Tom Williard
Principal
Sage Renewable Energy Consulting

Solar Photovoltaic Feasibility Report

Mountain View Whisman School District

June 14, 2018

AGENDA

1. Introduction and Summary of Findings
2. Solar Photovoltaic (PV) Site Analysis
3. Solar PV Financial Analysis
4. Next Steps

STUDY OVERVIEW

The solar PV feasibility study consisted of:

+ Assessed 10 School Sites and District Office for PV feasibility
+ Evaluated historical and future energy consumption
+ Developed conceptual PV system size and siting for systems
+ Performed preliminary lifecycle financial modeling

FINANCIAL MODELING ASSUMPTIONS

Project Name	Mountain View Whisman SD
Project Lifetime	25 years
Net Energy Metering (NEM) 2.0 Export Energy Rate	Full Retail Rate, minus non-bypassable charges, for 20 years
Annual Utility Inflation Rate	3.0%
Annual Utility Tariff Risk Factor	-0.25%, loss in value of PV energy due to utility rate changes
Time-of-Use (TOU) Grandfathering Loss	-5%, loss in value of PV energy after TOU Grandfathering expires on Dec 31st, 2027
NEM 2.0 Loss	-15%, loss in value of PV energy after NEM 2.0 expires in 20 years
Net Present Value (NPV) Discount Rate (DR)	3.0%

SOLAR PV SYSTEMS SUMMARY

Project Name	Mountain View Whisman SD
Total Targeted Sites	10 School Sites and District Office
Estimated Potential Project Size, kW_p*	1,700 kW_p
Estimated Installed Cost, $	$6,975,000
Annual PV Energy Production, kWh	2,616,000 kWh
Energy Consumption Offset, %	94%
Utility Bill Offset (Yr-1 %)	74%
Lifetime Carbon Offset (Tons eCO_2)	16,000 Tons eCO_2
Shade Square Footage Added, SF	65,000 SF

kW_p or Kilo-Watt Peak is the aggregate size of all PV systems added together based on solar panel wattage rating.

ENERGY USAGE – CURRENT AND FUTURE

No.	Site Name	Current Annual Usage (kWh)	Est. Efficiency/ Additional Load Changes (%)	Future Annual Consumption for PV Design (kWh)
1	Crittenden MS	607,000	-14%	522,000
2	Graham MS	578,000	-4%	556,000
3	Bubb ES	201,000	-23%	154,000
4	Landels ES	220,000	-19%	177,000
5	Huff ES	182,000	-14%	156,000
6 7	Mistral ES Castro ES	150,000	36%	204,000
8	Monta Loma ES	286,000	-16%	242,000
9	Stevenson ES	164,000	20%	197,000
10	Theuerkauf ES	459,000	2%	466,000
11	District Office	65,000	49%	97,000
	Total	**2,912,000**	**-5%**	**2,771,000**

Estimated efficiency/additional load changes capture the effect of **Prop 39 Energy Efficiency (EE) measures and future building footprint changes** on annual energy consumption. For example, energy efficient LED fixtures were installed at many of the school sites. In the case of Monta Loma, this change is expected to reduce annual energy consumption by nearly 45,000 kWh annually.

PV SIZING & PERFORMANCE

No.	Site Name	NEM or NEMA	Year-1 Target PV Production (kWh)	Modeled System Size (kWp)	Year-1 Savings ($)	Year-1 Bill Offset (%)	Design Canopy Area (SF)	Design Rooftop Area (SF)
1	Crittenden MS	NEMA	492,000	310	$83,000	71%	19,000	-
2	Graham MS	NEMA	515,000	335	$98,000	81%	20,000	-
3	Bubb ES	NEM	146,000	90	$22,000	60%	5,000	-
4	Landels ES	NEM	165,000	105	$26,000	65%	6,000	-
5	Huff ES	NEM	146,000	90	$23,000	64%	5,000	-
6 7	Mistral ES Castro ES	NEM	192,000	125	$30,000	65%	4,000	4,000
8	Monta Loma ES	NEMA	227,000	150	$49,000	96%	-	9,000
9 10 11	Stevenson ES Theuerkauf ES District Office	NEMA	720,000	475	$124,000	73%	6,000	22,000
	Total		**2,603,000**	**1,680**	**$455,000**	**74%**	**65,000**	**35,000**

NEM or Net Energy Metering sites have one meter onsite. Sites under **NEMA or Net Energy Metering Aggregation** have more than one meter on the same property or on adjacent or contiguous properties, and consumption on these meters is being aggregated together.

