

# Village of Chagrin Falls

## WWTP Solar Project

October 2022



# Why consider a WWTP Solar Project?

- WWTP plant is the Village's highest electricity consumer
  - Base electric bill is estimated at ~\$140K next year
- Village electricity power contract (PPA) expires June 2023
  - Current PPA rate is \$0.035/kwhr plus \$0.05 First Energy peak/distribution fee = ~\$0.085/kwhr
  - Est. post June 2023 rate is >\$0.085 plus \$0.05 = >\$0.135/kwhr
  - Est. future base rates projected increase 3% per year on average
- Administration explored alternatives and a WTTP solar field appears attractive:
  - Provide 35%-45% of WWTP – fixed cost of ~\$0.04XX/kwhr for 25 years (field life)
    - Cost includes amortized capital cost of \$950K, plus all operating and maintenance cost estimates
    - Awarded \$250K County grant, reducing net capital cost to \$500K (assured)
    - *“Expected/Estimated”* 2022 Inflation Reduction Act payment of \$280,000 – to be confirmed
    - Fund with low-cost debt over 15 or 20 years ... alternative financing/ownership structures being considered OEPA
  - Remainder of electricity consumption remains subject to actual market rate fluctuations



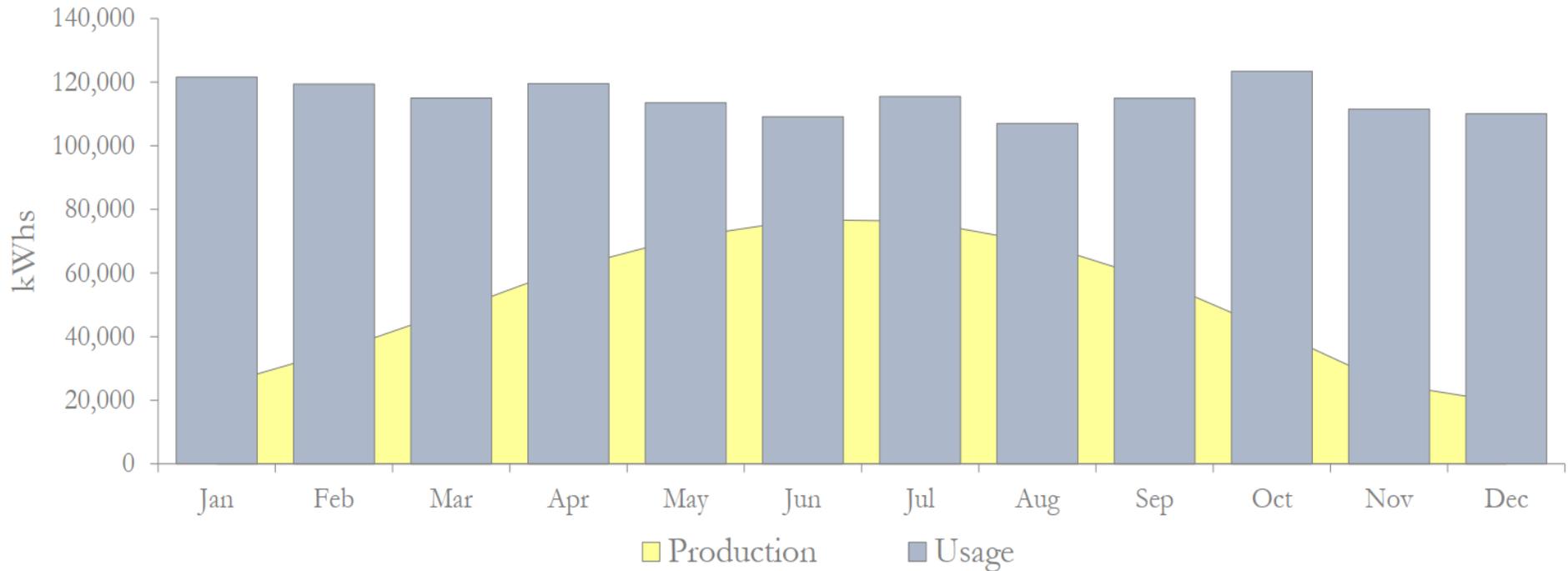
# Levelized Cost of Power (“LCoP”)

- LCoP is the fixed cost of the solar power produced (per kwhr) over the project life
- LCoP conceptually equals (Project Capital Cost plus operating, maintenance costs) divided by (kwhr produced over the project life)
- LCoP assuming only \$250K County Grant: \$0.04X/kwhr fixed over 25 years
- LCoP including Federal ITC Direct Pay: \$0.03X/kwhr fixed over 25 years
  - The potential qualification for this benefit is under investigation and derives from new provisions of August 2022 Inflation Reduction Act.



