LONE PINE FARM & STUDIO

BABCOCK FARM
ASSESSMENT
&
CONCEPT DESIGN

Prepared for: Jon Rose, President, Olympic Property Management Group
Prepared by: Ryan Montella, Director, Lone Pine Farm & Studio
November 22, 2016
Proposal number: 1

INTRODUCTION

THE SITE TODAY: Babcock Farm is currently being used as a ranch, and from time to time is home to anywhere between 8 and 12 Long Horn Cattle. The greenhouses are currently being used by Green Valley Nursery, and are primarily used for plant start propagation. The site is in good condition has been well maintained.

ANALYSIS AND ASSESSMENT studies (A&A) are completed prior to any major design project, and especially sites with many complicated layers of information such as a farm. The critical areas that were studied included: The Climate; Landform; Water; Vegetation; and Infrastructure. Considering the important inter-relationship between these critical components, each area was surveyed in detail during multiple field inspections. Further research was done to establish base line data which in-turn,will help us understand the full capability of this site. Regardless of outcomes, analysis and assessment studies are useful at all stages of development whether they be for the entire site, or particular areas.

GOALS ARTICULATIONS help us to understand how to use information gathered in A&A and put that information to work. They are guiding principles that shape our design process. The purpose of this project was to explore potential, and from that, design and process will lead to discoveries as the project goes on. Goals for the first stage of the design process are:

-Establishment of a system which seeks to meet human needs while increasing ecosystem needs
-Create a plan for soil stabilization and erosion prevention which is also productive and efficient
-Produce a planting schedule which is bio-diverse, resilient, and profitable year-round

CONCEPT DESIGN is where we begin to understand potential and put it into context. Included in this plan is a conceptual design plan based on studies and research of the site. Using the goals as a foundation, the Concept Design is a long term plan for the site and can be implemented all at once, or one piece at a time. Included is a schedule for phases of development, and can assist in planning the project.

CONTENTS

CLIMATE & MICRO-CLIMATE

Additional Detail:

-Plant Hardiness Zone; ZONE 7

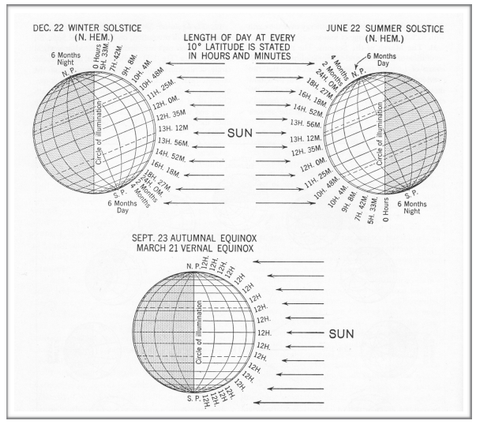
-Location:
N: 47.50.898
W:122.35.859

-Growing degree days: 236

-Average Frost free dates: 236

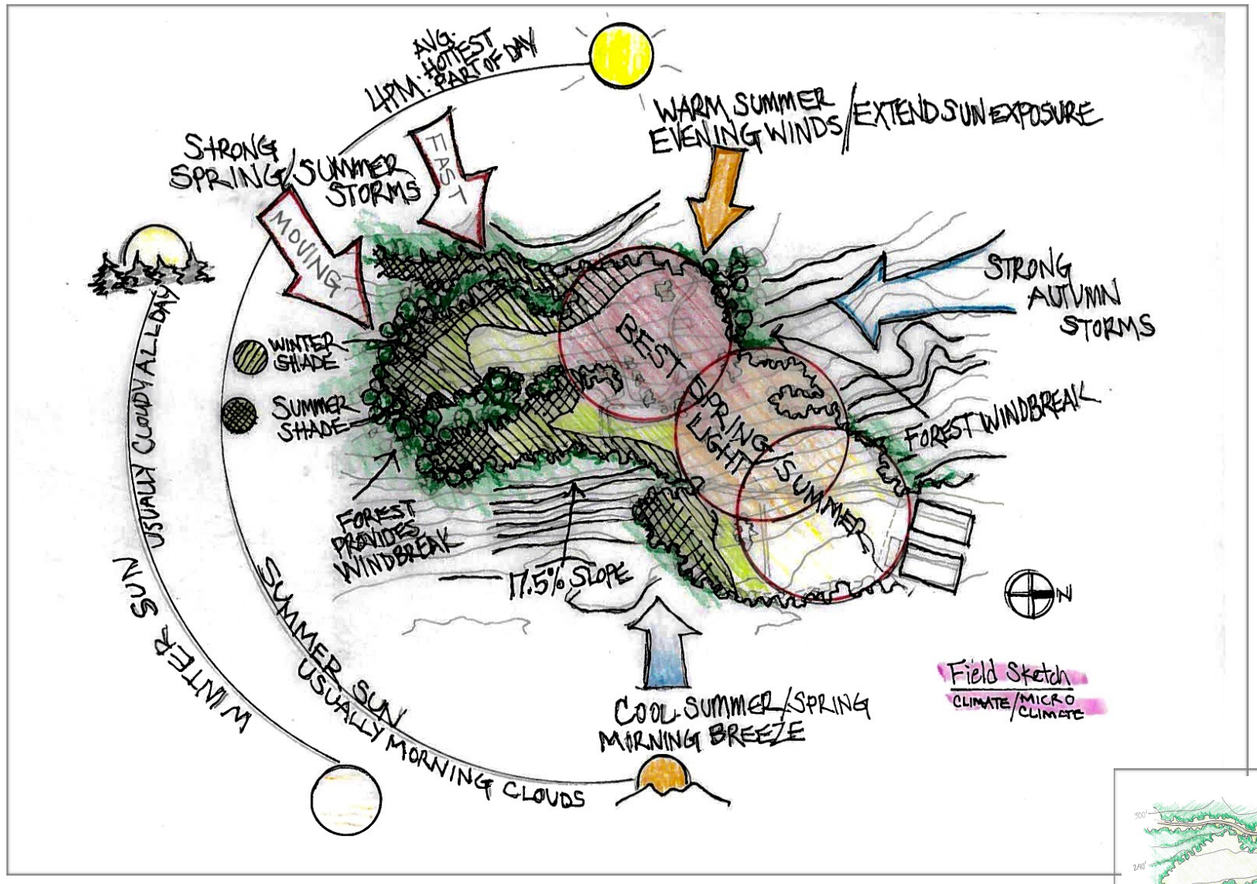
-Extreme Weather potential: Moderate, given proximity to coastline.