FINANCING OPTIONS

Cash Purchase		Tax-Exempt Lease Purchase (TELP)		Power Purchase Agreement (PPA)	
District owns and maintains the PV systems and accrues all financial and environmental savings.		Essentially a loan. The District would be responsible to maintain the PV systems and pay back the borrowed amount with interest. District owns the PV systems (for a nominal fee) at end of lease.		A third party funds, owns and operates the systems; the District purchases power at a fixed price for a contracted period of 20-25 years from the third party system owner.	
Pros	Cons	Pros	Cons	Pros	Cons
• Highest energy savings.	• Large upfront investment. • District responsible for O&M. • Federal tax credits (ITC credit and MACRS) cannot be used.	• No large upfront investment. • Low interest rate.	• Savings less than those available via cash purchase. • Higher interest than General Obligation debt. • Federal tax credits (ITC credit and MACRS) cannot be used.	• No large upfront investment. • No O&M burden. • Predictable electricity rate. • ITC and MACRS used by third party developer. • Incentives align well: paid only if systems perform.	• Savings less than those available via cash purchase. • Long term (20 - 25 year) contracts.

25-YEAR FINANCIAL MODELING SUMMARY – ALL SITES

Project Name	No PV (Current State)	Cash Financed ($4.15/W)	TELP Financed (4.5% Interest)	PPA Financed ($0.18/kWh)
Energy Costs, Nominal $	$22,568,000	$11,329,000	$22,324,000	$20,642,000
Project Soft Costs, Nominal $	$0	$897,000	$897,000	$0
Simple Payback, Years	N/A	18	24	11
25-Yr Savings, Nominal $	N/A	$3,367,000	$244,000	$1,926,000
25-Yr Project Savings NPV, 3.0% DR	$0	-$164,000	-$1,043,000	$1,065,000

Inclusive of **all District sites** in the portfolio.

SOLAR PV SYSTEMS SUMMARY – BEST VALUE SITES

Project Name	Mountain View Whisman SD
Total Targeted Sites	3 Sites (Crittenden MS, Graham MS, Monta Loma ES)
Estimated Potential Project Size, kW_p	795 kW_p
Estimated Installed Cost, $	$2,975,000
Annual PV Energy Production, kWh	1,234,000 kWh
Energy Consumption Offset, %	94%
Utility Bill Offset (Yr-1 %)	80%
Lifetime Carbon Offset (Tons eCO_2)	7,000 Tons eCO_2
Shade Square Footage Added, SF	38,000 SF

Sites with **system size greater than 150 kWp** are included above, except for Stevenson-DO-Theuerkauf which requires PV design consolidation and optimization for better installed cost.

25-YEAR FINANCIAL MODELING SUMMARY – BEST VALUE SITES

Project Name	No PV (Current State)	Cash Financed ($3.8/W)	TELP Financed (4.5% Interest)	PPA Financed ($0.165/kWh)
Energy Costs, Nominal $	$10,500,000	$4,748,000	$9,586,000	$8,866,000
Project Soft Costs, Nominal $	$0	$497,000	$497,000	$0
Simple Payback, Years	N/A	16	21	<1
25-Yr Savings, Nominal $	N/A	$2,288,000	$914,000	$1,634,000
25-Yr Project Savings NPV, 3.0% DR	$0	$480,000	$93,000	$1,004,000

The above analysis is for **three sites**: Crittenden MS, Graham MS, Monta Loma ES.

