COPPICE AGROFORESTRY
Resprout Silviculture for the 21st Century
Mark Krawczyk • 37 Kelton Dr., New Haven, VT 05472 • 802-999-2768 • keylinevermont@gmail.com
Dave Jacke • 33 E. Taylor Hill Rd., Montague, MA 01351 • 603-831-1298 • davej@edibleforestgardens.com

Coppice Design Case Study

No Name Farm

Northeastern USA
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Note: This farm's owners and operators prefer to remain anonymous. Some citations have been obfuscated to facilitate anonymity while still attempting to lead readers to useful data sources.

DESIGN GOALS:

- The farm provides enough income to pay land taxes and provide a basic livelihood—or a portion thereof—for owners and farmer(s), allowing the land to stay in the family while shutting down the existing auto salvage business and allowing an active, healthy, and productive retirement for the elders.
  - Taxes in the range of $24,000 per year.
- The farm provides diverse, healthy products for customers and healthy homestead products and activities for the farmers and aging owners.
  - All food and medicine produced is clean, organic, high quality, healthy.
  - Medicines > annual vegetables in terms of crops.
- Farm production methods and crops heal the land, help turn around the damage done by the farmer's ancestors.
  - Soil health and quality becomes and remains high.
  - Toxins from auto salvage are decomposed/attenuated/neutralized/ immobilized.
  - Runoff leaves the site clean, infiltrated water is also clean.
  - Biological diversity of the land becomes and remains high and functionally interconnected.
  - Farm production helps cause and pay for these results to occur and sustain.
- The farm is a sanctuary and refuge for the farmer's family.

• Key potential coppice products:
  - Greenhouse crops: greenhouse hoop materials/soil bedding organic matter.
  - Raised bed crops: raised bed construction materials, soil bedding organic matter.
  - Mushroom substrates: chips, branches, and logs.
  - Medicinal crops: ginkgo leaves, willow bark, etc., woody and herbaceous
  - Food crops: linden leaves, etc.
  - Biochar materials for soil improvement.
  - Runoff purification plants.
  - Woody ornamental cut flowers.
  - Basketry and other craft materials.
  - Compost additives (biochar, biomass/high carbon OM).
  - Soil improving chop and drop crops.
  - Windbreaks, living fences
  - Animal fodders: for rabbits, chickens?
  - Fuel wood for rocket stove heaters for homestead and greenhouse use.
  - Jean Pain style heat system.
  - Nursery?

TRAINING/BACKGROUND OF FARM MANAGER(S)

Knowledge and skill of horticultural techniques, compost making, woody crop establishment, tree felling, greenhouse management, plant propagation, an awareness of the tolerances/preferences of the floral industry and market, specialized craft skills as needed, and skill with product marketing/outreach

SITE ANALYSIS AND ASSESSMENT

SITE HISTORY

• Historical USGS quad maps suggest that the site was occupied by forest within the last 100-140 years, and that was most likely the case predating European colonization and development. The farm site has been home to a family-owned auto salvage yard for at least the past 3 decades. While disturbed patches of forest ecosystems surround the core of the property, they were likely last cleared within the past 30-40 years. The majority of the property has been subjected to severe disturbance during the entirety of the existence of the salvage business.

CLIMATE

Average annual precipitation: 52 inches/year; *average* monthly precipitation is at least 4 inches per month throughout the growing season except it drops to a low of 3.66 inches average in July.[1]

→ Irrigation probably not necessary in average years, but increasing water storage in the soils will be of benefit for droughty years.

→ Planning for the likelihood of increased variation in precipitation conditions is necessary given climate chaos. Stronger and more intense storms, as well as longer and deeper droughts are both likely. Design for increased retention for drought AND increased drainage in wet periods. A nice trick!

→ Select drought tolerant species especially for unirrigated areas to help resilience amidst climate chaos.

→ Design for increased runoff retention/purification/infiltration on this site.

USDA plant hardiness zone: 6b (-5° to 0°F)[2]

Arbor Day plant hardiness zone: 7 (0°F to 10°F)[3]

→ Site is probably not yet in a solid, consistent zone 7. Design for a general warming trend in future, but with punctuated cold events.

Average Annual Wind Speed at 10 m high: 5.1-5.6 m/sec or around 12 mph. This equals between 150 and 200 Watts/sq. meter.[4]

Prevailing Winds: Nearby data source 1: West-northwest and northeast. Nearby data source 2: Westerly, generally, from southwest to northwest.[5]

→ Given the site's location on the regional high ground, wind speeds are fairly high. Prevailing westerlies will hit this site hard, as will northeasterly storm winds, though the site offers slightly more protection from that side. Provide windbreak to westerlies, maintain windbreak for northeasterlies. Wind-sensitive crops should be carefully sited, especially fruits: not at hillcrests, especially west-facing.