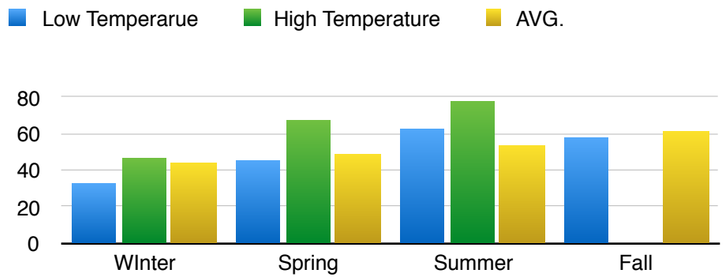
Elements of Climate:



Notes:

While it is important to remember you can, with 100% certainty predict length of day, it is difficult to predict temperature 100% accurately. Plant hardiness zones provided by USDA are a reliable resource for planning crops estimating yields.





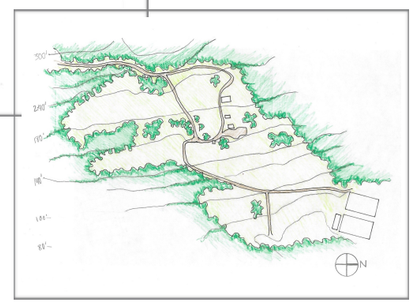
Priorities:

In the interest of 4 season growing; increasing season extension capability in the spring, fall, and winter, greatly increase production.

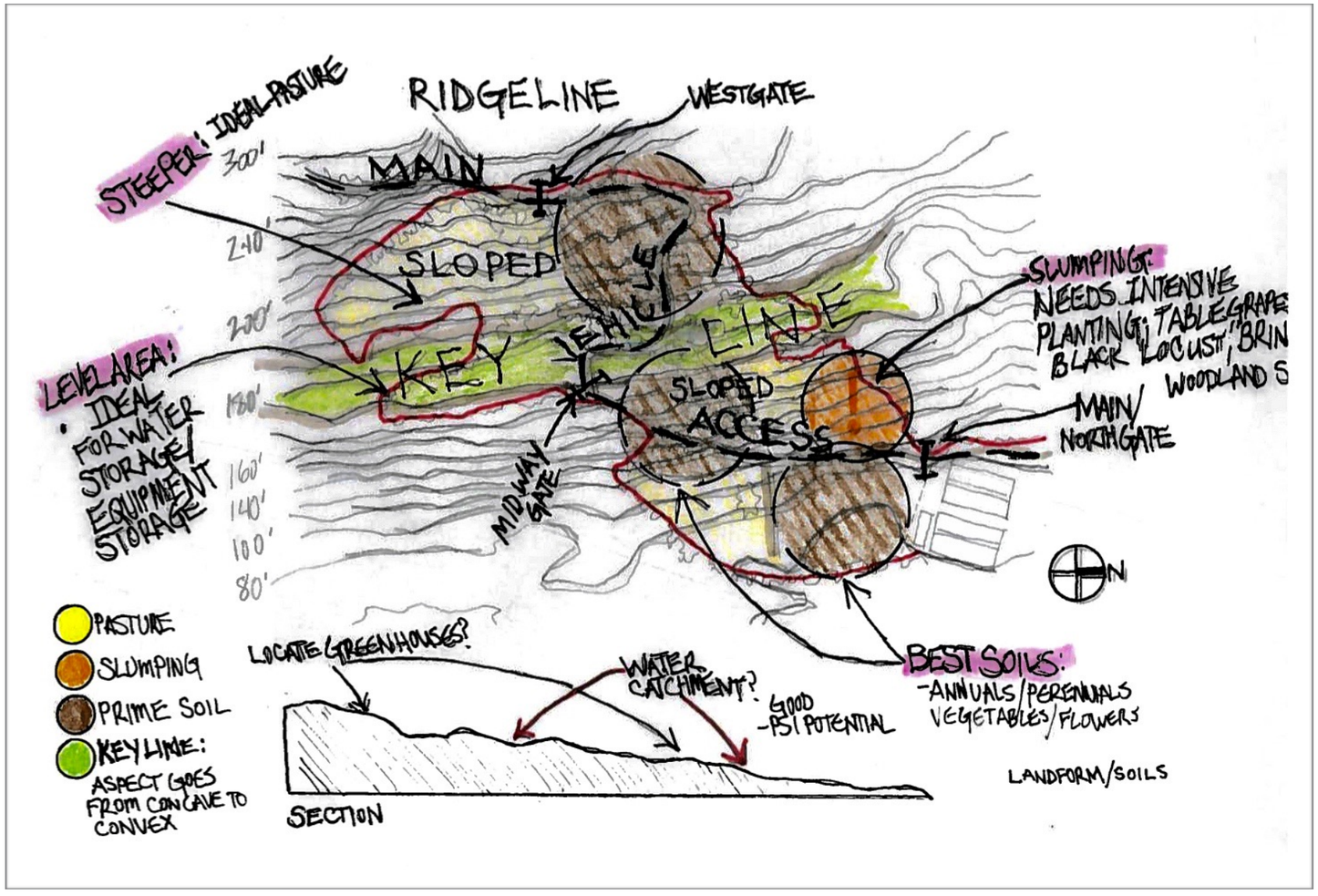
Constraints:

Although a well exits on the site capacity for large scale production could be limited. Installation of a water catchment area in the Key Point area will allow for adequate water storage and movement on site.

REFERENCE:



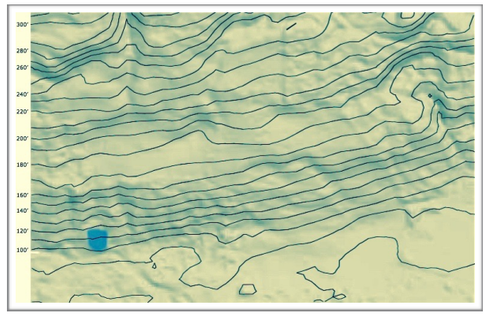
LANDFORMS / SOILS



Priorities: Creating a plan to mitigate erosion in the areas identified as “slumping” should be a addressed as soon as possible. There are many ways the negate this problem including building retaining walls. However taking clues from restoration projects along water ways where erosion happens quickly, planting intensively has slowed and stopped erosion, and choosing aggressive species like black locust can speed recovery of affected areas.