NEXT STEPS

Finalize Optimal PV Siting

Board decision to move forward with RFP

RFP issued - select best value solar vendor

Contract negotiated with solar PV vendor

Board decision to accept contract

Final design, permitting

Construction

Commissioning and interconnection

Commercial operation and project

For more information:

Tom Williard

Principal

O: 415.663.9914

C: 415.847.9066

tom@sagerenew.com

APPENDIX

DEFINITIONS

- **Investment Tax Credit (ITC)** - The ITC is a federal tax credit that allows taxable entities to deduct 30% of the system installed cost from their federal taxes. PPA developers utilize this credit to finance projects. The ITC level is scheduled to drop to 26% for projects with a construction start in 2020, 22% in 2021, and 10% for 2023 onwards. As the ITC steps down, PPA pricing will likely increase.

- **Net Energy Metering (NEM)** - Under NEM, when a PV system produces more power than is used at the site at any instant, the excess energy is fed back into the utility system grid and the customer is credited for the cost of the excess electricity generated. This proposed solar project would be interconnected under the NEM 2.0 Guidelines. NEM 2.0 is grandfathered for 20 years from the date of initial operation of the additional solar PV system, after which point, exported energy is likely to have a lower value.

- **Net Energy Metering Aggregation (NEMA)** - Under NEMA, a single site with multiple meters on the same property, or on the customer's adjacent or contiguous property, can use renewable energy generation to serve their aggregated load behind all eligible meters. The site with PV (generating account) produces energy for itself and the adjacent meters (load or benefitting accounts). Exported energy is allocated to all accounts in the NEMA arrangement based on the proportion of the most recent year's usage for each meter.

- **Time of Use (TOU) -** Under TOU tariffs, rates vary by time of day. Rates are higher during times of the day when demand on the grid is higher and vice-versa. Rates are also comparatively higher in the summer than in the winter. Beginning in 2020, PG&E is changing summer peak TOU periods from 12:00 pm - 6:00 pm to 4:00 pm - 9:00 pm, thereby lowering the value of solar. However, the District sites are grandfathered on existing TOU periods for a period of 10 years until December 31st, 2027.

PROJECT RISK CONSIDERATIONS

Market Risks	Mitigation
Investment Tax Credit (ITC) Stepdown (drops to 26% in 2020, 22% in 2021, and 10% after 2023)	Beginning solar implementation project before 2020.
PV Module import tariff (30% in 2018, decreasing by 5%/year, until 2022)	Conservative modeling.
Steel import tariff (25% on foreign made steel)	Conservative modeling.
Utility cost escalation is less than expected or solar friendly utility rate schedules change	Conservative modeling. Ongoing advocacy for solar with the California Public Utilities Commission (CPUC).

PRELIMINARY SITE PLANS

Target PV - 315 kWp

PV Shown - 310 kWp (98%)

Crittenden MS

Mt. View Whisman SD
Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES

Target PV - 340 kWp

PV Shown - 330 kWp (97%)

Graham MS

Mt. View Whisman SD
Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES

Target PV - 90 kWp

PV Shown - 90 kWp (100%)

Bubb ES

Mt. View Whisman SD
Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES

Target PV - 105 kWp

PV Shown - 105 kWp (100%)