→ The southwestern hillside vegetation is a key aspect of the windbreak on this site and the area needs to be dealt with carefully keeping winds in mind.

LANDFORM

Ecoregion: This site sits on the southeastern edge of a lowland overlooking an even lower region to the south. Here and to the north and west, Pennsylvanian age sedimentary rock (sandstone, graywacke, shale, conglomerate) with an extensive covering of glacial till and outwash plain deposits form gently rolling irregular plains with most elevations under 200 feet. Parent material is mostly coarse-loamy and sandy, well drained and mesic. To the south the relief is even lower, and the glacial deposits even thicker (200-400 feet thick), hence the underlying bedrock plays less role in the character of the region. Soils there are mostly well drained to excessively drained, more acid, and have unique vegetation.[6]

Elevation: 160-180 ft.[7] Some slightly higher hills rise to the west (250-300' elevation). This is, however, one of the highest points in the area.

Slope aspect(s): The site lies on top of a small hill, with mostly relatively flat topography, though the site spans a long, wide ridge and therefore slopes gently to the northwest and southeast. The highest point of the property lies towards the southwestern corner. The southern edge of the property slopes drastically to the south, dropping 60-70 feet to a major roadway. The western edge of the property slopes to the northwest at a somewhat more moderate slope, though still steep.

→ The land will likely be high and dry, with a deep water table. Design for drought.

Soil types: The northernmost portion of the property around the residence consists of Merrimac sandy loam on 3-8% slopes, while the steeper southwestern slopes consist of Udorthents, 0 to 8 percent slopes, gravelly. A portion of the 'home zone' east of the primary residence includes Barnstable loamy sand, 8 to 15 percent slopes, and the bulk of the salvage yard itself is considered to consist of 'urban land' with unspecified soil qualities (see Appendix 1 for a soil map).

- Merrimac sandy loam typically consists of an A horizon that extends just 2-3" deep before transitioning into a B horizon that consists of coarse sandy loam underlain by gravelly coarse sandy loam between 3-22" depth. The C horizon consists of gravelly sand and typically extends more than 80" deep before reaching bedrock. These soils tend to be somewhat excessively drained and extremely to moderately acidic. While somewhat drought prone, these soils are suited to cultivated crops although irrigation is often considered necessary. Septic systems require careful design to prevent groundwater pollution. These soils are associated with aquifer recharge areas.[8]
- Udorthents are well drained soils that usually consist of an A horizon stretching up to 5" deep, followed by a C horizon consisting of gravelly loam and/or sandy loam that stretches to 80" or more before reaching bedrock. These soils lie on areas either cut to a depth of 2' or more or covered with 2'+ worth of fill. While cut areas were often used as a source of fill material for construction, filled areas were often leveled and/or built up for development. These soils' permeability and stability vary and require on-site assessment, as they are not uniform.[9]
- Barnstable loamy sand may consist of an O horizon as much as 4" deep but little if any A horizon. An E horizon of loamy sand at between 4-6" depth gives way to a gravelly sandy/stony loam B horizon reaching depths of up to 27", followed by a C horizon of very gravelly coarse sand, occasionally reaching a restrictive feature at depths of between 23 to 27 inches to strongly contrasting textural stratification. Formed in loamy till over sandy, loose glacial outwash, these soils are very deep and well drained. They are typically forested and often host poor quality scarlet, black and white oaks and pitch pine. Barnstable loamy sand is rarely used for crops or pasture.[10]

- The soil in the salvage yard is thick with broken glass bits, tiny bits of cars, etc. Very compacted. This is a sandy soil, with very little orgnaic matter or life in it.

→ All of these soils need lots of organic matter (OM), especially decay resistant OM, to improve water- and nutrient-holding capacity and soil biology. The Barnstable loamy sand's deep O horizon, thin A horizon, and presence of an E horizon indicate that soil biology and decomposition capacity is limited, probably by drought or nitrogen limitation, while leaching is also high. While that soil is unlikely to get used on this site, it is reflective of the conditions the site faces. Compost, mulch, and biochar are all indicated to rejuvenate the soils and increase their productive capacity. Consistent moisture will also assist in strengthening the biology of these soils.

→ Nitrogen fixing plants are also a necessity in these sandy soils, and will also likely improve soil biology and decomposition potential.