# Estimated System Production

## Estimated Electric Usage and Solar Production



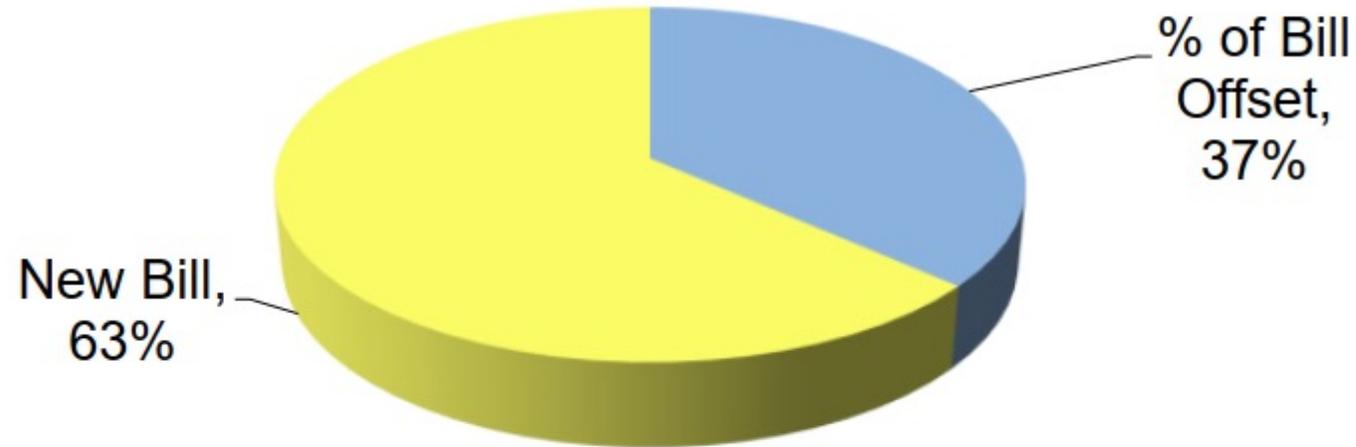
Solar = 607,650 kWh/year    Use 1,380,669 kWh  
Solar should offset approximately 44%