Landels ES

Mt. View Whisman SD
Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES

Target PV - 90 kWp

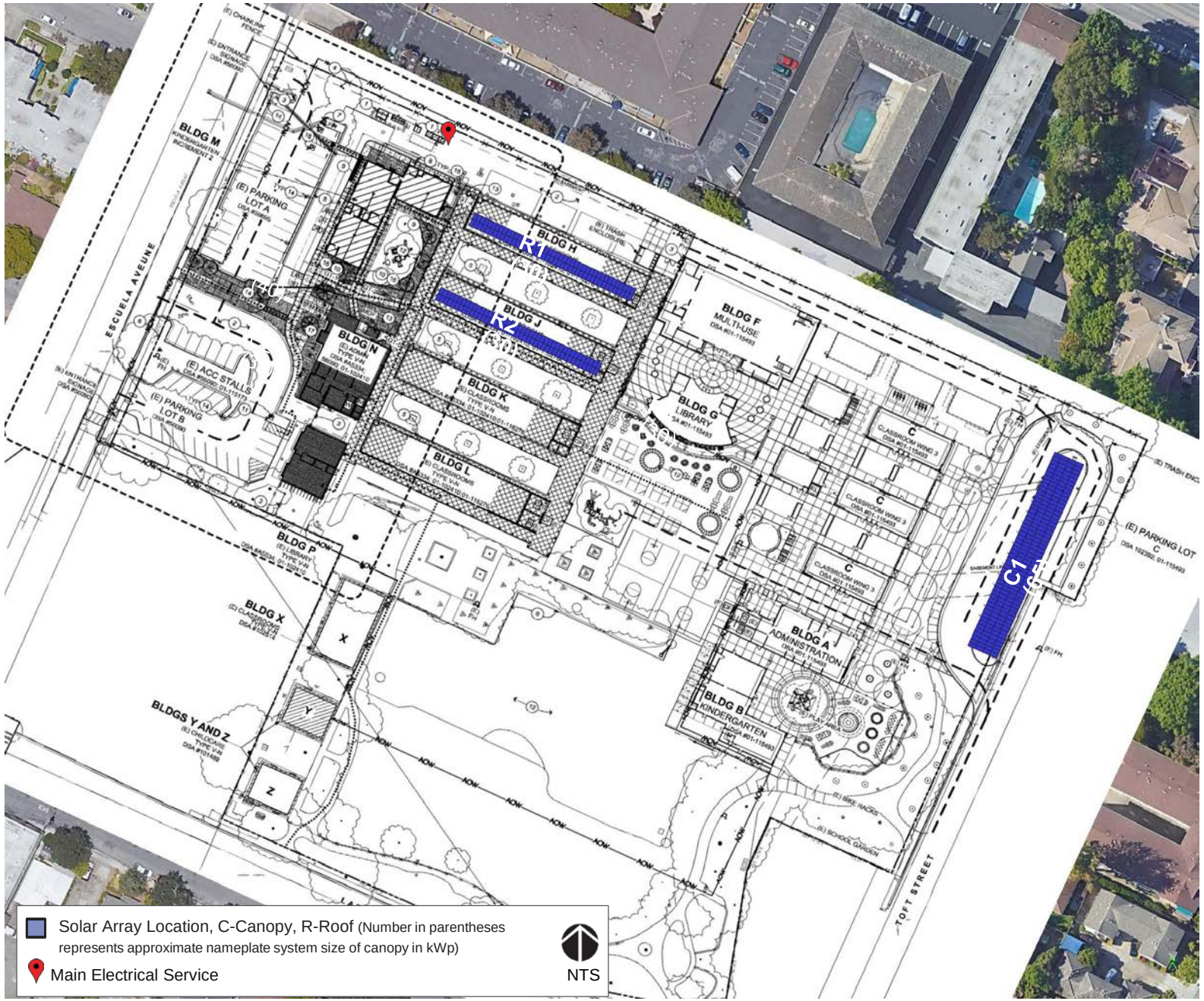
PV Shown - 90 kWp (100%)

Huff ES

Mt. View Whisman SD
Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES



Target PV - 125 kWp

PV Shown - 125 kWp (100%)

Castro-Mistral

Mt. View Whisman SD

Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES

Target PV - 150 kWp

PV Shown - 150 kWp (100%)

