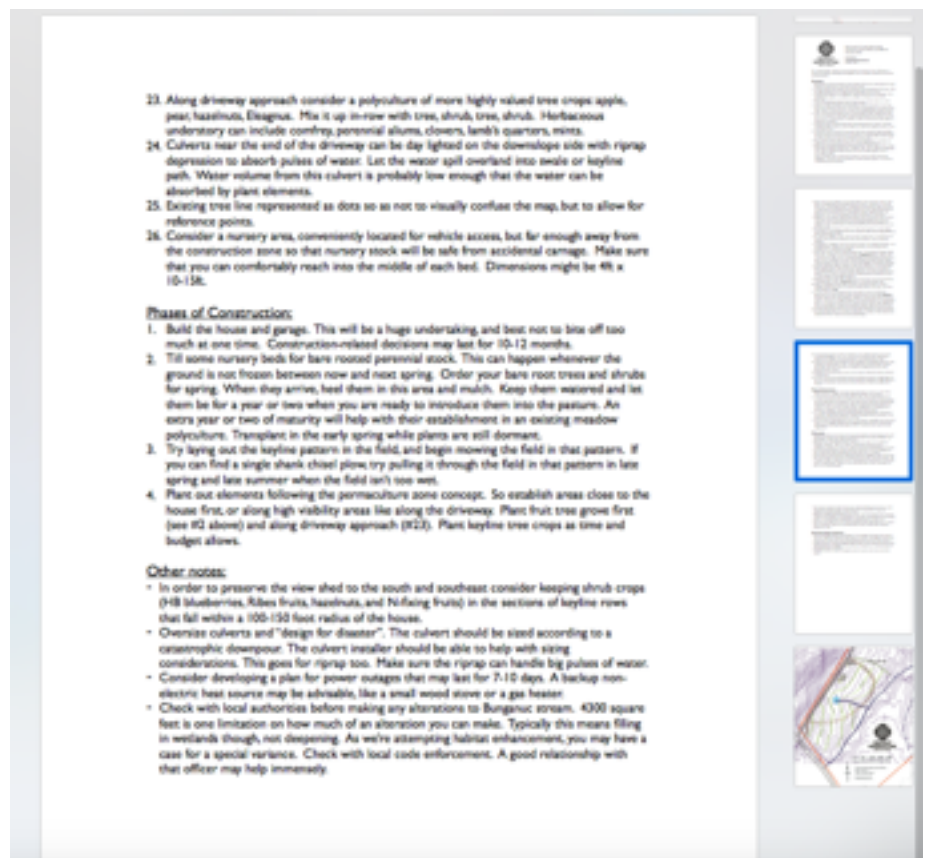
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This concept drawing is meant as an overview pattern for the area of focus. We intend to demonstrate patterns of plantings and management that can enhance household resilience and ecosystem function.

Map details:

1. Korean nut pines (*Pinus koraiensis*) to the northeast of the house, along existing forest edge. Evergreen foliage offers year round windbreak protection.
2. Once the house is built, consider a fruit tree grove to the north and east of the house. Plant your highly preferred fruit trees apple cultivars, Asian pears, peach cultivars.
3. Greenhouse attached (or not) to garage for season extension, close to the house. Consult with Patti/Hans designer for contemporary thoughts on attached vs non-attached greenhouses.
4. Patio or deck wrapping around the house allows for easy transition inside to out. Also allows for outdoor room potential, like an outdoor kitchen.
5. Herb spirals anchored off the corners of the house. Close to the kitchen for easy access. Keep culinary herbs here, but beware of rhizomatous spreading plants in a herb spiral. Avoid mums! Consider rhizome barriers to contain some clumping herbs like oregano and sage.
6. Arbor to the south should be built with dry, cured timbers of cedar or black locust, if you want to avoid pressure treated lumber. Build this big and heavy, as your perennial vines will last a long time. Try hops, grapes or schisandra. Avoid kiwi because they require aggressive pruning once established.
7. Work with contour around the house and make kitchen gardens on contour. Use sheet mulching and hugel mounds for weed management. Keep annual vegetable production close to the house in zone 1.
8. Advocate for septic and leach field to go east of the house, not south. Keep the southern side of the house for food production if at all possible. Ultimately though, let the leach field be where it needs to be so that it can be a gravity system. You don't want to have to pump your drains uphill to your septic tank. Avoid this if at all possible.
9. Keep a patch of soft fruits close to zone 1 for easy harvesting. Raspberries, blackberries, strawberries here. Groundcover polyculture of violets, dandelions, clovers.
10. Keep a patch of highbush blueberries on the edge of zone 1 & 2 for easy harvesting. Thickly mulch with wood chips and granite dust. Amend soil with organic acidifiers and azalea food if they languish. Blueberries need properly acidic soil for nutrient uptake, as well as mycorrhizal associates.
11. A patch of fruiting trees or shrubs near the outlet of the culvert will help with water management. If the area is wet, use elderberries and Amelanchier species. If it's more dry, consider Asian pears and peaches.