# ELECTRIC BILLS COMPARISON

## Before and After Solar

% of Bill Offset	37%
New Bill	63%

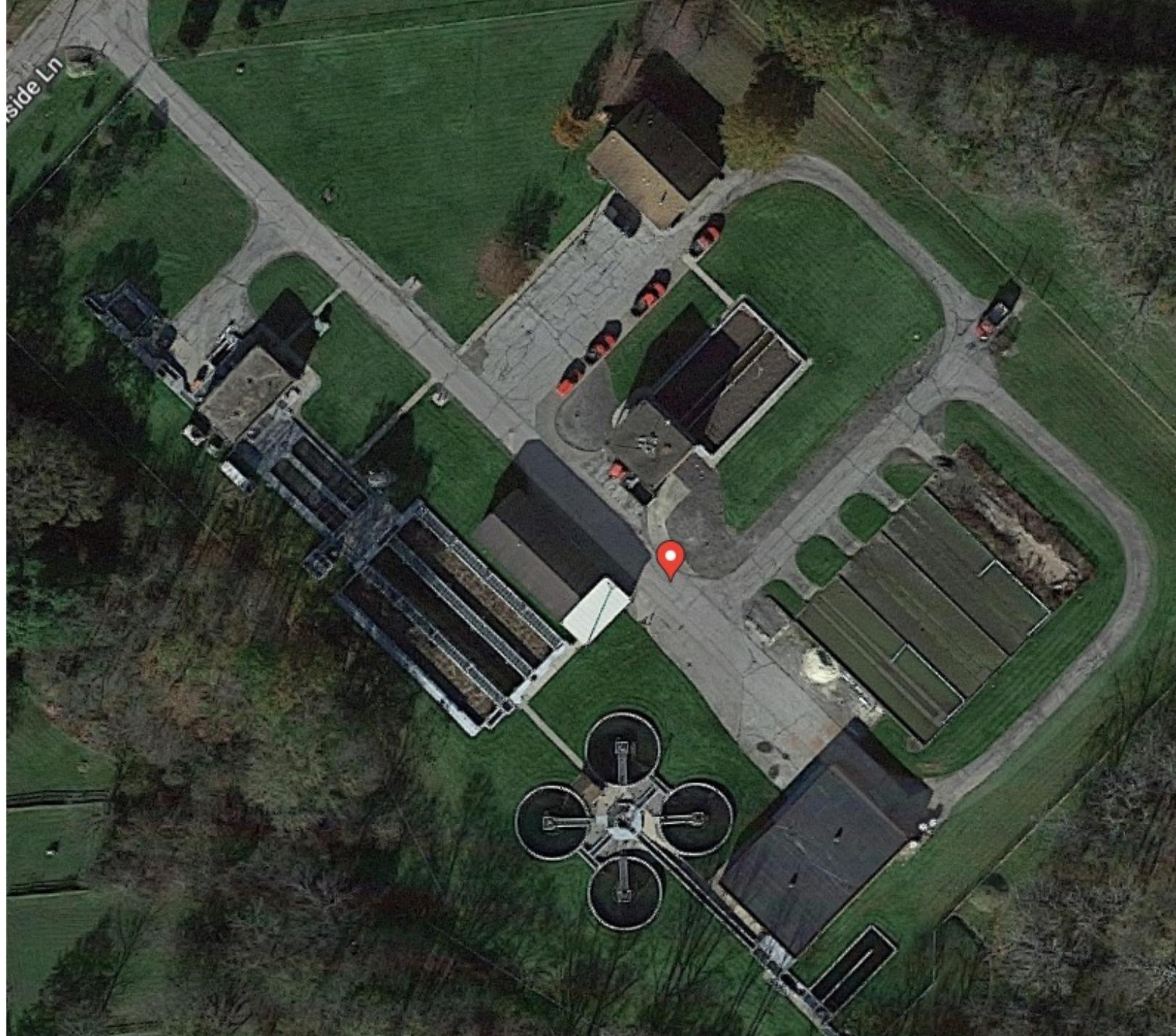


Note: While kwhr from grid is projected to decline by 44%, First Energy peak demand and admin charges remain, reducing net bill reduction to 37%

■ % of Bill Offset      ■ New Bill

Note: All numbers are modelled estimates and subject to adjustment in final form based on further analysis formal quotations

