Agricultural Land Acquisition Due Diligence Primer

Agricultural land acquisition due diligence may be classified in a way that clarifies and allows for the clear compartmentalizing of the functions, goals and methods of due diligence. This treatise starts with an explanation of the process followed by an actual checklist. The agricultural due diligence can be categorized into four areas:

1. **Property Identity and Encumbrances**: Are we buying what we think are buying? Are we aware of all the easements, liens, structures, lease rights to access, rights to develop, etc. that might make a difference in our decision? Is the deed the type of deed that allows us great latitude or does it cause us concern for the future use, government impingement, or eminent domain issues?

2. **Environmental Concerns**: This area is, fortunately, very well-defined in the Federal regulation 40 CFR §312: ***Standard for Conducting All Appropriate Inquiries (AAI)***. Requirements under the regulations overlap many of the items that one will require in Property Identity and Encumbrances. For instance, review of historical aerial photographs, topography, soil types and drainage, on site photography, list of improvements, copy of survey and legal description, development of history going back to point in time that the land was first used as agricultural land, use of herbicide, pesticide, and fertilizer application are part of the Phase 1 ESA deliverable. The most common environmental issues on farmland are:
    a. **Underground storage tanks for farm use.** These are federally exempt and exempt under most state laws from mandatory removal or remediation. However, if a properly appointed regulatory authority indicates that the tank system or tank contamination is a threat to human health of the environment, the tanks are usually required to be removed and the impacts remediated.
    b. **Groundwater or soil contamination from on or off-site point sources**. This may be due to:
        i. **Imprudent application of pesticides or herbicides**. For example, a single crop dusting with Dieldrin, Aldrin and Heptachlor (organochlorides) killed 90% of all cats, 84% of all dogs, and about half of all horses, cattle and sheep, in Sheldon and Donovan, Illinois in April, 1960. In addition, in one ditch alone, 150 muskrats were killed, and all the fish in several ponds were killed. The report by Rachel Carson in 1962, (*et seq.* Hicks1963) indicates the spraying was intended to control Japanese Beetles. The addition of Heptachlor to the Dieldrin/Aldrin mix was new to this fly-over. In one barn, 12 rats/year were killed by the owner. The winter following spraying, 900 rats were killed by the owner. Despite the dusting, Japanese beetles are doing quite well today having expanded their range at least 200 hundred miles to the north of that original frontier line of 1961.

Nearly 50 years after the events in Sheldon and Donovan, approximately 10% of the land is still contaminated with Heptachlor at levels exceeding regulatory limits.

ii. More typically, such contamination is caused by the **illegal use of older chemicals, now banned, or the long-term use of an on-site dump** (illegal in all states) in which the offending chemicals have been released. Often the releases are sourced to corroded containers that were sound when dumped.

iii. **Legal application of herbicides and pesticides that are later banned** such as the recently-banned Carbofuran which has a 92% kill rate for all birds when used at recommended application rates.

c. **Surface water contamination from chemical outfall from a source either on or off site.** The source for such outfall is usually in one of three categories:

i. Animal husbandry and slaughter house releases of hormones and disinfectants.

ii. Bacterial release due to improper animal waste lagoon treatment facilities.

iii. Chemical spills form herbicides pesticides or fertilizer.

d. **Undifferentiated soil and water contamination due to local practices**. An excellent example of this is the mixing of diesel fuel and 2,4-d in sprayer trucks which then apply the compound to roadside weeds. This practice still continues today. Unfortunately, the mixture produces dioxin – one of the most potent poisons known to science.