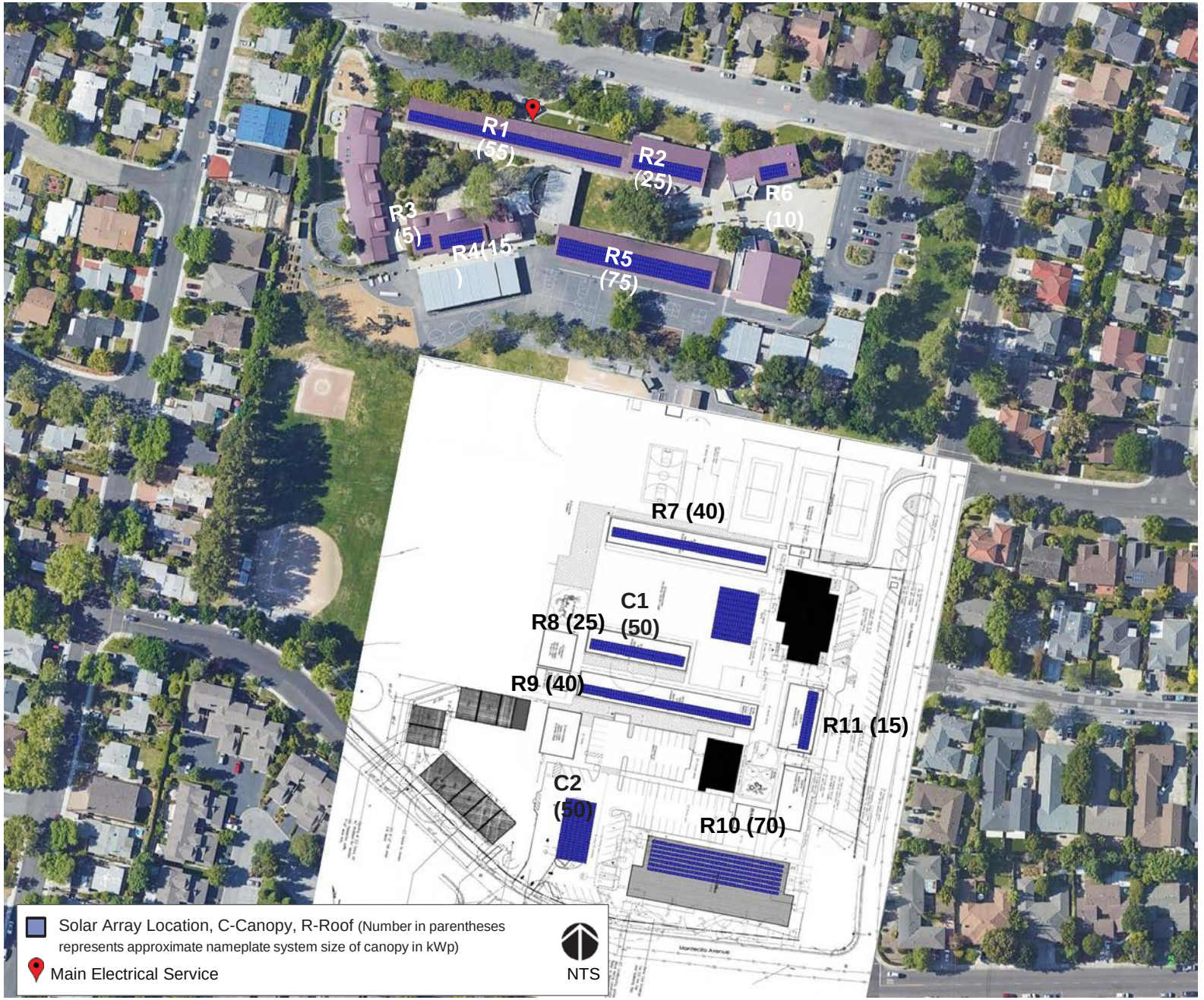
Monta Loma ES

Mt. View Whisman SD

Solar PV Feasibility

Preliminary Design

SAGE RENEWABLES



Target PV - 475 kWp

PV Shown - 475 kWp (100%)