Constraints: Currently with autumn upon us and heavy rain, getting on site to plant can be tedious as soil can quickly erode with continuous rainfall. Availability of rootstock at this time of year may be an issue also, and delays with USDA quarantine may slow process. However, Black locust is the best choice for a project like this due to its long tern benefits as a rot resistant wood, and its ability to be coppiced and rapidly grow, and be used for various projects on site for years. Post can last up to 80 years in the ground.

Topographic / Elevation



Satellite View (Erosion Highlighted)

Area of Erosion/Slumping

Additional Detail:

Slope 17.5% +- 1-2%

Topographic Position: Aspect of the site is to the East

Elevation 80’ - 300’ above sea level. Site is situated just below a ridgeline

Landslide Potential: Low
-Greater potential once cultivation persists

Soil Types/ Hydrologic group:

Alderwood/Group C: very sandy loam
Harstein/Group C: sandy gravelly loam
Kapowsin/Group C: gravelly loam
Norma/Group D: fine sandy loam

Top Soil Fertility: good

pH: 6.5

Percent organic matter: 7%

WATER

Additional Detail:

Existing Irrigation Sources:
Old Well
-Location:Southwest corner
-Quantity: Unknown
-Quality: Unknown
-Dependability: Unknown
-Water Rights: None, Pending

Potential Pollution Sources: Animal manure, machinery, vehicles, Nitrate leeching

Flooding, Ponding Puddling Areas:
Possible Sources/Collection for irrigation, but not present, site drains very well

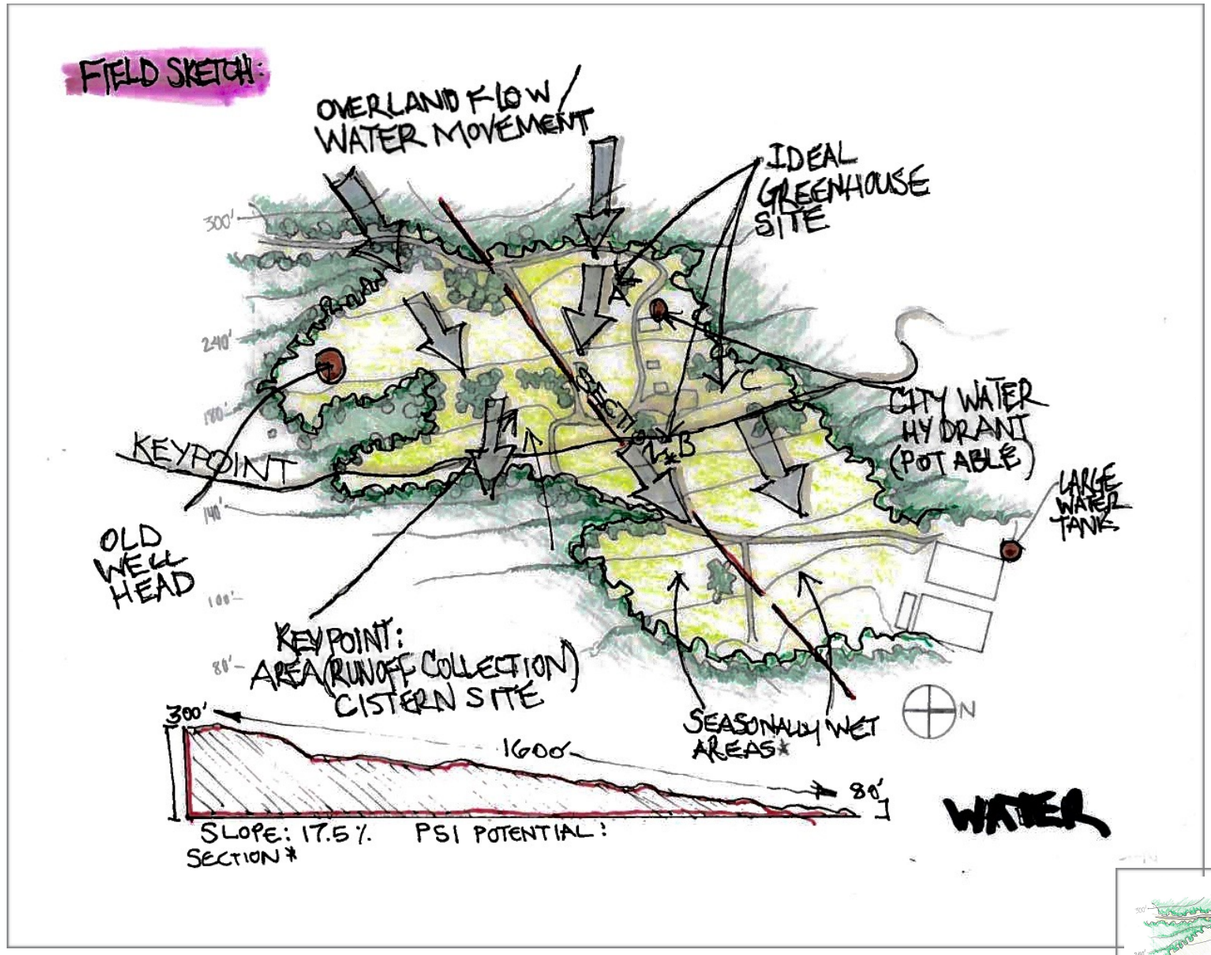
Existing Infrastructure:
-Culverts: Along access roads and in ditches, clear and functioning

-Water Lines: City water line in NW corner

-Sewage Lines: None
-Septic: None

NOTES:

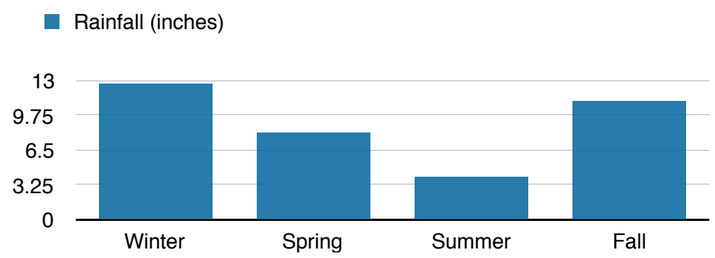
An additional analysis of an existing well should be fully studied and recharge rate needs to be determined. Should the capacity be adequate for crop irrigation, impact on dry season production should be significant. Geological integrity is always a concern with old wells, as risk of collapse is greater due to uncertainty of well condition and maintenance history. Establishing water rights is a lengthy and arduous process, and time would be better used investing n rainwater catchment.