For concept sketches prepared after one site visit we will include a report with map details, proposed phases of construction and other cursory notes. This is a summary of any ideas generated during the first consultative site visit.



23. Along driveway approach consider a polyculture of more highly valued tree crops apple, pear, hazelnut, Dogwood. Mix it up in-row with tree, shrub, tree, shrub. Herbaceous understorey can include comfrey, perennial alliums, clovers, lamb's quarters, mint.

24. Culverts near the end of the driveway can be dry lighted on the downslope side with riprap depression to absorb pulses of water. Let the water spill overland into swale or layline path. Water volume from this culvert is probably low enough that the water can be absorbed by plant elements.

25. Delineate tree line represented as dots so as not to visually confuse the map, but to allow for reference points.

26. Consider a nursery area, conveniently located for vehicle access, but far enough away from the construction zone so that nursery stock will be safe from accidental damage. Make sure that you can comfortably reach into the middle of each bed. Dimensions might be 4ft x 10-15ft.

Phases of Construction:

1. Build the house and garage. This will be a huge undertaking, and best not to bite off too much at one time. Construction-related decisions may last for 10-12 months.
2. Till some nursery beds for bare rooted perennial stock. This can happen whenever the ground is not frozen between now and next spring. Order your bare root trees and shrubs for spring. When they arrive, heel them in this area and mulch. Keep them watered and let them be for a year or two when you are ready to introduce them into the pasture. An extra year or two of maturity will help with their establishment in an existing meadow polyculture. Transplant in the early spring while plants are still dormant.
3. Try laying out the layline pattern in this field and begin mowing this field in that pattern. If you can find a single shank chisel plow try pulling it through the field in that pattern in late spring and late summer when the field isn't too wet.
4. Plant out elements following the permaculture zone concept. So establish areas close to the house first, or along high visibility areas like along the driveway. Plant fruit tree grove first (see #2 above) and along driveway approach (#23). Plant layline tree crops as time and budget allows.

Other notes:

- * In order to preserve the view shed to the south and southeast consider keeping shrub crops (Hb blueberries, Ribes fruits, hazelnuts, and Nifing fruits) in the sections of layline rows that fall within a 100-150 foot radius of the house.
- * Oversize culverts and "design for disaster". The culvert should be sized according to a catastrophic downpour. The culvert installer should be able to help with sizing considerations. This goes for riprap too. Make sure the riprap can handle big pulses of water.
- * Consider developing a plan for power outages that may last for 7-10 days. A backup non-electric heat source may be advisable, like a small wood stove or a gas heater.
- * Check with local authorities before making any alterations to Burganic stream. 4000 square feet is one limitation on how much of an alteration you can make. Typically this means filling in wetlands though, not deepening. As we're attempting habitat enhancement, you may have a case for a special variance. Check with local code enforcement. A good relationship with that officer may help immensely.