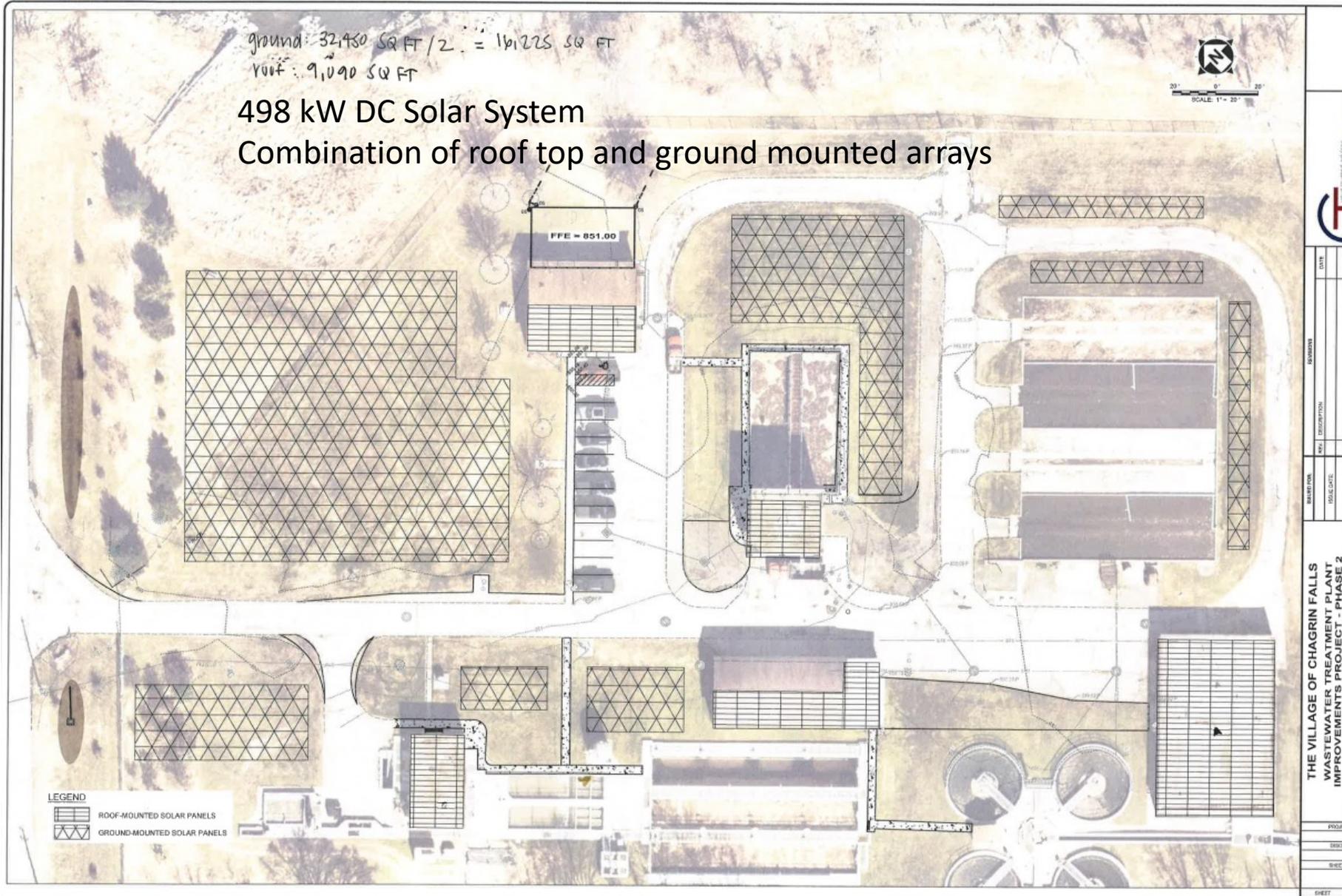
# Chagrin Falls Wastewater Treatment Plant