32 year Rainfall Data History:

-**Average Annual Rainfall**: 36.05”

-**Record Single Day**: 5.8”

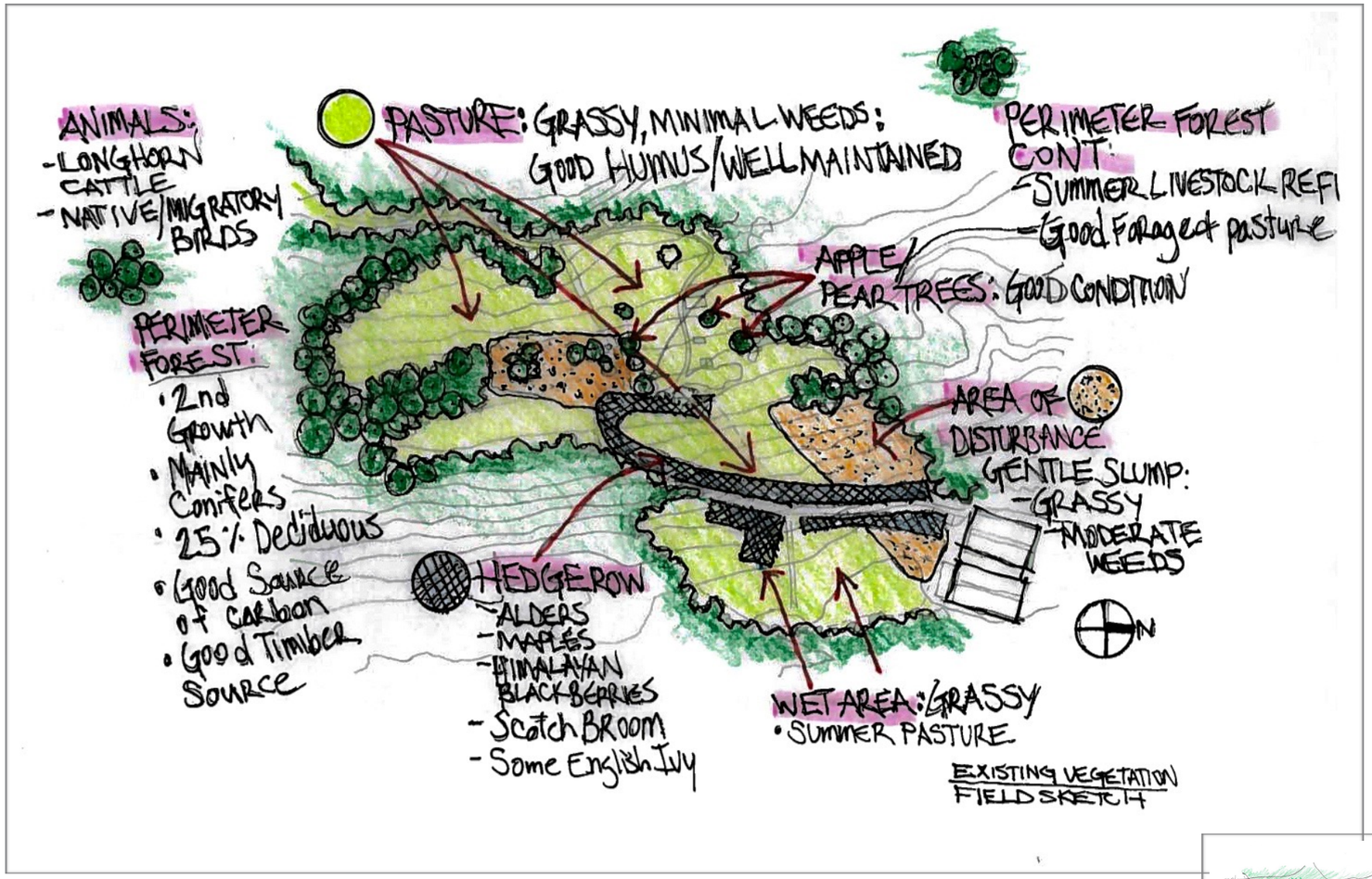


Priorities: Preparing for hot weather growing should start with setting up rainwater catchment on existing structures and establishing baseline water holding capacity for the site. Procurement of rain barrels, cisterns, and or construction of containment areas for rainwater runoff should happen as soon as possible. Containment of the water should be kept towards the key point area of the farm, and growing spaces down slope could be constructed. This would allow gravity fed irrigation, and easy, low cost production.

Constraints: Capacity will always be the issue when growing, so if experimental garden beds are set up upon successful development of a simple irrigation system to test the concept: ensure there is a careful water management system in place such as timers and heavy duty ball valves to mitigate water resource losses.

REFERENCE:

VEGETATION



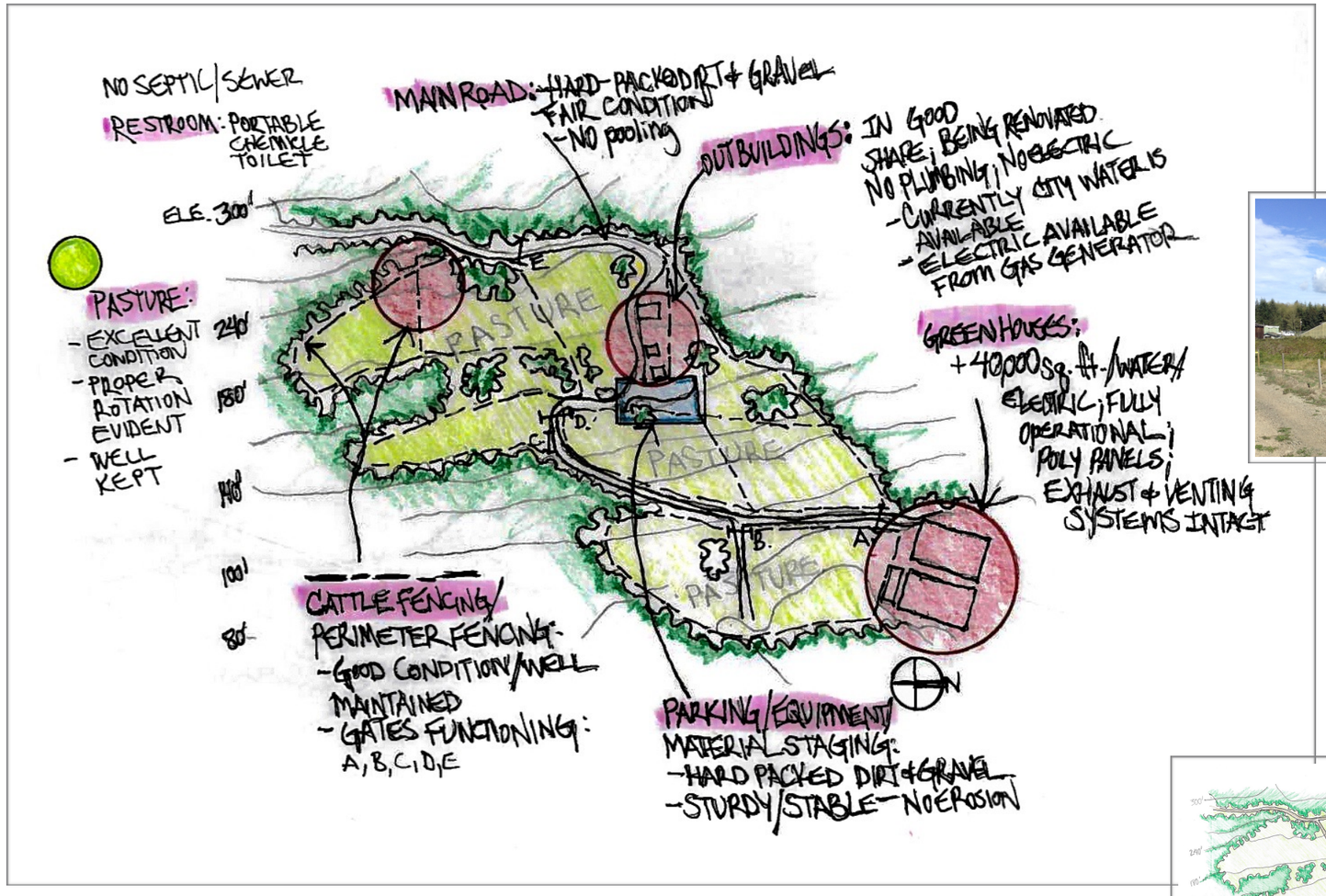
Notes: Grassy areas, depending on their age are typically the most productive soils on the planet. While this is certainly a young site in geological and biological time, proper management of this site has yielded Mollisol Soil - a very productive, humus-rich base which is very beneficial when considering the potential capacity of an organic vegetable farm. While “prairie conditions” exist on the site, it is important to recognize there were few nitrogen fixing plants present, and concentration was low and scattered. Incorporating a 2:1 ration of Grasses to Nitrogen fixers would be ideal.

Priorities: Considering that the site has been maintained very well, assigning areas where cultivation would be ideal would be the next step. Ideally, getting into the areas deemed suitable for cultivation early next spring and cover cropping them would be a great first step. Next, addressing the area actively slumping can be mitigated with an intensive planting of Black Locust, and aggressive natives. This will be discussed later in the next section. Perimeter areas; fence lines; ditches and roadways need to continue to be maintained and although invasive are minimal, eradication should be ongoing.

Constraints: As mentioned above, the slumping are does present a challenge to that part of the parcel, but also presents an opportunity to demonstrate effective mitigatgatlon of erosion with plants normally used in Riparian zones along rivers and creeks. Again, more will be discussed later. Additionally, due to the slope of the land, entire area cannot be cultivated and tilled in because the risk of further erosion is a reality. Planning on using techniques from Agroforestry or “alley cropping”; alternating rows of cultivation with rows of orchards, bushes and ground coverage will adequately eliminated further risk; increase soil retention; increase biodiversity and lessen irrigation demand.

REFERENCE:

INFRASTRUCTURE



Existing Green Houses

Priorities:

While there is access to 40,000 square feet of Greenhouse space, evaluation of available space for the farm use needs to be considered. Installation of temporary “hoop houses” can be utilized in the time being. Adequate rainwater collection infrastructure, I.E. Greenhouses, needs will have to be addressed because that runoff collection will likely support food production and be an integral piece of the irrigation system.

Constraints:

A considerable, but phased investment in capital infrastructure will likely be a strategic way to incrementally increase production capacity. As noted above, Greenhousing will be key for irrigation, and water collection as Department of Environment regulations prohibit rainwater catchment in ponds or cisterns UNLESS it is derived from roof runoff.

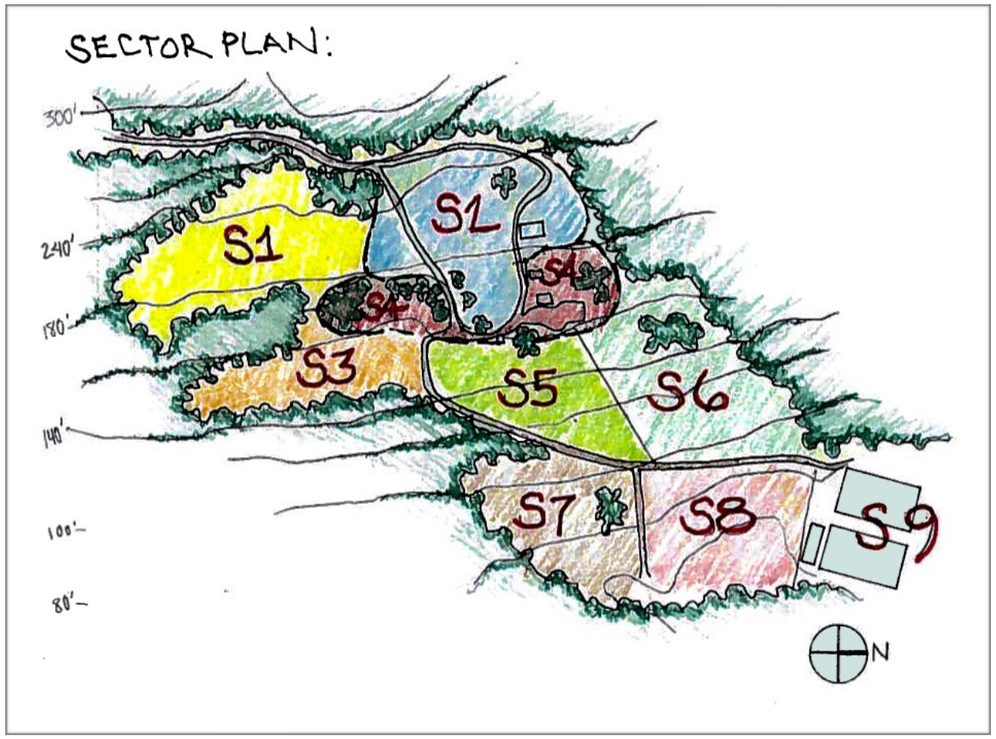
REFERENCE:

NOTES:

Currently, the cattleman on site is fixing up buildings, including repairing floors and roof structures to presumably use for storage. The site for these buildings is located in a useful place and demolition or relocation is not necessary. Additionally, two other buildings not shown on sketch are intact but did not appear to be in use.

Existing Out Buildings

DEISGN SUMMARY/SECTOR PLAN



SECTOR 1:

SILVIPASTURE

This technique blends animals pasturing and orchard maintenance into one. With an established, but young orchard, integration of grazing animals such as goats, sheep, and cattle can provide a mutual beneficial relationship by increasing soil fertility, reducing maintenance and feed costs.

SECTOR 2:

INTERPLANTED ORCHARDS & ANNUALS

This technique will increase productivity per acre by combining annual row crops and perennials. Rows of Stone Fruits and raspberries established between garden beds help hold the hillside together, and because all cultivation is on contour, gravity slowly feeds water and nutrients downhill, virtually eliminating loss.

SECTOR 3:

PASTURE

Availability of adequate pasture is critical when planning for integrating animals into cultivated areas. Either for holding, or for habitat, this area can allow animals to keep to themselves and graze, and will be out the major traffic areas, but close to access routes to allow movement around the farm.

SECTOR 4:

SERVICE AREA

Area for storage of water catchment, equipment, compost, and other material bays. This area is level making for a safe space for operating machinery and already has a well maintained road surface suitable for four season operations.

SECTOR 6:

VITICULTURE & BIO-REMEDIATION

This area will showcase techniques in erosion mitigation by planting grapes, Black Locust, and natives with aggressive roots systems to hold hillside together. They are both valuable and useful crops and showcase conscientious stewardship techniques.

SECTOR 8:

BLUEBERRIES & GRAPES

While in the wettest area, this zone will also receive adequate solar access to rapidly grow blueberries. Planting perennials here mitigates damage that would otherwise be caused by conventional cultivation. Planting of early/mid/and late season varieties will ensure longer and profitable season. Continued Grape propagation as part of landslide mitigation and soil deterioration.

SECTOR 5:

ANNUALS AND PERENNIALS

This area can accommodate a wide variety crops and is well suited for major production given its location and solar access. Green housing will allow for 4 season production. Continuing with the theme of interplanted tree and shrub crops, flowers, and horizontally

SECTOR 7:

SUMMER SALAD & COOL WEATHER/HOT SEASON CROPS

Taking advantage of this micro climate; growing valuable salad greens and brassicas during peak production time without stress from heat in greenhouse and pressure to irrigate constantly saves resources.

SECTOR 9:

PROPAGATION / NURSERY

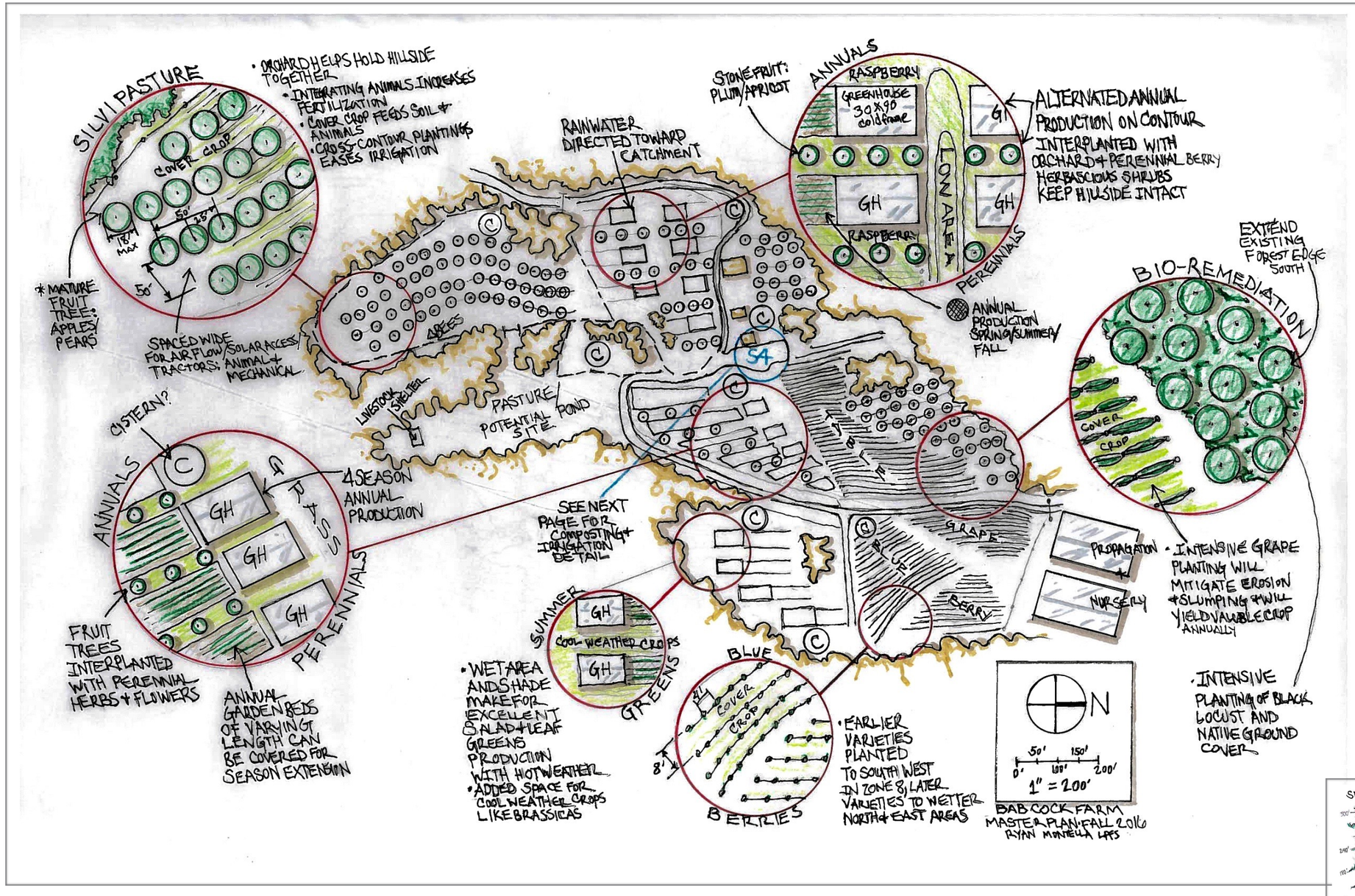
Although currently occupied, this area will serve as a vital hub for future projects including hydroponic growing, aquaponics, and could be a major source or income during the winter months producing valuable head lettuce, salad greens, and kale in containers and in raised beds. These environments provide unlimited potential, and profitability in shoulder season would be