Master Plan

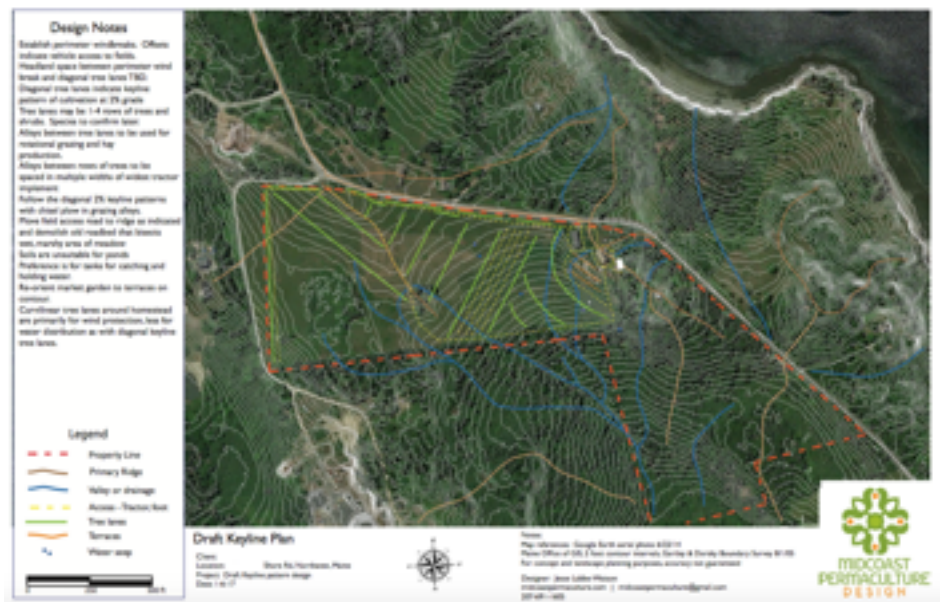
In the master planning phase we move from the patterns into details. We design for multiple considerations involving the client, the site and the business if applicable. We design for plant form and architecture, ecological function, yield, harvest, installation and management.



This is the planning process where we apply whole systems thinking to design for water management, soil stewardship, plant and livestock health and the benefits to future generations.

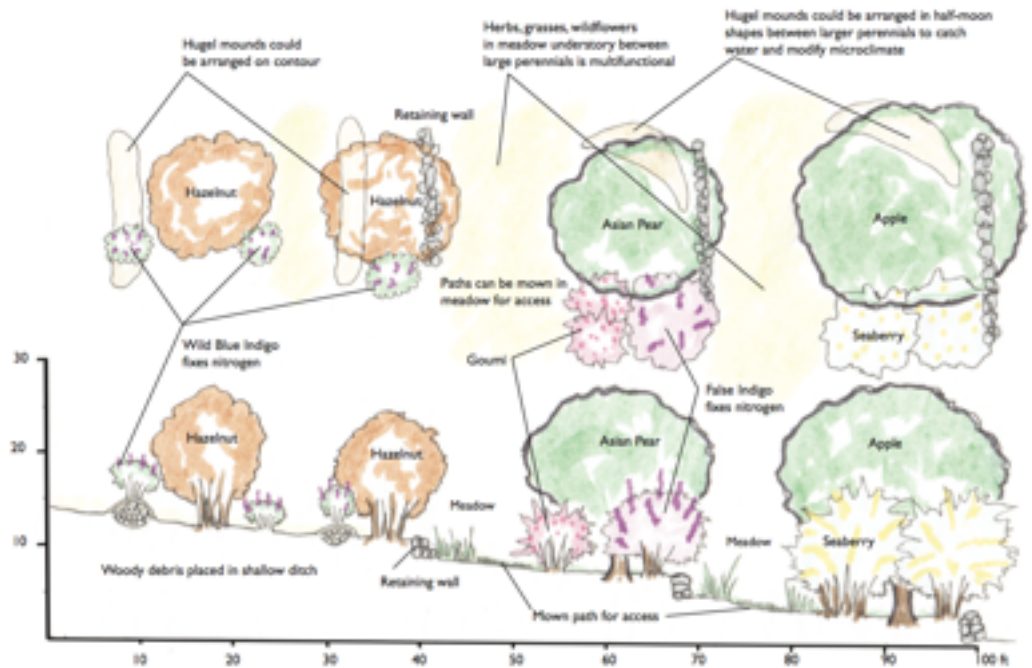


Sometimes we will overlay design ideas over an aerial photo if we think that will enhance understanding. Often we will overlay design ideas over the base map line drawing and colorize using alcohol-based ink and/or colored pencil.