# Prelim Chagrin Falls WWTP Solar Layout Plan

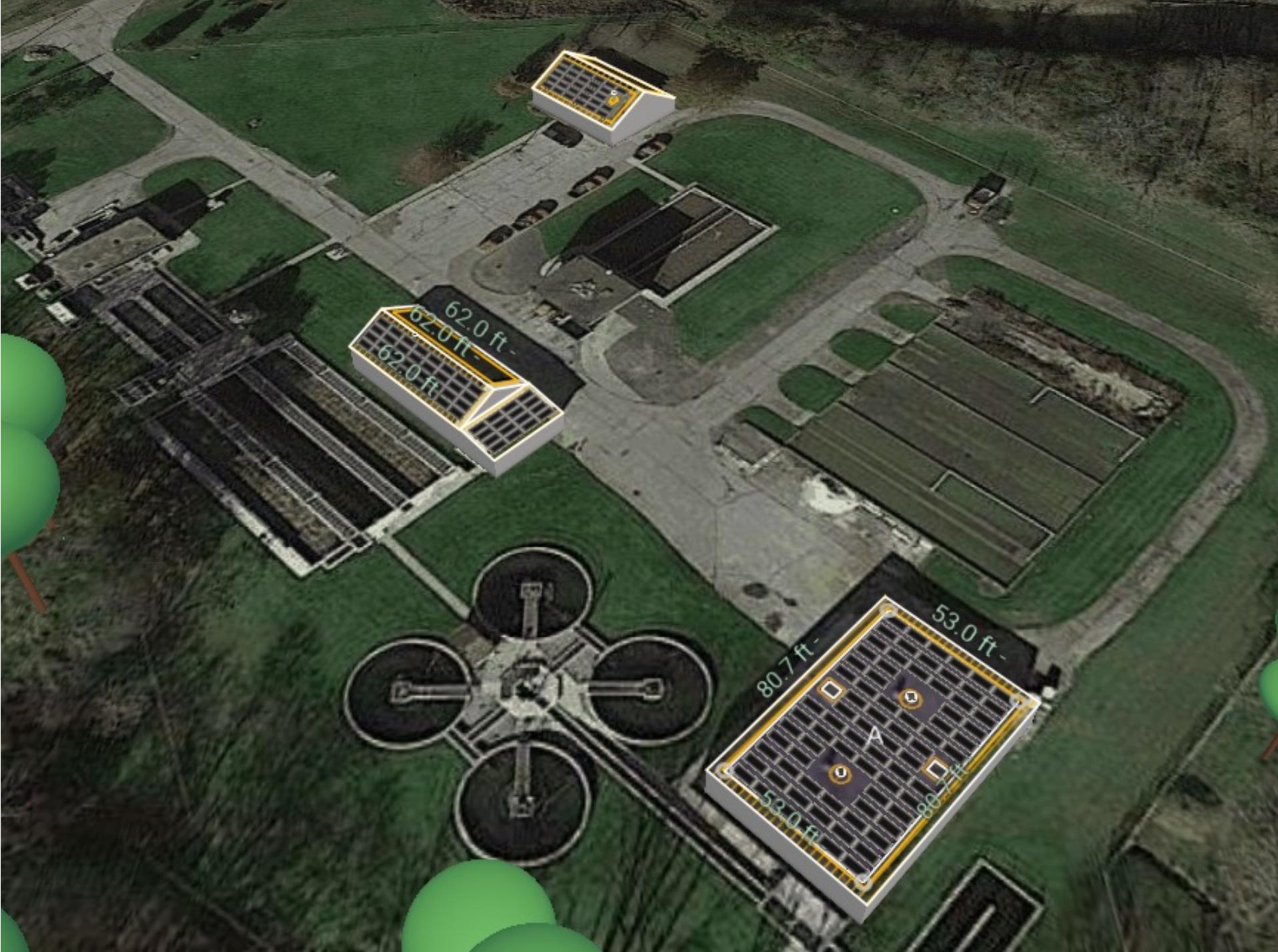
ground: 32,450 SQ FT / 2 = 16,225 SQ FT  
 Roof: 9,090 SQ FT

