A Permaculture Design for
Bayside Park Farm
930 Old Arcata Road
Arcata, California

Prepared as an exercise for Geoff Lawton's 2015 Online PDC

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Bayside Park Farm is a unique municipality-owned and operated farm primarily focused on intensive annual vegetable production, with some perennials and animals in Arcata, CA. The main functions are community supported agriculture (CSA), market sales and farm stand sales, in addition to community education and outreach. The farm is run by a staff of 2-3 city employees, 5-10 interns and numerous volunteers. The farm is a hub of the community and is constantly seeking to improve its productivity and function.

Arcata's climate is cool and constant. Koppen climate designation Csb, USDA zone 9b. The temperature is moderated by the Pacific Ocean and generally stays between 40 and 60 degrees F. Precipitation is around 40-45 inches per year and the area is somewhat insulated from the drought currently gripping the rest of the state.

Table 1. Average monthly temperatures and precipitation for Arcata, CA

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Average high °F (°C)	53 (12)	54 (12)	54 (12)	55 (13)	57 (14)	60 (16)	60 (16)	61 (16)	62 (17)	60 (16)	57 (14)	55 (13)	57.3 (14.3)
Average low °F (°C)	42 (6)	42 (6)	42 (6)	44 (7)	48 (9)	51 (11)	52 (11)	52 (11)	51 (11)	48 (9)	45 (7)	43 (6)	46.7 (8.3)
Average precipitation inches (mm)	8.6 (218)	6.3 (160)	5.3 (135)	2.5 (64)	2.3 (58)	0.9 (23)	0.1 (3)	0.2 (5)	0.8 (20)	3.5 (89)	4.9 (124)	6.7 (170)	42.1 (1,069)

