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Checklist for Planning Irrigation Systems

Irrigation water requirements - Is water available in the quantities needed to irrigate? In Michigan and Indiana evaporation and plant water use from the soil are between 0.25" and 0.30" for several days each summer, systems that can provide 5 gal/acre irrigated will meet the 0.25"/day. Seven gal/acre irrigated is needed to provide 0.30" water requirements. This capacity will be require 24 hours per day 7 days per week continued pumping in time of drought.

Ground water availability - Irrigation is not profitable without a reliable and adequate source of water. Nearby large volume irrigation, municipal or industrial wells are an excellent source of water availability. Well drillers familiar with large volume wells in your area are also excellent resources. Michigan has available groundwater mapping tools that can help evaluate potential water withdrawal sites: <https://msustatewide.msu.edu/Programs/Details/2053>. Indiana information on groundwater availability can be found at: <http://www.in.gov/dnr/water/2451.htm>

Surface water availability - Is surface water available in dependable large volumes? Surface water quantities need to be available at the time of maximum irrigation, often late July early August. This is the season the surface waters are near their lowest. Make sure to evaluate available flow the summer before you start irrigating. In most areas you may not delete stream flow to the extent that it negatively impacts neighbors or the environment. If not, consider part of the water of the States, drainage ditches flow, may be depleted. Remember there can be major contamination challenges impacting food safety in using surface water for vegetable irrigation and cooling.

Water rights and regulation - Make sure you understand your rights and obligation to use water in your State. Example: Michigan operates as a riparian state for surface water use allowing only the property with legal description adjacent to the surface water to receive the water, but well water may be transferred between properties. For information on Michigan water rights see:

https://www.canr.msu.edu/uploads/235/67987/lyndon/Michigan_Water_Law.pdf

For information on Indiana water rights see: <http://www.in.gov/dnr/water/2451.htm>

Water registration - Irrigation water use almost always is considered a large volume water use (capacity to pump > 70 gal./min). In both Indiana and Michigan new installations require a registration. In Indiana this is handled by Indiana DNR find them at:

<http://www.in.gov/dnr/water/2451.htm>

In Michigan you will need to work through the Michigan Water Withdrawal Assessment Tool at <http://www.deq.state.mi.us/wwat/> to determine if your proposed water use is likely to cause a negative environmental impact. At the end of the process you will either be able to register online or may be required to request a site specific review by MDEQ. MDEQ site specific

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reviews may result in allocation of the water resulting in registration or the opportunity to bring together all large volume water users in the watershed to negotiate reducing use by existing water users to allow allocations for a new water use. For information on Michigan's water use registration process see: <https://www.canr.msu.edu/uploads/235/67987/lyndon/9largewaterwith.pdf>

For information on Indiana's water use registration processes see: <http://www.in.gov/dnr/water/2451.htm>

Options for sharing irrigation equipment - Irrigation systems are very scale dependent. Sharing the irrigation expense by jointly investing with a neighbor often leads to a configuration which is better and is more cost effective. For more information on split irrigation cost between neighbors see Fact Sheet #10 at:

https://www.canr.msu.edu/uploads/235/67987/lyndon/10_Shared_Irrigation.pdf

Map your irrigation ideas - Acquire an aerial map of all the land in question for your irrigation projects. Excellent maps and tools are available from Google maps and others or your local USDA Farm Service Agency paper map and a pencil/compass will work. Identify large spaces of land you have available that are adjacent to or may share water sources. Identify major excavation needs such as woodlot or fence line removal. Identify drainage ditch and wet areas that will require modifications for the system to cross.

Power sources - Identify available power sources - a 3 phase power line in close proximity (1/2 mile or less) to potential water source(s) is the cheapest. Liquid fuel storages located near wells and surface water pose potential environmental risks, along with higher equipment, maintenance and fuel cost, leaving engine power as a second choice for most situations.

Get multiple bids - Use irrigation professionals to your advantage. Take your best ideas to at least two irrigation sales/design people. Many will have access to excellent mapping and planning software tools, plus they will have far more experience than most producers in irrigation system design. Compare potential designs on a cost per irrigated acre basis (for an average years irrigation). This process will help equalize investment in equipment with energy cost and labor. Example work sheets are available under the irrigation cost section of the following website: <https://www.canr.msu.edu/irrigation/#costs>

Irrigation economics - Make sure irrigation will pay. Think in terms of increasing your average net income per acre after you have covered the additional irrigation related bills. To receive good outcomes, expect to provide good estimates of increased fixed and variable costs. Figuring this out in advance of the investment is detailed, but is well worth the time. An excellent tool to assist in evaluating the economic feasibility of a proposed project is the "Capital Investment Model" developed by MSU Educator Roger Betz: <https://www.canr.msu.edu/irrigation/#costs>

Crop rotation and tillage preferences - Among the traditional crops, commercial corn and alfalfa have shown the greatest economic advantage to irrigation. Small grains and soybeans have offered some of the lowest returns from added investment in irrigation. Changes in crop rotations often result from adding irrigation. Although it is not always the case, a smaller proportion of irrigated fields are managed using no till systems than non-irrigated fields. Excessive corn residue produced on irrigated fields might be part of the reason.

Specialty/vegetable crop options - Indiana and Michigan's irrigated land is dominated by contracted specialty crops like vegetable and hybrid seed corn production. The reduced risks offered by sandy soils for early planting, less delays after rain for field work, low to no flooding injury potential coupled with the removal of drought stress entice the high dollar invested seed and vegetable crops to the area. These options and conditions are not available everywhere in Michigan and Indiana. Avoid the idea that "if you build it they will come". Do your homework and identify what options are realistically available and feasible for your operation.

Match your farming/family goals to your irrigation ideas - If you think you have a difficult time getting away for a summer vacation now, adding irrigation will greatly increase the required summer labor and cut free time. Capable irrigation labor is hard to find. Misjudging your available labor and management time needs towards completing irrigation can lead to a disaster.

Good irrigation planning can set your direction for a profitable and efficient irrigation future - For more irrigation design and management information visit our website: <https://www.canr.msu.edu/irrigation/>