→ Explore the economics of hiring a bulldozer with ripper/subsoiler to remediate soil compaction within the woody cuts planting beds.

WATER

Watershed: The site largely lies atop a broad plateau with expansive views to the southeast. Hence the property drains in almost all directions, although the bulk of the salvage yard appears to have been graded gently (0.5-1% slope) towards the northwest. Along the northern edge of the salvage yard, the grade increases to the north and west. The southwestern edge of the salvage yard marks a prominent watershed divide, delineating the drainage between the salvage yard and that of the fairly steep wooded southwestern slope, pitched 20-30% to the southwest. Along the southeastern edge of the salvage yard, the landscape drops dramatically, falling 70 or so feet over roughly 250' to the valley below.

- The north and easternmost portions of the property, especially the public road bed, feed into a primary valley that drains south and east to the lowlands, feeding into a network of wetlands before gradually making its way into a local creek, passing through a network of small ponds, and ultimately draining to the east.

→A growing erosion gully at the northwestern 'outlet' of the salvage yard highlights the need for better on-site runoff management, both to infiltrate runoff and minimize erosion as well as affording it some level of treatment (sediment deposition and biological filtration) before leaving the site.

→ The low end of salvage yard should not form part of the farm's core. We don't want this runoff entering the farm core until systems are in place to deal with it.

On Site Water Resources and Wastewater Treatment

- Existing buildings utilize town water and sewer. We are currently unaware of additional existing access points for water, nor do we know the extent of the municipal water infrastructure on the property.

→Access to water currently stands as a major limiting factor to the development of any significant farm enterprise on site. Identify the location of existing water lines and then explore the most practical and economic layout for a freeze-proof irrigation line that will supply adequate water for nursery management, as well as the establishment of tree crops and woody cuts plantings.

MARKETS

- The farm lies amidst a bustling, high traffic and densely populated stretch of the northeast. The historic local town has roughly 50,000 full time residents, and lies within 45 minutes of several metro areas (home to millions) and popular vacation and recreation destinations. This proximity to such an enormous population, connected by extensive and well developed transportation infrastructure, and a bustling tourism industry all contribute to considerable economic potential for the farm's enterprises. While cultivating both retail and wholesale relationships may take some time, there lies no shortage of opportunities, and perhaps the biggest challenge may lie in narrowing down the farm enterprises and developing their identity as a 'brand.'

VEGETATION AND WILDLIFE:

Potential Natural Vegetation: This region was historically dominated by Appalachian oak-pine forest: some combination of white, red, post, scarlet, black, and chestnut oaks with white pine, red maple, hickories, and other central and some transition hardwoods.[11]

Actual existing vegetation:

- Mature oak stand: a dense stand of maturing white and other oaks with a *Vaccinium* and *Gaylussacia* understory grows in the southeastern hilltop corner of the property. Mostly larger diameter trees, likely unsuited to coppice initiation. Sheep laurel. Some sassafras. A landscape probably accustomed to fire management prior to European contact.
- Salvage yard: Little vegetation grows here, primarily due to high disturbance frequency and intensity, as well as compaction. Small patches of grey birch and black locust occur, with seeding and sucker initiation spreading the clumps. Small patches of forbs and grasses also occur, mostly mosses, goldenrods, little bluestem and other forbs. Mullein is common. Quaking aspen grows primarily in the east corner of the salvage yard.

• Southwestern disturbed slope: White pine, pitch pine, eastern red cedar, *Rubus*, multiflora rose, black cherry, fire or pin cherry, wild apples, sweet fern, black locust, grey birch, blueberry and huckleberry. Sassafras.

Weed or pest/varmint challenges: Currently unknown but likely rabbits, squirrel, voles, and potentially deer.

SITE DESIGN:

Scheme Summary:

• Overall pattern: The farm produces a mix of veggies, fruits, seedling starts from greenhouses, medicinal products and herbs, and woody ornamental cut flowers. The farm grows slowly to eventually take over the whole salvage yard, with the north edge of the property all the way to the west serving as the zone of first establishment:
  - The western portion of the residence site from the pool house to the salvage yard forms the locus of initial edible and medicinal crop production. Homestead veggies, seedling nursery, and shade tolerant medicinal herbs go here for purity of soil and ease of care (some tree cutting recommended for veggies).
  - The ¼ acre corner of the salvage yard closest to the family home serves as the initial site for greenhouse spring bedding plant production in movable greenhouses using imported potting soil.
  - The northern edge of the salvage yard becomes woody cuts and runoff-purifying woody cuts. We recommend woody cuts beds running parallel to the north property line (E-W beds) with a 10' vehicle lane down the middle and vehicle lanes at each end of the beds.
  - Fruits and medicinals go on the slope southwest of the salvage yard, starting in the northern edge of the space.
• See Appendix 2 or the "No Name Farm Design Concept" in file NoNameFarmDesign.Final.pdf (11 x 17 color) for a graphic representation of this design.
• As the greenhouse nucleus and woody cuts expand, the salvage yard shrinks to the south. Consider transitioning the nucleus/base of operations to the garage post-salvage yard (hence, construct mobile greenhouses). Ultimately, we can foresee several attached greenhouses on the south and west sides of the garage with a circular drive access around garage and greenhouses.
• One woody cuts farm in NC grows $110,000 worth of woody cuts on 3-3.5 acres. Hence we guesstimate that this woody cuts operation on 1.5 acres could gross perhaps $40,000 to $50,000. Add in bedding plants, medicinals, you might get some livings out of it. With the large nearby markets you should be able to sell cut flowers at a good price, especially if you use the greenhouses to force some in the

late winter and early spring before bedding plants take over the greenhouses completely.

Scheme Details:

Water Issues:

- Water is a big issue.
  - Explore options for most economical water supply. Either:
    - ~ Start from the residence or pool house and run along the north edge of the property with T's and hydrants at the north edge, or;
    - ~ Start from the salvage garage, and go either west to the fruit tree edge or north along the east property line to the greenhouse nucleus and onward.
    - ~ It seems that with the residence back yard and the north edge of salvage yard as the initial planting area, that taking off from the house/pool house makes the most sense.
    - ~ Test the town water for chlorine (and investigate historical chlorine intensity) before investing in the irrigation system, and consider means to improve the water before putting it on your sensitive and already damaged soils.
  - Install irrigation pipe and hydrants along the north edge of the yard. Place concrete well tiles perhaps every 100 feet or so, in which you can place pipe junctions and hydrants. That way you can easily install more lines running N-S from each well tile/junction. Well tiles can also serve as places for draining water lines if you slope the pieps properly.
  - Ultimately, if you go with woody cuts beds, you may want to tee off the main irrigation line and run lines N-S along the ends of all the woody cuts beds with hydrants or junctions for drip irrigation on each bed. Just design the system so that it is modular and expandable, with easy connections without digging holes again in this tough soil.
- Salvage yard runoff management is key—no edibles or medicinals here (NW corner). We recommend building raised beds over decompacted soils (use a bulldozer) with mulch/compost (at least) and planting *Ilex verticillata* and pussy/corkscrew/other ornamental willows and dogwoods to meander the runoff, soak it in, and purify it before it leaves the site. We recommend the overflow off the site be moved further east along the north property line to reduce erosion: the current runoff egress flows over a high, steep bank and erodes severely, while the bank is lower and less steep further east, and runoff will flow through more woodland for even more purification before getting to its destination down the hill.

Woody Cuts Operation:

- Use the greenhouse in late winter to force woody cuts for Easter flower sales before it gets taken over by bedding plants. Bedding plants can sell along with pussy willows, other willows, and spring woody cuts. In summer sell woody cuts from outdoor beds. In late fall, sell evergreen cuts, *Ilex verticillata* berries, and medicinals as a seasonal package of products.
- Build woody cuts beds from north to south in the salvage yard. We recommend east-west rows of beds paralleling the north property line with a 10' N-S lane between the two sets of ±100-foot beds.
- The woody cuts growers we visited used approximately 8' wide beds with 4-5' paths for some crops, and for others they used 4-5' beds with similar sized paths. Paths should be sized for ease of mowing—one or two passes for a mower deck of a small tractor for each path, or measure the arc-width of your scythe blade to fit that modality. Two-passes-wide paths would allow you to manage habitat for beneficials more easily by mowing the two sides of each path alternately so that there is always habitat for the beneficials in the grass.
- We strongly urge decompaction before building the beds—bulldozer? With ripper?—then sheet mulch and plant woody cuts. A single or double rip, ideally 16-24" in depth along the center of each row should suffice. The importance of this step cannot be overstated. Compaction will severely limit plant growth and productivity and cannot be easily ameliorated post-planting.
- You can use chipped materials from the slope to build the beds, along with compost from your tip-yard.
- You may need to design a succession of woody cuts crops: early crops with species more tolerant of crappy soils, later crops with species needing better soils.
- Possible Woody Cuts Species:
  - *Chaenomeles speciosa* - flowering quince
  - *Forsythia* x *intermedia* - forsythia
  - *Hydrangea* spp. - hydrangea
  - *Malus* spp. - flowering crabapple
  - *Myrica pensylvanica* - northern bayberry
  - *Prunus* spp. - flowering almonds, plums, cherries, apricots
  - *Syringa* spp. - lilac
  - *Viburnum* spp. - viburnums, snowball
  - *Weigela florida* - weigela
  - *Corylus avellana/americana* - European filbert/American hazelnut
  - *Salix* spp. - willows
    - ~ S*alix alba* - white willow
    - ~ S*alix caprea*- florist's willow