Site Specific Crops:

Annuals:
-Beets
-Bush Beans
-Broccoli
-Cauliflower
-Carrots
-Celery
-Cabbage
-Cucumber
-Cantaloupe
-Chard
-Eggplant
-Fennel
-Garlic
-Heirloom Tomato
-Head Lettuce
-Kale
-Kohlrabi
-Leaf Lettuce
-Leek
-Onion
-Potato
-Peppers
-Radish
-Summer Squash
-Sweet Potato
-Tomato
-Winter Squash
-Water Mellon
-Yams

Perennials/Berries:
-Blueberry
-Strawberry
-Raspberry

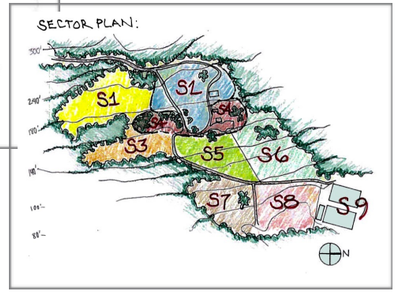
Perrenials/Fruit:
-Apple
-Apricot
-Cherry
-Flg
-Nectarine
-Plum
-Pear
-Peach



FARM PLAN: See previous page for sector summaries

CROSS CONTOUR planting programs ensure the most efficient way for water to be distributed throughout the farm; mitigates nutrient loss by interplanting orchards, perennials, and ground cover; and does not leech excess nitrates into the surrounding environment or groundwater. The advantages of the interplanted orchards and annual garden beds also increase the amount of organic matter onsite and with simple “chop and drop” techniques, humus is built up over time, thus improving the farm’s vitality and lessening the workload by not having to haul around material. Further, integration of this on-contour systems slows overland flow of storm water, and with managed swales, can mitigate erosion from large rain events. Rather than retaining storm water in one place, it is spread among the entire site.

REFERENCE:

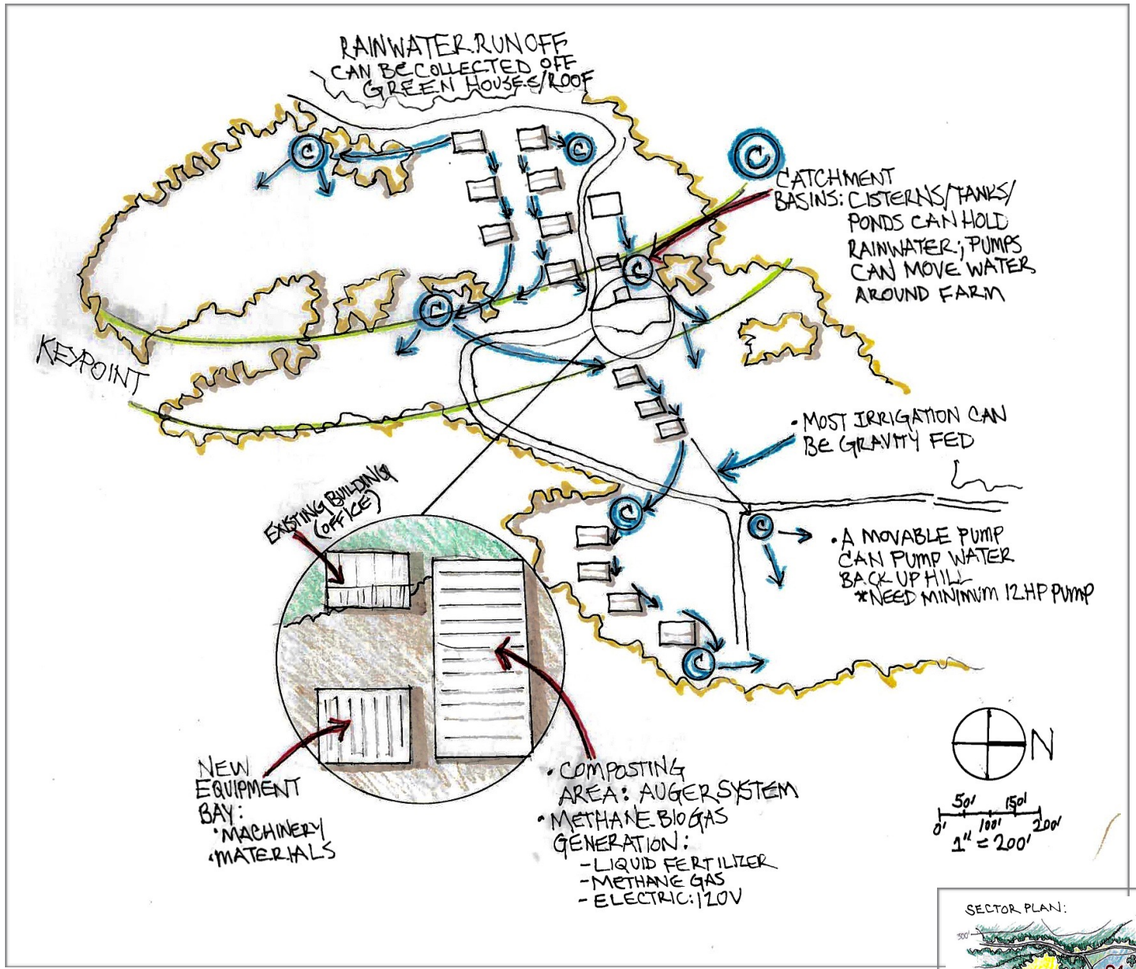


IRRIGATION AND COMPOST

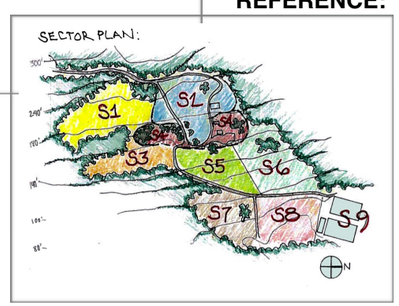
Auger Composting System by Green Mountain Industries. Approximately 30'X70'. Can aerobically produce up to 500 yards of compost a month. Uses 50% less space and can produce compost nearly 3 times faster than machine turning. This unit in use at Hey Day Farm.