498 kW DC Solar System  
 Combination of roof top and ground mounted arrays



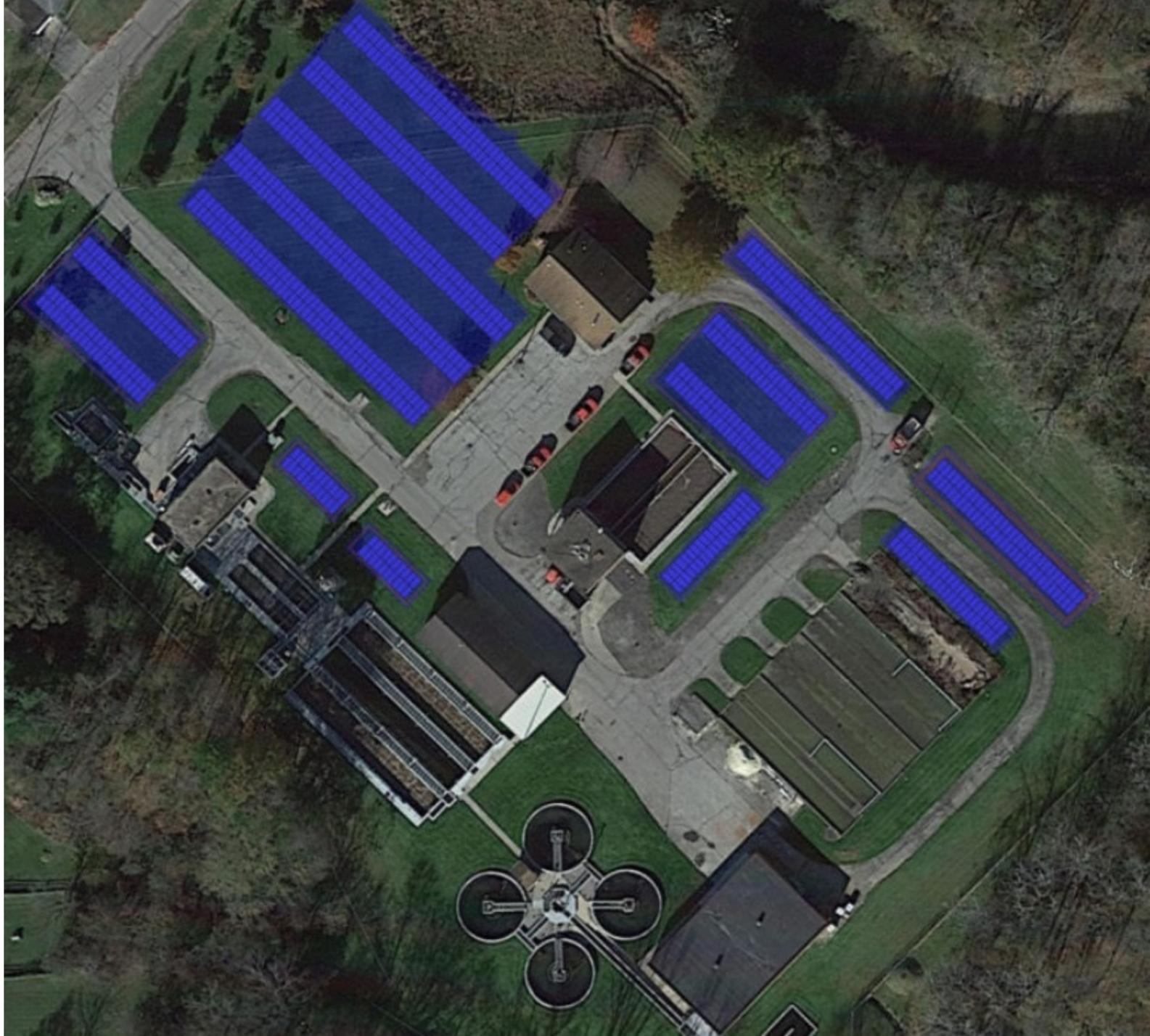
# Proposed Roof-top Solar Arrays

73.9 kW from 3 systems including 154 480-watt panels



# Proposed Ground Mounted Solar Arrays

424.3 kW from  
884 480-watt panels



Typical row of ground array



# Proforma Estimated Savings

Year	Base Electric Bill	New Electric Bill	Annual Savings	YE Debt Balance	YE Principal Payment	Interest @ 2.5%	Total Yr Debt Service	Net Annual Savings
0				\$ 420,000				
1	\$141,230	\$89,580	\$51,650	\$ 399,000	\$ 21,000	\$ 10,500	\$ 31,500	\$ 20,150
2	\$149,703	\$95,161	\$54,542	\$ 378,000	\$ 21,000	\$ 9,975	\$ 30,975	\$ 23,567
3	\$158,686	\$101,089	\$57,597	\$ 357,000	\$ 21,000	\$ 9,450	\$ 30,450	\$ 27,147
4	\$163,446	\$104,352	\$59,094	\$ 336,000	\$ 21,000	\$ 8,925	\$ 29,925	\$ 29,169
5	\$168,350	\$107,719	\$60,631	\$ 315,000	\$ 21,000	\$ 8,400	\$ 29,400	\$ 31,231
6	\$173,400	\$111,193	\$62,207	\$ 294,000	\$ 21,000	\$ 7,875	\$ 28,875	\$ 33,332
7	\$178,602	\$114,777	\$63,825	\$ 273,000	\$ 21,000	\$ 7,350	\$ 28,350	\$ 35,475
8	\$183,960	\$118,476	\$65,484	\$ 252,000	\$ 21,000	\$ 6,825	\$ 27,825	\$ 37,659
9	\$189,479	\$122,292	\$67,187	\$ 231,000	\$ 21,000	\$ 6,300	\$ 27,300	\$ 39,887
10	\$195,163	\$126,230	\$68,933	\$ 210,000	\$ 21,000	\$ 5,775	\$ 26,775	\$ 42,158
11	\$201,018	\$130,292	\$70,726	\$ 189,000	\$ 21,000	\$ 5,250	\$ 26,250	\$ 44,476
12	\$207,049	\$134,484	\$72,565	\$ 168,000	\$ 21,000	\$ 4,725	\$ 25,725	\$ 46,840
13	\$213,260	\$138,809	\$74,451	\$ 147,000	\$ 21,000	\$ 4,200	\$ 25,200	\$ 49,251
14	\$219,658	\$143,271	\$76,387	\$ 126,000	\$ 21,000	\$ 3,675	\$ 24,675	\$ 51,712
15	\$226,248	\$147,875	\$78,373	\$ 105,000	\$ 21,000	\$ 3,150	\$ 24,150	\$ 54,223
16	\$233,035	\$152,624	\$80,411	\$ 84,000	\$ 21,000	\$ 2,625	\$ 23,625	\$ 56,786
17	\$240,026	\$157,525	\$82,501	\$ 63,000	\$ 21,000	\$ 2,100	\$ 23,100	\$ 59,401
18	\$247,227	\$162,580	\$84,647	\$ 42,000	\$ 21,000	\$ 1,575	\$ 22,575	\$ 62,072