  - ~ S*alix discolor* - pussy willow
  - ~ *Salix matsudana* - curly willow
- *Ilex verticillata* - winterberry
- *Cornus* spp.- red osier/yellow twig dogwoods

• Each species will be managed on its own rotation. Some species may require a rest period of more than one season after cutting; for example, *Ilex verticillata* is perhaps best cut on a three-year rotation, as seen at a woody cuts operation near Washington, DC.

• Every woody cuts crop should be planted in polycultures with soil improving and insect attracting herbaceous groundcovers! In the optimal world, some of these might be plants useful as cut flowers in their own right, if you can work out the architecture of the vegetation properly. But none of these should be harvested for human consumption!

• If well-designed, mosing the aisles should be an act of mulching the woody cuts beds to improve the soil, so make sure to plant the aisles with soil improving plants also, e.g., white clover.

Coppice for Producing Biomass:

• Possible Soil Building/Biomass Species:
- Any species already growing on the southwestern slope that coppices, especially black locust and autumn olive (nitrogen fixers).
- *Acer rubrum* - red maple
- *Betula papyrifera* - paper birch
- *Populus* spp. - poplar species
- *Robinia pseudoacacia* - black locust
- *Salix* spp. – willows (growing in runoff treatment beds)

• To produce mulch or potting soil from willow coppice:
- Willow wood weighs 21 pounds/cf.
- Willow coppice production ranges from a low of 3.5-6.7 tons/ac/yr to a high of 4.5-9.8 tons/ac/yr. Assume: 4 tons/ac/yr production of willow coppice; 60% bed coverage on a 50 x 100 area (5,000 x 0.60 = 3,000 sf).
- 4 tons/ac/yr = 8,000 # x 3,000 sf/43,560 sf = 550 # willow wood production per 3,000 sf per year.
- 550 # ÷ 21 # willow/cf = 26.2 cf willow/year, on the low end, a good guess for these soils/conditions. This equals ~ 1 cy/yr. Nowhere near enough to even mulch the area the willow is growing upon.
- If we assume 100% coverage rather than 60%, and higher production of 5 tons/ac/yr: 10,000# x 5,000 sf/43,560 sf = 1,147.8 # wood per year ÷ 21 #/cf = 54.65 cf ÷ 27 cf/cy = 2 cy.

- 2 cy of material will fill between 150-250 seedling trays (36 cell flats = 6- 6-cell packs, 0.21-0.35 cf per flat based on cell sizes given online), with 6 packs of 6 cells in each = 900 – 1500 seedling packs of 6 plants each; sales of approximate $3 each = $2,700 - $4,500. Of course more will be needed than just the wood chips to make potting soil….

→ Clearly this wood chip material will not fill very many seedling trays, not enough to make a large dent in commercial seedling production needs. In addition, the amount of work required to make potting soil out of this material will be high. From a business standpoint, it will be best to just buy potting soil or make your own mix from commercially available materials.

→ All bulk organic material produced on the land is best applied to the land to help heal it—don't take it away or use it for potting soil.

• Assume taking over a 50' x 100' (5,000 sf) section of the salvage yard for establishing runoff purifying woody cuts or other crops: Organic materials needed for mulch/compost:
  - Assume 60% of space is in growing beds: 5,000 x .60 = 3,000 sf.
  - Assume 6" mulch depth: 3,000 sf x 0.5 ft depth = 1,500 cf/27 cf/cy = 56 cy material needed for bed creation for a 50 x 100 area of the salvage yard.
  - As above, yields of biomass for the same area are on the order of 1-2 cy/yr/
  - C:N ration of wood chips or sawdust is 100-500:1.[12]

  → Will need to import materials to make the beds. Cannot grow it *in situ* in any reasonable period of time.

  → You will need to import high-nitrogen materials to balance out the high-carbon materials your site will produce. Hence, compost tipping!