3. **Productivity:** Is the land capable of producing a profitable crop? This must be determined both historically and with current site data gathered at or about the time of purchase. There are a number of factors affecting the analysis of productivity such as the skill of the farmer, weather, erosion, fertility, static diversity and quantity of pest species and outbreaks (new species or uncontrolled population expansion of pest species), *etc*. There are some factors that can change enough in the near term that some land may well be fertile and profitable one year and incapable of producing a crop the next. Recently flooded land is an excellent example of this – especially if the flood water was brackish. Productivity must be evaluated with an associated cost. Productivity is not static. It can be increased or decreased based on land management techniques. First, one must know if the base material is adequate. Then the changes that have taken place on that land in the past that alter that base productivity must be evaluated. Last, the changes that can alter land for improvement of productivity. This can be likened to an ecological income statement where deposits of time effort and money into the land are balanced against natural soil fertility depletion, erosion, disasters, weather change, *etc.*

a. **Fundamental Suitability for crop production:** Essentially this can be evaluation can be reduced to an analysis of

   i. Cationic exchange capacity of the soil (an ability to retain fertility)
   ii. Soil friability/texture
   iii. Underlying drainage
   iv. Water availability
   v. All other techniques or measures that one might undertake (which are noted in the following checklist) are simply ways of performing this evaluation. If these four fundamentals are satisfactory there is promise for the land.

b. **Measure of necessary inputs to achieve *historical* satisfactory yield(HSY):** Historical satisfactory yield is essentially the break-even yield plus a reasonable profit for the farmer based on experience. However, the land management methods used in the past may not be the best way to produce that yield so the evaluation of productivity must be analyzed keeping open the possibility that better management may change this value. That said, using yield alone as a measure of productivity is like looking at one side of the balance sheet and ignoring the return on investment ratio. If one were trying to sell farmland based on yield figures (not an uncommon practice), one could pump more cash into expensive fertilization, high cost weeding techniques, water for irrigation for a period of three years or so, *etc.*, to maximize yield at any cost. The yield figures would, perhaps, be impressive, but the land would be damaged, and the cost to produce that yield may (likely would) exceed the ensuing return on the crop. Since this level of productivity cannot be sustained by many individuals for long, a longer term look at yields is far more beneficial. We recommend an absolute minimum of 5 years of crop yield analysis and an optimum of 10 years of yields. The actual accounting of the use of fertilizers, pesticides and herbicides, cultivation (fuel and/or manpower) is critical to the total evaluation of the land. Hand weeding is a far more sound land management practice than herbicide application. A single farmer can hand weed about 400 acres of soybeans per year at the 39th parallel in Illinois. 300 miles farther north the same farmer can weed perhaps 600 acres. At three hundred miles farther south, it would take at least 2 people to weed the same 400 acres of beans or the acreage that one man can weed reduces to 200 acres. In evaluating the land, consider that any of these farmers could opt for expensive herbicide or cultivation methods for reducing weeds thus increasing the cost of the yield

c. **Costs to produce optimum sustainable yield (OSY):** Optimum sustainable yield is the level of management necessary to achieve the greatest profit without deteriorating the agricultural value of the land. A note is in order here: All land will lose productivity over time regardless of management practices.

The best that humans can do is minimize this productivity loss to a very small decrease so that the variance in yield is lower than the variance due to loss in productivity. The cost to enhance productivity for OSY can usually be summarized as the costs for the following:

i. Returning organic matter to the soil.
ii. Crop rotation which incorporates the use of legumes
iii. Use of natural fertilizers where possible.
iv. Use of synthetic fertilizers when necessary
v. Minimizing erosion through appropriate soil management techniques
vi. The use of integrated pest management
vii. Cost for water delivery improvement and/or desalination
viii. Drainage improvements/maintenance

d. The ratio of OSY to HSY should be 1.05 minimum (of course, comparing each potential crop). Over a ten year period, this will average to about a 3% minimum return on the crop due to base yield reduction. Better farmland will have an OSY to HSY ratio of 1.1 to 1.2.

4. **Off Property Economic Considerations**: These considerations are clearly divided into two categories:

a. **Local Economics.** These issues are largely location and fuel issues though others are at play.

i. The time it takes a crop to be transported to market. Both distance and transportation infrastructure play a role in this analysis. Weather at the time of harvest is also an issue. For example, apples in the U.S. have a disadvantage in this area versus apples from Chile. Harvest in the U.S. in apple country is subject to ill-timed ice storms and snowfalls. This is a rare occurrence in Chile where apples are grown. The roads in the apple regions of both countries are similar. Luckily they do not compete head-to-head at the marketplace because Chilean Autumn is our Spring.

ii. Local cost of fuel.