Theuerkauf ES
Stevenson ES
District Office

Mt. View Whisman SD

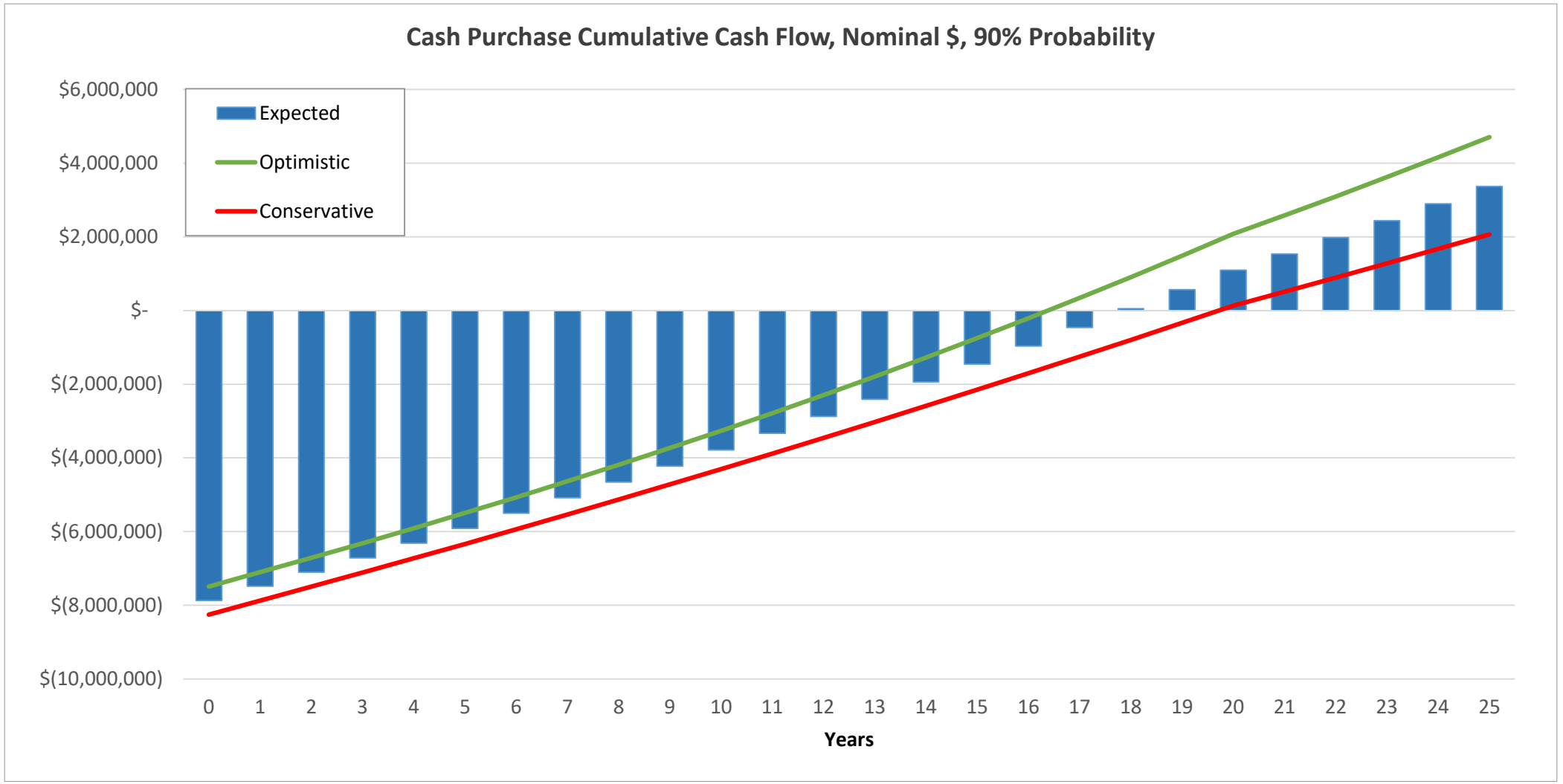
Solar PV Feasibility