Source: Weatherbase

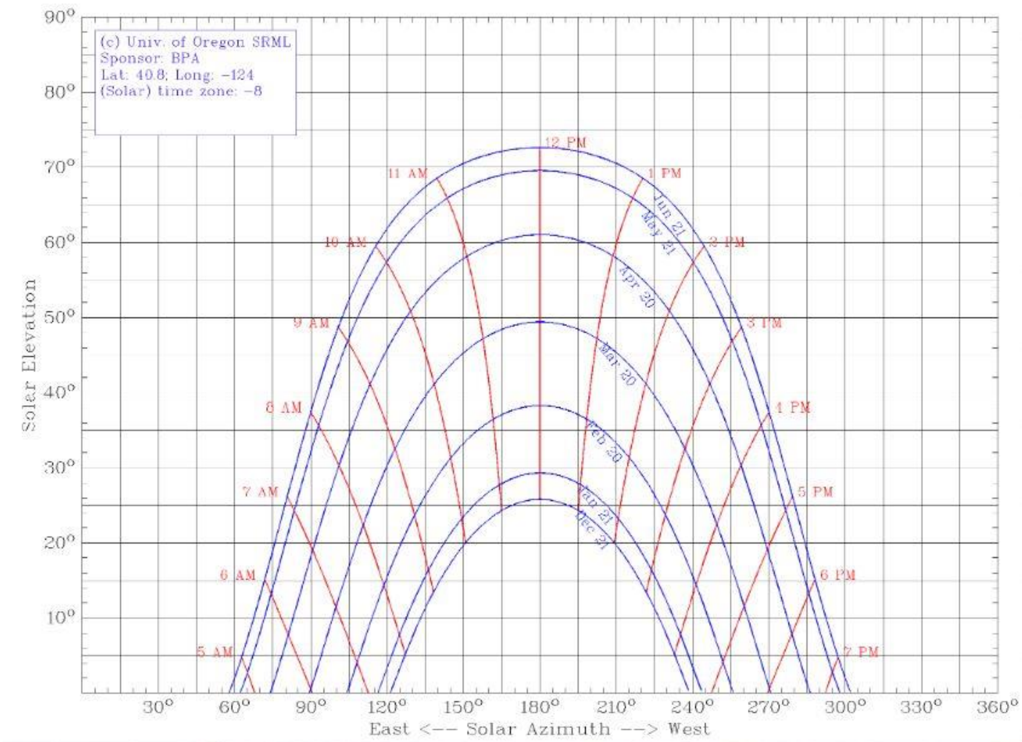
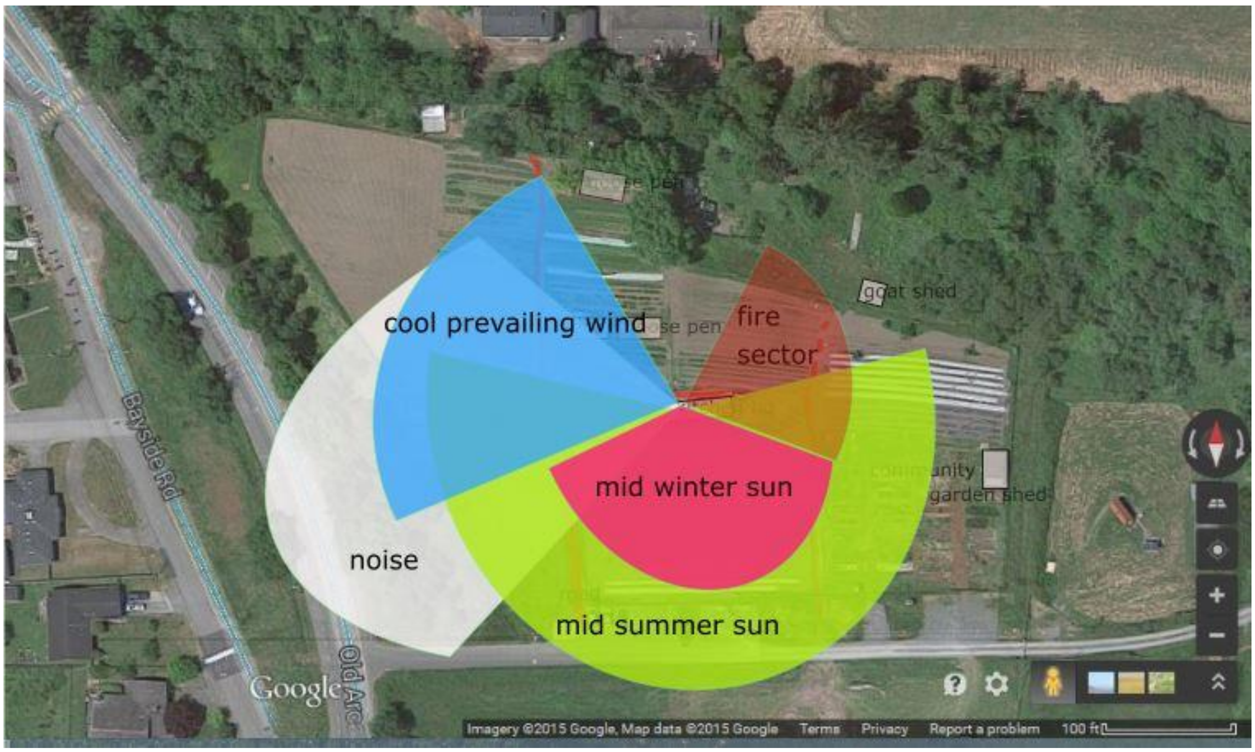