  → The ±1 ac. brushy slope southwest of the salvage yard may be a source of OM/wood chips to build beds in the salvage yard. Will need to estimate actual biomass standing crop to see how viable that is as a source of OM for the salvage yard space. However, to clear cut that slope will cause other problems, including weed population increases, possible erosion, etc. These issues must be considered before cutting the slope, especially if the whole slope is to be cut.

• Even with on-site OM production you will need to import large quantities of biomass to improve the salvage yard soils in a reasonable period. Seriously consider a small-scale composting operation with income from tip fees, *but no sales of compost*. Use all of it on site, at least for a number of years.

Southwestern Slope:

• The very top strip of the southwestern slope along the edge of the salvage yard offers the most worthwhile space to plant medicinals and edibles (e.g., fruit trees

with medicinals under) in a single 400' or so long strip where it is relatively level and accessible.
  - There may be spots where you can widen this strip deeper to the southwest if patches of level area exist that extend more than 15-20 feet deep—use these as well.
  - Some medicinals and edibles can grow in the first terrace below the top, but further downhill the yield should probably become primarily biomass, fuel wood, and/or additional woody cuts to bring up the slope for use above and/or for market sales. Hence, the southwestern slope below the top strip would serve as a harvested-wild zone with some plantings to create biomass for improving soils patch by patch in the salvage yard area (plant nitrogen-fixers especially).
  - Alternatively, harvest biomass near the top of the slope (and use this as a coppice windreak), and have edibles/medicinals further down (less weight to move uphill, but less care and management of edibles/medicinals because further away/out of sight).
  - The southwest slope edge of the salvage yard runs about 400' from north to south. That will fit about 27 semi-dwarf fruit trees (15' diameter) with canopies touching. With a 20 foot-wide bed, that provides 8,000 sf of growing space for sun-loving and semi-shade tolerant herbs as edibles and medicinals.
  - The prevailing westerly winds will likely be intense in the strip at the top of the southwestern slope. *Design carefully* with this facto rin mind, as many fruit are wind-sensitive. Consider a windbreak planting on the windward side of the strip just downhill of the fruit trees.
- The lower portions of the southwest slope can be edibles and medicinals in shade and part shade as well as coppice biomass production and maybe mushrooms if you can get water to the site.
  - We recommend an organic development strategy for the slope, not a massive bulldozer intervention to make terraces. Thin and cut what already exists on the slope for coppice and biomass, and chip and use this material to build woody cuts beds bit by bit. Plant into slope as you go to shift species composition towards more nitrogen fixers and other coppice species of value to the project.
  - Use the upper, more level strip along the slope for fruit trees/medicinals/edibles.
  - Develop the slope gradually using slash to make "hugelterraces" for increased water retention and infiltration.
  - Design/engineer terraces around what is there and to direct water and access where it makes sense. This can only be patterned in the field, not at a distance. Take advantage of flatter spots for more intensive cultivation, steeper slopes for denser plantings of coppiced species for biomass, off-contour paths for wheelbarrow, etc. access up and down slope.

  - Place more frequent/intensive uses near the top, more infrequent uses near the bottom, unless you can get right of way down the hill through the neighbor's land…
- Given the varied nature of the plants on the southwestern slope and the organic approach to developing that slope that we recommend, it may prove best to manage the slope by draw felling individual stools, or to cut individual clumps at once, rather than as coupes or cants each cut in full at one time. The stand as a whole would thus have more of a shifting mosaic pattern, creating patches of intense disturbance as material needs and management imperatives require. Plants for coppice could be added to the slope over time, and a more systematic approach could develop as you shift the nature of the slope's vegetation.

OVERALL COMMENTS:

- This site offers a dynamic and unique set of challenges and constraints, but they also point towards some very specific imperatives:
  - No food/medicine grown in salvage yard soil.
  - Use of property margins wherever possible for food and medicine production (terraced hillside, home zone).
  - Water stewardship/management is a must.
  - Incremental expansion of the farm business from north to south over time.
- Because of your financial targets, as well as the site's size and ecological constraints on food production, it's imperative that the core and largest space of the future farm focus on high value crops that either do not require cultivation in native soil or are not intended for human consumption, or that are used to improve the site or keep the farm and homestead running, including:
  - Woody ornamental cut flowers
  - Bedding plants.
  - Perhaps woven crafts as skills and materials become available.
  - Biomass for soil building/remediation.
  - Fuel wood.
- Critical to the farm's success, however, is also that the products above be supplemented with products for human consumption, especially those of high value, that can be grown in the few areas uncontaminated by the salvage yard:
  - Medicinal herbs and value added products therefrom.
  - Fruits.
  - Veggies.
- The proximity to enormous market demand and distribution infrastructure, coupled with the skill and passion of the farmers present two of the farm's most potent assets.

