



Beyond The Panel Pollinator

Installation & Maintenance Issues

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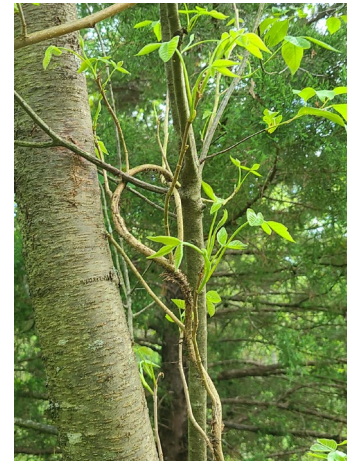
Ideally What You Want To Accomplish

- > Successful production of energy from the solar panels.
- > Good vegetative coverage to control erosion and reduce ground temperature.
- > Vegetative coverage that benefits pollinators and is practical to maintain.
- > Establish deep rooted native plants that allow stormwater percolation.
- > Carbon sequestering and improvement of soil health.



Every Site Is Different

- > 1st every site is different and needs to be analyzed before a planting plan is determined.
- > The soil type and moisture levels need to be determined.
- > Current existing vegetation will determine how to prepare the site.
- > Weed pressures will effect the species composition influenced by what it will take to maintain the site. We don't want to create a maintenance nightmare.
- > Surrounding vegetation is a concern as it will move into the site. Mostly trees.
- > No one seed mix fits for all sites.



Panel height is a consideration

- > Taller panels opens up the species list greatly.
- > Going from 24 inches to 36 inches about doubles the native species that can be used.
- > The ability to get mowing equipment under and around the panels can make maintenance easier.



Seed Mixes for Pollinators

- > You want to stagger bloom times. Pollinators will need pollen and nectar sources from blooming plants in spring summer and fall.
- > When thinking about pollinators think beyond honey bees. Some major groups of pollinating insects: Bees and wasps, flies, butterflies and moths, and beetles.
- > Many natives are host plants for insects. Butterflies and most insects are specialty eaters. They rely on these native host plants to feed and reproduce. Milkweed and Monarchs are the prime example.



Seeding window

- > Native seeding –Optimal time September 1st to June 15th.
- > Low grow fescues and clovers – early spring until June and September until early October.
- > Avoid July and August if possible.
- > Cover crops should germinate in 7 to 10 days.
- > Native plants will take a few years to establish.
- > Heavy soils will slow the process all the way along.
- > In my opinion drill seeding provides the best results.
- > Hydro seeding would work. (Roll after seeding to ensure good seed to soil contact). Same with broadcast.



Heavy Soils and Compaction



Maintenance

- > Site inspection will determine site preparation. If it has a heavy seed bank of broadleaf perennials like Thistle or Pokeweed or Mulberry that needs to be considered. With heavy presence of these type of species you will be fighting the seed bank for years. In that case a grass mixture could be used and the weeds could be controlled with a broadleaf herbicide.
- > Most converted agriculture fields are cleaner and could have a grass and forb mixture.
- > Mowing to prevent annual weeds from re-seeding is a common practice for native plant establishment. The timing for mowing will be determined by the species you wish to control. Mow during flowering but before seed is produced.
- > Spot spraying for woodies and weeds needs to be part of regular maintenance.

Costing Considerations

- > Factors that impact costs during installation and maintenance:
 - Distance between and height of solar arrays
 - Duration and intensity of site preparation
 - Soil conditions (compaction)
 - Previous land use
 - Chemical v. mechanical control
 - Seed mix composition
 - Installation season
 - Erosion control requirements
 - Woody encroachment
 - Mobilization



02 Turfgrass vs. Native Plants (Cardno Project Data)

126 acre site

Year	Native Plantings		Traditional	
	Cost Per Year	Cumulative	Cost Per Year	Cumulative
1	\$79,690.00	\$79,690.00	\$59,850.00	\$59,850.00
2	\$46,250.00	\$125,940.00	\$59,850.00	\$119,700.00
3	\$25,000.00	\$150,940.00	\$59,850.00	\$179,550.00
4	\$46,000.00	\$196,940.00	\$59,850.00	\$239,400.00
5	\$38,200.00	\$235,140.00	\$59,850.00	\$299,250.00
6	\$25,000.00	\$260,140.00	\$59,850.00	\$359,100.00
7	\$18,000.00	\$278,140.00	\$59,850.00	\$418,950.00
8	\$18,000.00	\$296,140.00	\$59,850.00	\$478,800.00
9	\$18,000.00	\$314,140.00	\$59,850.00	\$538,650.00
10	\$18,000.00	\$332,140.00	\$59,850.00	\$598,500.00
11	\$18,000.00	\$350,140.00	\$59,850.00	\$658,350.00
12	\$18,000.00	\$368,140.00	\$59,850.00	\$718,200.00
13	\$18,000.00	\$386,140.00	\$59,850.00	\$778,050.00
14	\$18,000.00	\$404,140.00	\$59,850.00	\$837,900.00
15	\$18,000.00	\$422,140.00	\$59,850.00	\$897,750.00
16	\$18,000.00	\$440,140.00	\$59,850.00	\$957,600.00
17	\$18,000.00	\$458,140.00	\$59,850.00	\$1,017,450.00
18	\$18,000.00	\$476,140.00	\$59,850.00	\$1,077,300.00
19	\$18,000.00	\$494,140.00	\$59,850.00	\$1,137,150.00
20	\$18,000.00	\$512,140.00	\$59,850.00	\$1,197,000.00