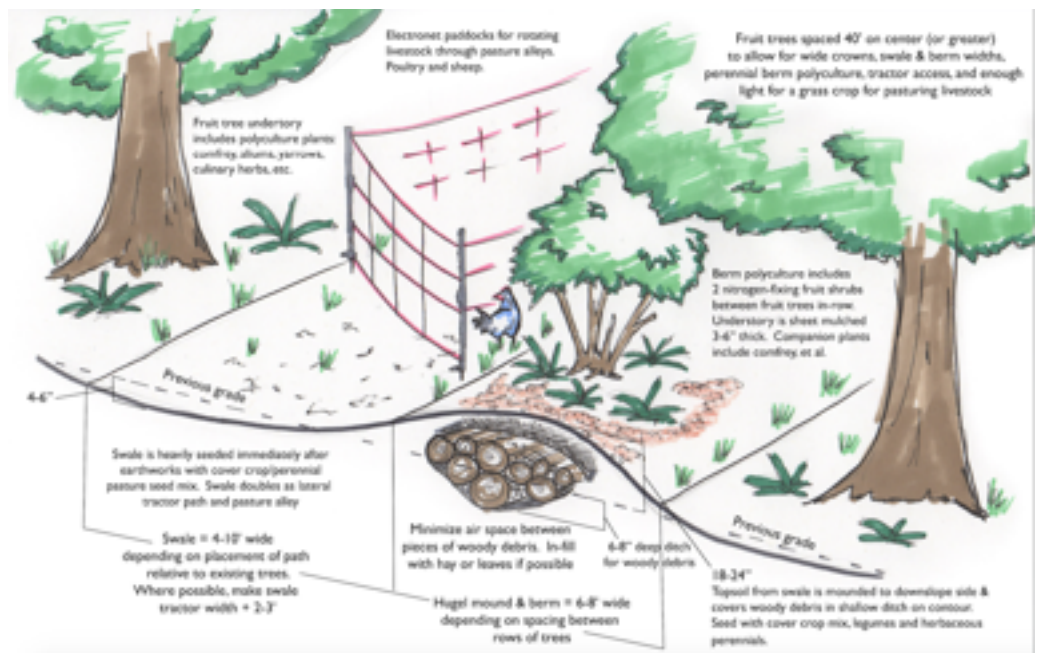


Supporting Detail Drawings as part of a Master Plan

Supplemental detail drawings to show polyculture, spacing and earthworks details.