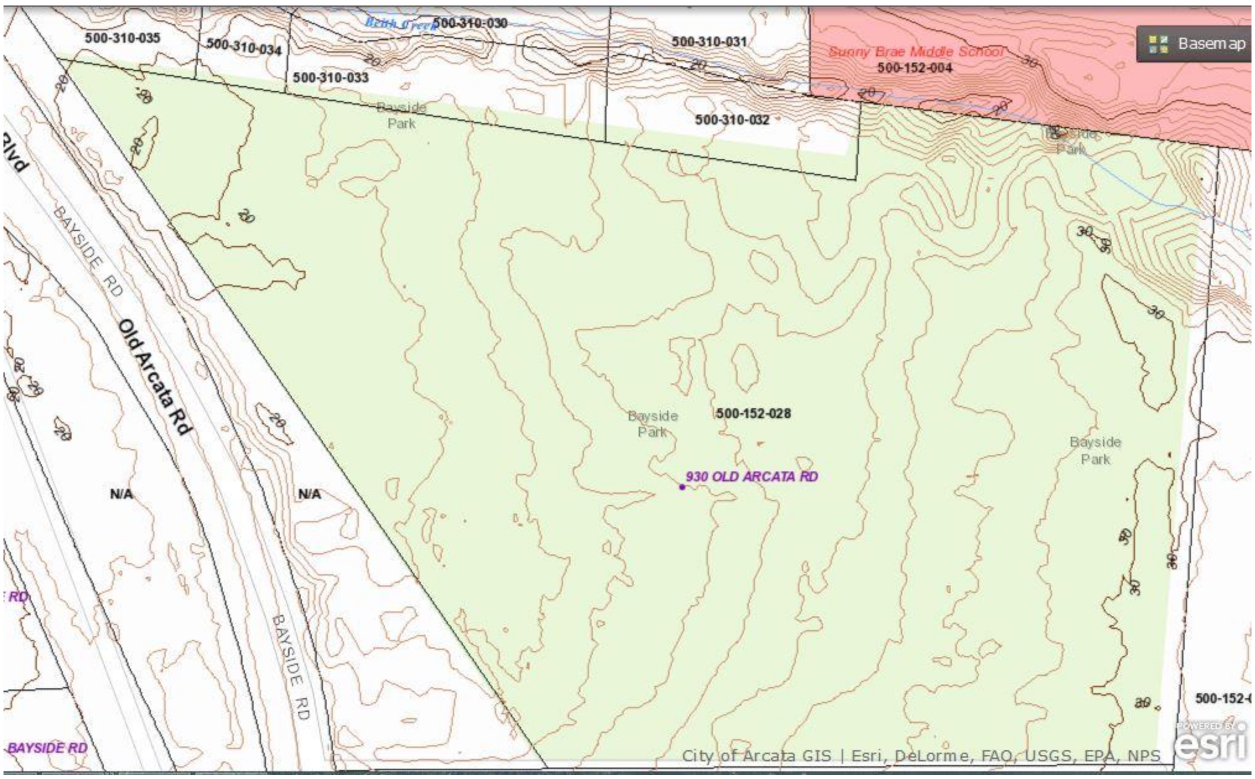
Figure 1. Sun sector for Arcata throughout the year. The maximum mid-summer angle is 72.5° and the minimum mid-winter angle is 26°.

Bayside Park Farm has operated without the use of chemical pesticides or fertilizers and is for all intents and purposes all-but-certified, customer-approved, organic. Diversity of productive species on the farm is steadily increasing as well as diversity of farming techniques. Many techniques and ideas covered in permaculture are already installed such as a solar hot water heating system, greywater reuse, roof water catchment, and an herb spiral, to name a few. Soil health is valued and nurtured. However, the farm has yet to implement a mainframe water harvesting design which could very well address some issues such as water logging and runoff, sub-optimal infiltration and retention of water. Other issues to be addressed include low soil pH, weeds, fertility maintenance (input requirements), pests and diseases (cabbage worm, cucumber beetles, powdery mildew, allium white rot)

Screenshot showing existing infrastructure over-laid with topographic map.