[1] From http://www.usclimatedata.com/climate/xxxx/xxx/united-states/xxxxx, accessed December 8, 2014.
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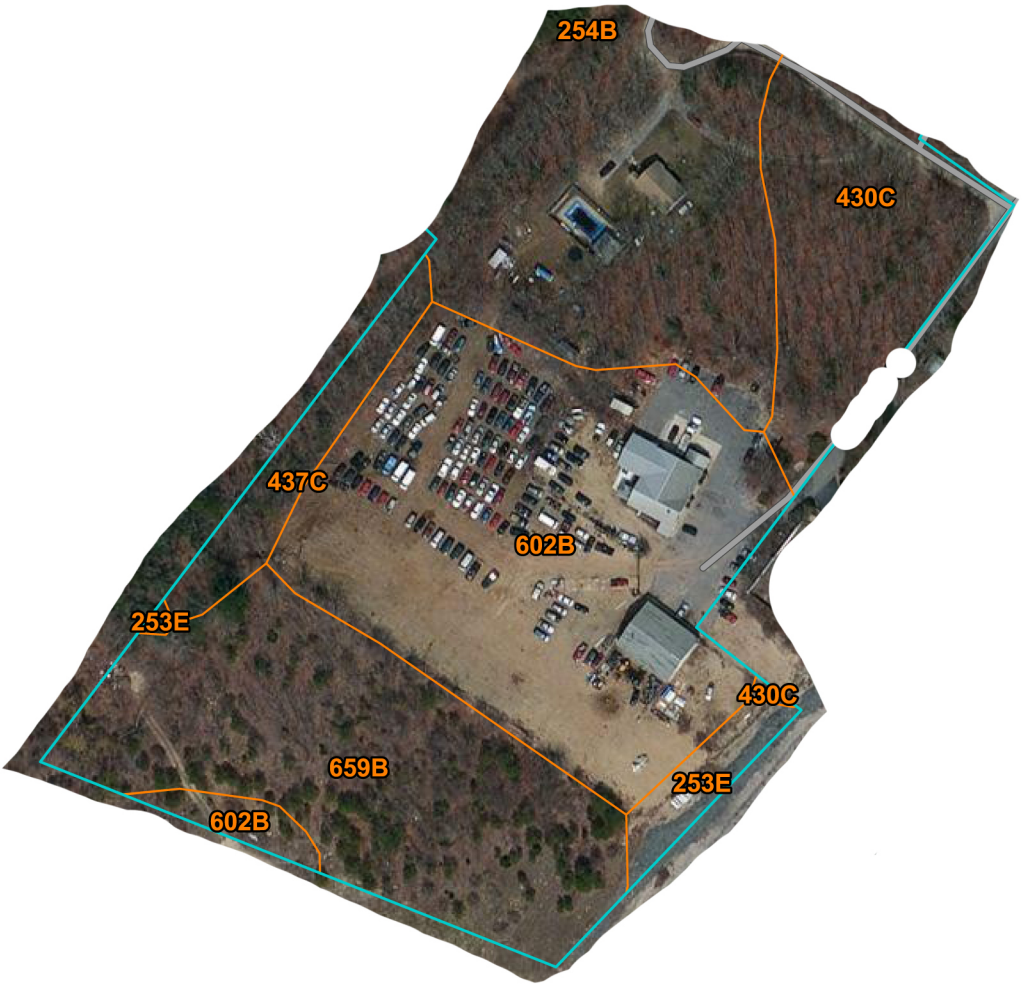
[9] From http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/home/?cid=nrcs144p2_016612, accessed January 20, 2015.
[10] From https://soilseries.sc.egov.usda.gov/OSD_Docs/x/xxxxxxx.html, accessed January 20, 2015.
[11] Griffith, G.E., J.M. Omernick, S.A. Bryce, J. Royte, W.D. Hoar, J.W. Homer, D. Keirstead, K.J. Metzler and G. Hellyer. 2009. *Ecoregions of New England*. Color poster with map, descriptive text, summary tables, and photographs. Reston, VA: US Geological Survey. Map scale 1:1,325,000.
[12] From Cornell Compost Science and Engineering. "Compost Chemistry." http://compost.css.cornell.edu/chemistry.html, accessed January 12, 2015.