19	\$254,644	\$167,796	\$86,848	\$ 21,000	\$ 21,000	\$ 1,050	\$ 22,050	\$ 64,798
20	\$262,283	\$173,178	\$89,105	\$ -	\$ 21,000	\$ 525	\$ 21,525	\$ 67,580
21	\$270,152	\$178,729	\$91,423	\$ -	\$ -	\$ -	\$ -	\$ 91,423
22	\$278,256	\$184,457	\$93,799	\$ -	\$ -	\$ -	\$ -	\$ 93,799
23	\$286,604	\$190,366	\$96,238	\$ -	\$ -	\$ -	\$ -	\$ 96,238
24	\$295,202	\$196,462	\$98,740	\$ -	\$ -	\$ -	\$ -	\$ 98,740
25	\$304,058	\$202,751	\$101,307	\$ -	\$ -	\$ -	\$ -	\$ 101,307
<b>Total</b>	<b>\$5,440,739</b>	<b>\$3,552,068</b>	<b>\$1,888,671</b>	<b>\$3,990,000</b>	<b>\$420,000</b>	<b>\$110,250</b>	<b>\$530,250</b>	<b>\$1,358,421</b>

Assumes:

- Average electricity 3% rate inflation in base bill
- Year-end interest and principal payments
- Includes County grant
- Includes estimated and expected Federal ITC Direct Pay from 2022 Inflation Reduction Act

Note: All numbers are modelled estimates and subject to adjustment in final form based on further analysis formal quotations



# Financing Scenario Summary

- Only considers direct ownership and 100% debt financing options

Financing Scenario	Project Life Savings	Scenario Comment
10-year / 1.9% Rate	\$ 1,424,781	Net savings all years
10-year / 2.5% Rate	\$ 1,410,921	Small net declining cost Year #1 thru #3; Net savings all subsequent years
15-year / 1.9% Rate	\$ 1,404,831	Net savings all years
15-year / 2.5% Rate	\$ 1,384,671	Net savings all years
20-year / 1.9% Rate	\$ 1,384,881	Net savings all years
20-year / 2.5% Rate	\$ 1,358,421	Net savings all years

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# Summary Comments

- Planning targets construction in Spring '23 coordinating with current power contract June 2023 expiration date
- Project is self funding with >\$1.2M lifetime net savings in all funding scenarios
  - Additional research underway to finalize optimal ownership/costs/financing format
- Project decision targeted for 2<sup>nd</sup> October or 1<sup>st</sup> November Council Meeting
- Questions ... Discussion ...