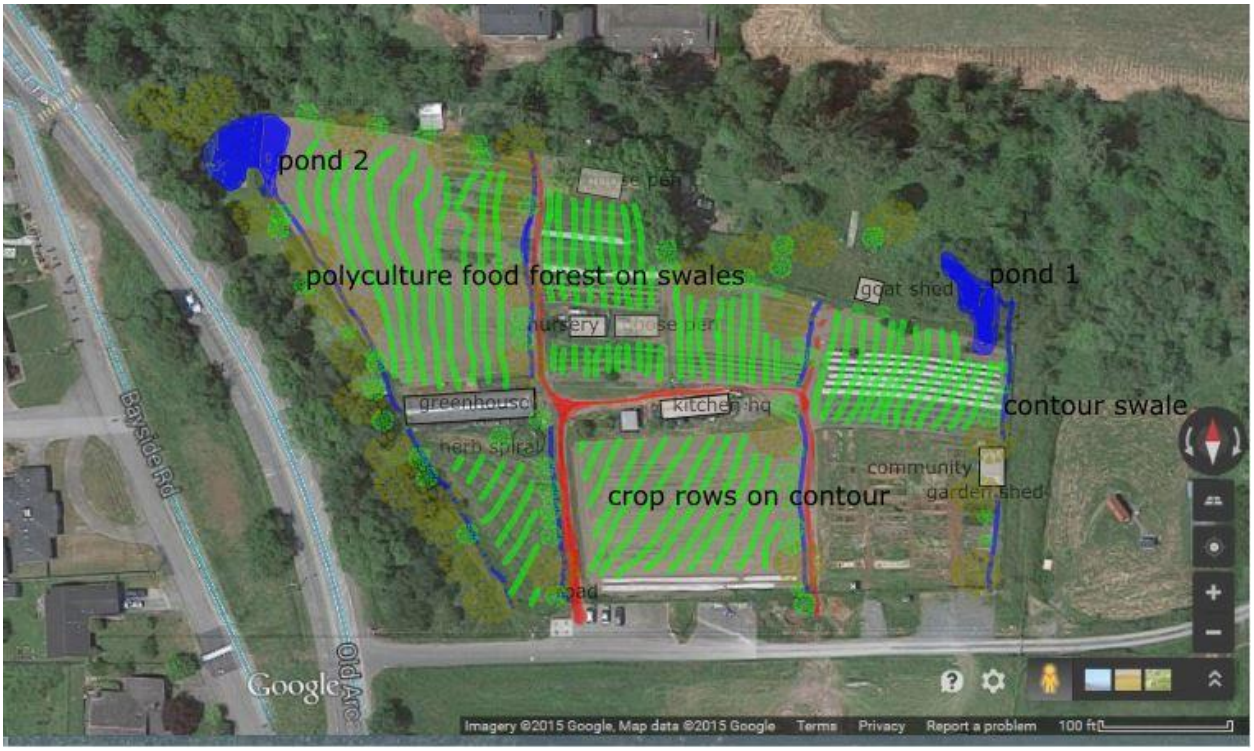


The sectors influencing Bayside Park Farm include the sun, a cool north-westerly prevailing wind, some noise from the road and highway in the distance, and a small fire hazard from the northeast.



A 1 ft. LiDAR contour map from the City of Arcata GIS map shows the relatively flat nature of the land, with only 10 ft. elevation drop over almost 700 ft. However the contour indicated by the map is generally confirmed by observation of water flowing from east to west.

Ideas to implement:



Mainframe water harvesting design: ponds and swales. One pond at the highest elevation, which is covered in willow trees currently, will provide for more diverse habitat in what is currently treated as zone 5, but is not particularly rich habitat. It is close to Beith Creek, which is a constantly flowing stream. The position will allow for gravity irrigation of the rest of the farm, if need be. The eastern boundary swale is very close to following contour (according to the map, to be verified on the ground) and is the highest, longest option for initial water catchment. The intermediate swale positioning is not precisely on contour, however the designer assumes that the relative flat nature of the land will allow for the swale to essentially create its own contour, without excessive earthworks, holding and soaking water for the downslope fields. The western boundary swale would also cross contour lines, especially on the southern end. Creative swale shaping in a wave pattern could increase edge and further slow surface water on this boundary. The northwest corner, the lowest area of the farm, seems like the best position for the second pond, inside the fence, providing habitat for farm ducks and geese, as well as other local birds. Both ponds could support aquaculture, habitat for aquatic plant crop species, and in the long run, harvested for the rich soil they will generate. Duck and goose pens will be relocated closer to either pond.

Swales would be planted with climate verified fruit, berries, nuts, nitrogen fixing coppice species, pioneer species, and perhaps even long-term timber species as well as understory herbs, flowers and groundcovers. The swale mounds/food forest, once the trees are established, will also function as wind breaks further increasing the diversity of edge and microclimates on the farm.

Main cropping beds can be minimally tilled and mulched heavily from mowing wide, intermediate living mulch rows as well as with cuttings from trees. Main crop beds should be situated roughly on contour to function as mini-swales, further slowing and soaking water. Hugelmounds can be established as material becomes available creating microclimates and long term water security.

Addressing issues such as soil pH and pests and diseases is less direct and more incidental, trusting an increasingly diversified and minimally disturbed food ecosystem to balance itself with minimal input.

While this design includes somewhat extensive permanent earthworks, it can still be carried out in small, iterative steps as saplings and seed as well as labor and equipment become available. The design should evolve as implementation proceeds.