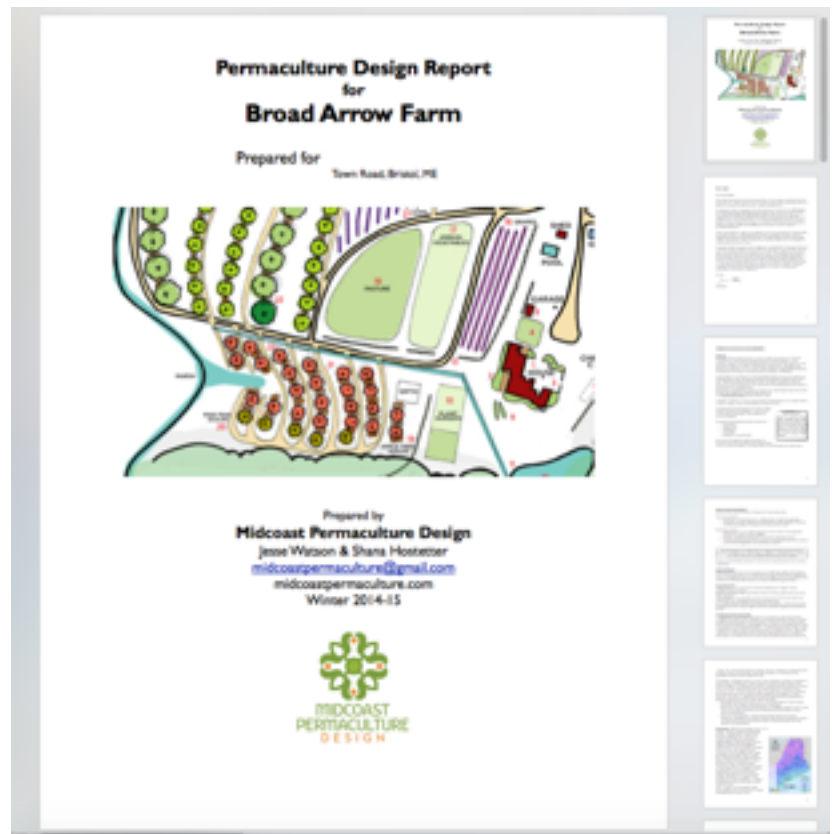


Detail drawings are usually necessary during the master plan to show details in another visual and textual way in order to enhance understanding.



Master Plan Report

The report describes the details of the design in a narrative form that enhances the understanding of the drawings. One without the other gives an incomplete picture.



The report describes details of the map and master plan along with discussions of management and alternative options. Step by step phasing of construction is discussed in the report as well as resources for plants, books, tools, construction trades, soil tests and more.

Suggested Order of Implementation to Establish This Design

Identify you should implement this plan gradually over five to ten years. Broad patterns of prioritizing implementation for Broad Arrow Farm include: Earthworks, road access & circulation, soil building, livestock integration, establishing perennials, plant propagation.

As with any permaculture plan, the both start of the work and investment of time and money happens in the first few years.

Description	Notes	Budget/Financial Notes
Phase One 2014-2017		
Replant apple orchard	Will likely need to move 10-12 trees	Pricing will vary based on the model chosen for installation. Educational events can generate free labor while bringing down costs compared to hired labor.
Build roads in apple orchard	See detail drawing for construction notes (pg. 20). "Permaculture" work party may be an option.	\$10/in ft to dig roads if using hired labor. Not including budget construction.
Build tractor access roads	Along ridges for arterial paths. Along contour for connecting paths.	Dump trucks: \$40/hr Heavy sign (excavator, backhoe): \$150/hr Rental sign: \$40-60/hr (based on Local Farm rates) General road construction: \$25-50/in ft based on existing conditions
Grade soil succession in newly logged areas	Use rotations of logs, chickens, cover crops and soil.	
Swine fencing & shelter systems	Paddock size: 100x400 ft. See Premier Fences for details. Pig chutes can be rudimentary or durable.	Fencing, posts, solar charger = \$2200 per paddock. Shelter prices vary widely depending on design (2012-2013).
Plant native fruit orchard	Build walk structures	\$1-4/yard
Install timber gardens		Seed prices vary depending on species chosen
Energy audit for the old house	Contact Evergreen Home Performance	Contact Evergreen Home Performance
Phase Two 2016-2018		
Continue to develop tractor access roads	As above	As above
Develop composting operation	Monitor chisel system of foodstocks. Avoid lawn clippings contaminated with Roundup	Heavy sign (excavator, backhoe) \$150/hr to load off a pad for compost area
Site & build greenhouse	Begin plant propagation by seed sowing, direct, bench grafts	Pricing will vary based on design & material options
Plant elderberry and hops orchard	Build walk for hops	\$13.18, on Elderberry \$18.18, on Hops \$6.15/in
Plant hazelnuts	Use Burgundy genetics. See Resources section.	\$6-15/in
Continue to low grade timber stands		

The report that accompanies a master plan fills in details that can't always show up in a drawing. Each report is a unique work because the design, installation and management of every system is unique.

vulnerability to wind and we observed a drying kind of wind coming out of the South and West.

Approach, Access
The main access is the gravel driveway on the North side of the house. This gives easy access to the rest of the property. Other vehicle access to the field paddocks is in the Southern most third of the property. There is also vehicle access to the cabin in the Northern third of the property. Windbreak layout will allow good vehicle circulation routes throughout the property with revision.



Design notes and recommended elements:
Please see accompanying zone analysis map for conceptual boundaries around various zones of use.