12 acre site

Year	Native Plantings		Traditional	
	Cost Per Year	Cumulative	Cost Per Year	Cumulative
1	\$42,900.00	\$42,900.00	\$14,400.00	\$14,400.00
2	\$10,100.00	\$53,000.00	\$18,500.00	\$32,900.00
3	\$10,100.00	\$63,100.00	\$18,500.00	\$51,400.00
4	\$7,300.00	\$70,400.00	\$18,500.00	\$69,900.00
5	\$7,300.00	\$77,700.00	\$18,500.00	\$88,400.00
6	\$6,880.00	\$84,580.00	\$18,500.00	\$106,900.00
7	\$4,600.00	\$89,180.00	\$18,500.00	\$125,400.00
8	\$4,600.00	\$93,780.00	\$18,500.00	\$143,900.00
9	\$4,600.00	\$98,380.00	\$18,500.00	\$162,400.00
10	\$4,600.00	\$102,980.00	\$18,500.00	\$180,900.00
11	\$4,600.00	\$107,580.00	\$18,500.00	\$199,400.00
12	\$4,600.00	\$112,180.00	\$18,500.00	\$217,900.00
13	\$4,600.00	\$116,780.00	\$18,500.00	\$236,400.00
14	\$4,600.00	\$121,380.00	\$18,500.00	\$254,900.00
15	\$4,600.00	\$125,980.00	\$18,500.00	\$273,400.00
16	\$4,600.00	\$130,580.00	\$18,500.00	\$291,900.00
17	\$4,600.00	\$135,180.00	\$18,500.00	\$310,400.00
18	\$4,600.00	\$139,780.00	\$18,500.00	\$328,900.00
19	\$4,600.00	\$144,380.00	\$18,500.00	\$347,400.00
20	\$4,600.00	\$148,980.00	\$18,500.00	\$365,900.00

Sample Budget

Date:	7/30/2020
Project Name:	Sample Site
Acreage:	500.00
Maintenance Effort:	Average

User Input Required

Year	Task		Qty.	Unit	Unit Cost	Total Cost	
Site Installation	Site Planning	No	1.00	LS	\$0.00	\$0.00	\$319,900.00
	Mobilization/ Demobilization	Region 1	4.00	EA	\$600.00	\$2,400.00	
	Seedbed Preparation	Yes	500.00	AC	\$235.00	\$117,500.00	
	Erosion Control Mulch	No	500.00	AC	\$0.00	\$0.00	
	Native Seed Installation	Low	500.00	AC	\$400.00	\$200,000.00	
Year 1	Mowing		2.00	EA	\$87,500.00	\$175,000.00	\$301,800.00
	Herbicide Application		1.00	EA	\$125,000.00	\$125,000.00	
	Mobilization		3.00	EA	\$600.00	\$1,800.00	
Year 2	Mowing		2.00	EA	\$87,500.00	\$175,000.00	\$301,800.00
	Herbicide Application		1.00	EA	\$125,000.00	\$125,000.00	
	Mobilization		3.00	EA	\$600.00	\$1,800.00	
Year 3	Mowing		1.00	EA	\$87,500.00	\$87,500.00	\$213,700.00
	Herbicide Application		1.00	EA	\$125,000.00	\$125,000.00	
	Mobilization		2.00	EA	\$600.00	\$1,200.00	
Year 4	Mowing		1.00	EA	\$87,500.00	\$87,500.00	\$213,700.00
	Herbicide Application		1.00	EA	\$125,000.00	\$125,000.00	
	Mobilization		2.00	EA	\$600.00	\$1,200.00	
Year 5	Mowing		1.00	EA	\$87,500.00	\$87,500.00	\$213,700.00
	Herbicide Application		1.00	EA	\$125,000.00	\$125,000.00	
	Mobilization		2.00	EA	\$600.00	\$1,200.00	
Contingency		0.00%	1.00	LS	\$0.00	\$0.00	\$0.00
ESTIMATED TOTAL				Estimated Total Project Cost:		\$1,564,600.00	
				Estimated Per Acre Cost:		\$3,129.20	

Questions??

75 **YEARS**
Making a
difference.