iii. Availability of talented farmers. At 39 degrees latitude in the grain belt a talented farmer can handle 800 to 1000 acres of farmland assuming there is help from family and neighbors during planting and harvest. In some areas of the country there is a decrease in family size and a drift from agricultural vocations to non-agricultural vocations. This means that the average size of the farm and the social structure of a community may reduce the availability of suitable tenant farmers. Without farmers the investment in the land is meaningless.

b. **Macroeconomic conditions:**

i. Fuel/energy use intensity of crop production. Sugar cane is an excellent example of an extremely energy-intensive crop. Though some would argue that the industry creates most of its own energy by burning bagasse (unused sugar cane bio-mass), the furnaces at cane production facilities are at most 60 to 65% efficient and are extreme producers of particulate air pollution. This emission will be regulated with new legislation that has already passed on the state and national levels in cane country. The ensuing purchase of carbon credits represents a cost to production that must be considered.

A more traditional example is the difference in production methods required to raise a crop of popcorn versus feed corn. The popcorn requires the same growing conditions that the feed corn requires, however it is far more susceptible to insect damage and competition from weeds. All of the chemicals required to produce a crop of popcorn are petrochemicals, and the necessary cultivation is fueled by gasoline. A farmer may commit to a crop such as popcorn then an unforeseen increase in crude oil drives the cost to produce the crop to a level where breaking even is no longer possible.

ii. **Changes in cultural demand for a product.** Non genetically modified organism (Non-GMO) beans are an excellent example of a cultural shift in demand. Most of the beans in use in the U.S. are "Round-up® Ready" meaning that herbicides can be over-sprayed on the beans to greatly reduce the cost of raising the beans which would otherwise require cultivation, hand weeding, or spot use of herbicide using a back-pack sprayer. Japan and Europe and some U.S. companies such Gerber, demand Non-GMO soybeans. Non-GMO beans are far more difficult to grow, but they have a higher yield, cost less than GMO beans, and the price benefit at the elevator is significant (about 10% greater than GMO beans. Studies at the University of Iowa determined that the average benefit to the bottom line of producing Non-GMO beans is an astounding 36.11% over GMO beans.

As of 1998, 40% of all beans planted in the U.S. were GMO. By 2000, nearly 64% of all beans planted were GMO. However, the intensity of the international backlash against beans resistant to herbicide was not anticipated catching many farmers off-guard. The price per bushel for non-GMO beans is, at the time of this writing, approximately $1.50 greater than GMO beans which are at about $16.00 per bushel.

c. **Alternative crop possibilities:** If productivity decreases to the point that a change in crop type is mandated this must be considered and planned in advance. In Southern Illinois, for example, some farmland (sloping land, agriculturally depleted land, etc.) has decreased in productivity to the point where cash crops are no longer viable. In the last 30 years, acreage planted in grapes for wine production has increased dramatically as noted in the following table:

Grape Production in Illinois			
Year	**Wineries**	**Growers**	**Acreage**
1979	1	1	12
1984	2	2	17
1997	12	140	180
2002	N/A	160	N/A
2005	N/A	250	N/A
2007	68	450	1100

Clearly at just 1100 acres of total production grapes represent a very tiny quantity of tillable land, but this is one crop (for which data are readily available) among many (such as sorgho (sorgo), milo, *et al*). When decisions are made regarding the future potential for agricultural land, the possibility of a profitable change in cropping should be considered. A less drastic change is from row crops to perennial crops such as nut trees or other orchard type crops. Trees require far less fertility than row crops and, as such, are excellent alternative crops. The time to obtain production from trees can be ameliorated by a phased transition from perennial crops that require only 1 to 2 years to mature – such as berry crops, to those that take 3 to 5 years to produce – such as fruit trees, to those that take 5 to 10 years to produce – such as most nut trees. Multi-cropping in several of these crops simultaneously ensures some return on investment while the land is in transition. This is possible because all of these items can tolerate some minor level of shade and the overtopping of shorter plants allows for immediate use of all land by a crop while the taller plants are maturing. There is little or no net loss of space while allowing longer-lived perennial crops to mature.