Zone One: Market Garden details
Garden notes:

- Re-orient market garden beds on contour by shaping terraces in the existing hillside.
- Terraces can be 30 ft wide with an elevation drop of 2-3 ft between them. Slope stabilization is not necessary if the angle of repose is 1:1.
- This is enough space for current market production, and can include flowers and tea herbs.
- Lowermost terrace can include raspberries and highbush blueberries to be included in summer market garden production offerings.
- Hops vines can be trellised beneath the lowermost terrace. Hops spread by rhizome so a rhizome barrier or a mowing regime on either side of the trellis is advisable to prevent spreading. Hops are similar to other perennial crops in that you are committed wherever you plant them, once established.
- Adjust cultivation practices to broadfork and sheet mulching to eliminate tillage and build organic matter in garden beds.
- Prevent bare soil practices by using mulches.



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Cider Hill Farm polycultures

Polycultures can be represented visually on the map or in a detail drawing, and another way to discuss polycultures is in a chart or spreadsheet. This gives us the opportunity to get specific about plant details, size, spacing and sometimes nursery sources and costs.

Cost estimates for plant orders may or may not be included in the scope of work. Often this sort of budgetary consideration is a separate bit of work.

Form	Common Name	Latin Name	Avg Height x Width Values (ft)	Hardiness	Edible Part	Uses/Functions	Nursery source	Cost	Notes	In-row planting density notes	Nursery links
Perimeter Windbreak											
Tree	Korean pine	Pinus koraiensis	80x40'		Nuts		Burnt Ridge Nursery, Layer Nursery				Burnt Ridge Nursery
Tree	Norway spruce	Pinus abies	80x25'	25		Windbreak, Mast	Radco, Kelly Tree Farm	\$4/plug Start/1, or 500 bare-root	15 ft spacing in-row	spacing 0.6K; 50% density	Kelly Tree Farm Layer Nursery
Chestnut Windbreak											
Tree	Neohybrid chestnut		80x50'		Nuts						
Tree	American hawthorn	Crataegus spp	80x50'	25	Leaf	Hyperaccumulator, nesting crop	Belgerrett, Radco, Layer Nursery	5-6/ea, 22/ea	18 ft spacing in-row	spacing 0.50K; 50% density for tree layer	Abundant
Tree	Black locust	Robinia pseudoacacia	75x80	24	Flowers	Fiber nitrogen, fuelwood, fodder, forage	Melwood Nurseries, Layer Nursery	11/ea, 2-3/ea	Coppice for leaf crop		Layer Nursery, Layer
Large shrub	Siberian Pea-shrub	Carpinus arbuscula	5x25'	25	Beans	Fiber nitrogen, nutrient fodder	Layer Nursery	\$20-40 seedlings	10 foot spacing in-row. Theory	50% density	Layer Nursery, Plowville
Vine	Hops	Humulus lupulus	20x20	24	Leaf, Flower	Tea, medicinal, ferment	Radco	86/ea of 5			
Shrub	Beach plum	Prunus maritima	8x8'	25	Fruit		Radco	50/ea	5-foot spacing in-row. Theory	50% density	
Wood shrub	Golf berry	Lycium barbarum	8x8'	25	Berries, Leaf		One Green World	20 ea	5-foot spacing in-row. Theaters and top layers	50% density	One Green World
Shrub Windbreak											
Large shrub	Hornbush	Corylus spp	5x25'	24	Nuts		Belgerrett		10 foot spacing in-row. Farms thickets		
Large shrub	Fiber hedge	Azophya fruticosa	8x25'	25		Fiber nitrogen, insectary	Sheffields used company online	10/ea used plug	10 foot spacing in-row.		Sheffields used company
Wood shrub	Catalan huckleberry	Shepherdia canadensis	8x8'	22	Berry	Fiber nitrogen, wildlife habitat	Sheffields used company online, Assman	1/plug	5-foot spacing in-row.		
Shrub	Black chokeberry	Aronia melanocarpa	6x6'	25	Berry	Wildlife, wildlife habitat	Radco	10 ea	5-foot spacing in-row.		
Fruit tree polycultures											
Tree	Apple/pear	Malus/Pyrus	30x50	24	Fruit		Radco, local shops	15-30			