Methane Bio-Gas Digester By Impact Bio Energy. Anaerobic counterpart to the Auger system, this unit produces liquid compost, and methane gas. Can also produce 120V electricity. This one is in use at the Harbour Pub and is a joint project with Puget Sound Energy.

Classic Equipment bays should be employed for storage of Machinery, Compost and other assets sensitive to the environment. It is important that the bay have: a concrete floor to inhibit leeching of composts and other materials; and adequate diversion of rainwater from manures per county regulations.



REFERENCE:



Gravity Fed Irrigation Systems, with the assistance of a pump: systems can move water throughout the farm. Taking advantage of the 17.5% slope of the farm, getting good pressure to run drip irrigation and micro emitters will not be an issue. At minimum, moderate drops in elevation will give good pressure at 10psi, and running full blast from a catchment basin can achieve 40-50+ PSI and would require the installation of pressure reducer. With a program in place, catchment basins ranging from 2,500-5000 gallons placed strategically throughout the site can ensure adequate water resources in the dry season, without relying on a well or rain dances.

Phases of Development

Year One:

I. **Develop rain water catchment on existing buildings**:
   A. Retrofit roofs with rain gutters and downspouts
   B. Collect 55 gallon drums; 225 gal. palettes — if recycled, ensure non-toxic materials were stored, PBC free or food grade is desirable
   C. Gather 2 inch line and irrigation fittings

II. Prepare Annual and perennial beds:
   A. Start in Sector 5, for the ease of moving water down hill
   B. With a heavy tractor of at least 40 horsepower, run a sub-soiler through annual beds to break up compacted earth.
   C. Run a heavy disc, then smaller disc over beds.
   D. Fields will be ready for Roto-vator
   E. 50% of fields with cover crop
   F. Plant other 50% with mixed varieties of annals
   G. Add hoop-houses as needed

III. Prepare rows for fruit tree and perennials:
   A. Continue planting in Sector 5
   B. Plant Fruits trees in-line and on contour every 15 - 20 feet
   C. Perennial Herbs, berries, and flowers can be planted in between trees

IV. Sector 6 Intensive Erosion Prevention Preparation:
   A. Collect root stock for Black Locust
   B. Collect root stock for Grape
   C. Pot and store in Greenhouse

Year One Continued:

V. In Late Summer, repeat steps from section II.:
   A. Prepare site for Greenhouse Construction, and Building
   B. Repeat rainwater catchment steps from section I.
   C. Plants Raspberries between annuals bed areas
   D. Continue to plant stone fruit, apple and perennials

VI. Prepare Sector 8 For Cultivation:
   A. Repeat steps from parts II.
   B. Sow winter cover crop of Vetch and Rye

VIII. Prepare planted beds and greenhouses for over wintering:
   A. Cover frost intolerant plants with Row cover, either Remay or Plastic

Year Two:

I. Prepare Sector six for planting of grapes, black locust, and natives:
   A. Establish grape rows on contour every 7 feet from east to west, space grapes vines every 4 feet in rows. Pound posts in for support every four plants
   B. Plant black locust root stock on contour to the north, and stagger planting every 12 feet, space rows 12 feet apart
   C. Plant natives at a high density throughout tree stand
   D. Between rows, prepare beds as noted above and sow perennial clover and mustards as row cover

Year Two Continued:

II. Establish Blueberry Patch:
   A. Layout rows on contour at least every 8 feet.
   B. Soil Area, remove as much sod as possible
   C. Plant blueberries every 3 to 4 feet
   D. Between rows, cultivate beds for perennial cover crop as explained above

III. Establish orchard for Silvipasture area in Sector 4:
   A. Layout tree rows on contour
   B. Tree rows should be spaced a minimum of 15 feet apart
   C. Sub soil area, and disc as noted before. Skip rotation step
   D. Plant tress 15-20 feet apart
   E. Cultivate area in-between tree rows: sub soil, disc, roto-vate and seed ares will alfalfas, clovers, rye, and other beneficial animal fodder
   F. Continue to develop rain catchment and irrigation infrastructure

IV. Build Green Houses For Section 8:
   A. Follow all steps as noted above for annual garden cultivation
   B. Ensure adequate water availability for summer production
   C. Construct Greenhouses

V. Continue to develop areas in all sectors containing any annual or perennial production

VI. Continue to develop Green Housing, Rainwater Catchment, season extension capability

Year Three:

I. **Develop site for Onsite Composting Infrastructure:**
   A. Contact Aveterra Industries for Auger Composting equipment from Green Mountain Energies
   B. Build bays for material and equipment storage
   C. Obtain Methane Bio-Gas Digester from Impact Bio Energy

II. Continue to Improve all areas of site: planting maintenance and infrastructure, add Photovoltaic units

III. Begin to Integrate technologies to extend seasons:
   A. Use methane from Bio-gas digester to heat green houses in winter
   B. Solar equipment to run fans and pumps in summer

IV. Begin to integrate animals in areas to maintain cover crop and fertilize all areas: ducks, chickens, geese, dwarf goats, sheep etc.

Outcomes:

While the hobby farmer could develop this plan in the span of a decade; real return on investment will come by working with an experienced professional through all stages of this project and development phases. Following the design guidelines will certainly yield large amounts of produce, but in order to get there takes expert management throughout the entire lifespan of the farm — especially in the early years. Additionally, if managed properly, the embodied energy to produce crops should steadily drop year after year, and return on investments should increase over time steadily.