Map Scale: 1:2,130 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area:
Survey Area Data: Version 7, Sep 19, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
253E	Hinckley loamy coarse sand, 15 to 35 percent slopes	0.2	1.6%
254B	Merrimac sandy loam, 3 to 8 percent slopes	5.7	43.0%
430C	Barnstable loamy sand, 8 to 15 percent slopes	1.6	11.7%
437C	Plymouth loamy coarse sand, 8 to 15 percent slopes, bouldery	0.4	3.2%
602B	Urban land, 0 to 8 percent slopes	3.2	24.3%
659B	Udorthents, 0 to 8 percent slopes, gravelly	2.2	16.2%
Totals for Area of Interest		**13.3**	**100.0%**

Design Concept
No Name Farm

Mark Krawczyk and Dave Jacke
January 15, 2015

Design Concept Overview

No Name Farm develops 3 farm enterprises in a successionproperty over several years: bedding plants, medicinal herbs, and woody cut flowers. Given the compromised soil under the salvage yard, food and medicine production occur at the periphery of the farm--namely the home zone and the to-be-terraced western hillside. The foundation of the farm enterprise incorporates a bedding plants production business housed in movable greenhouses, and an expanding network of beds devoted to the production of woody cut flowers using coppice-type pruning cycles. Both enterprises enable the production of a high value product on this compact property without requiring remediation of the existing underlying soils. To avoid interference with the existing auto salvage business, these enterprises begin along the northwestern edge of the property, steadily expanding to the east and south as the property use transitions over time. Ultimately the business will take over the existing garage as its nucleus.

Farm Nucleus

- Locus of initial greenhouse & veggie & medicinal operations.
- Focus on bedding plant production for retail and wholesale in early spring though summer, and medicinal herbs.
- Expand from this operations base as farm enterprises grow.
- Build mobile greenhouses/polytunnels to maintain flexibility in farm planning and development.

*** Develop frost free water supply early on - this is the primary limiting factor here currently.

Home Zone

- Intensive, home scale vegetable production along with shade-tolerant medicinal herbs.

Water Stewardship & Revitalization

- Create sinuous, interconnected water retention basins densely planted with ornamental willow species (pussy, corkscrew), dogwood (yellow and red osier), and winterberry (*Ilex verticllata*).
- Plantings and earthworks, slow, treat, and infiltrate overland runoff before leaving the site, while simultaneously providing high value woody cut stems.
- Arrange the overflow so it leaves the site further east over a shorter and less-steep slope than it currently does, with more woodland to filter runoff as it heads downhill.

Woody Cuts Production Beds

- Two sets of 75-100' long beds run northeast-southwest, split by a 8-10' central laneway with headlands on both ends for tractor turning.
- Establish these permanent beds after significant investment in soil improvement and site prep including subsoiling with a bulldozer, gratituous annual applications of compost and organic matter, and diverse cover crops. Then install a range of woody species selected for the known local demand for their cut stems amongst florists, hotels, restauants, and farmer's market-goers.
- These beds expand to the south and east as the salvage enterprise contracts, ultimately moving the operations base to the existing garage.

Future Farm Nucleus

- As the farm's woody cuts and bedding plants enterprises grow and the salvage business recedes, plant beds expand to the east and south.
- Once the existing garage is no longer required for the salvage business, the structure becomes the heart of the farm, both logicstically and economically.
- Year round production expands as greenhouses spring up along the east, south, and west walls, using the mass of the existing block building and access to water and power.
- This area then becomes the commercial hub of the farm, offering convenient access for retail customers and commercial clients, and a well-rooted base of operations.

Terraced Western Hillside

-The property's largest least-impacted zone becomes a network of productive terraces.
- The 400+' x 20-25' stretch along the upper edge of the hillside becomes an intensively managed orchard row with a sun-loving medicinals below for value-added products.
- Lower on the slope, land use transitions to biomass and fertility-producing woody species including 'native' & naturalized species already present, along with additional multi-purpose coppice plantings. These 'cut and carry' crops are harvested and hauled uphill where they're chipped as mulch to nourish the tree crops, medicinal perennials, and woody cuts enterprises.

Water Line

- 2"+ buried main line extends from home supply with frost free hydrants at each production zone. Facilitates irrigation and ensures survival of plantings on these coarse soils.
- Should be one of your first investments, but make it modular so it can grow in stages with the farm.

N

1" = 100'

20 m
100 ft

Scale = 1:2,257

266,158.89m 857,673.12m