Preliminary Design

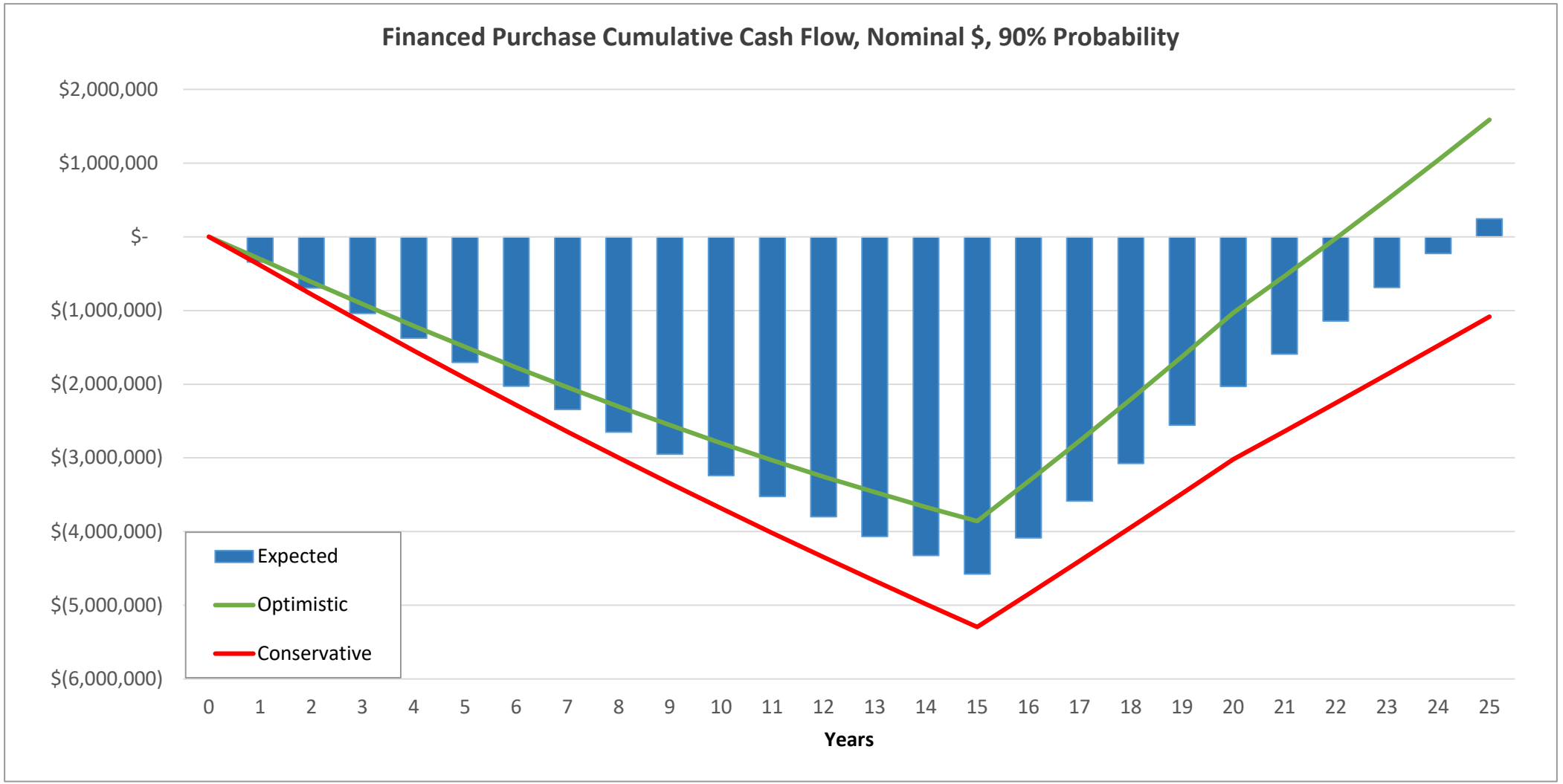
SAGE RENEWABLES

CUMULATIVE PROJECT CASH FLOW - ALL SITES

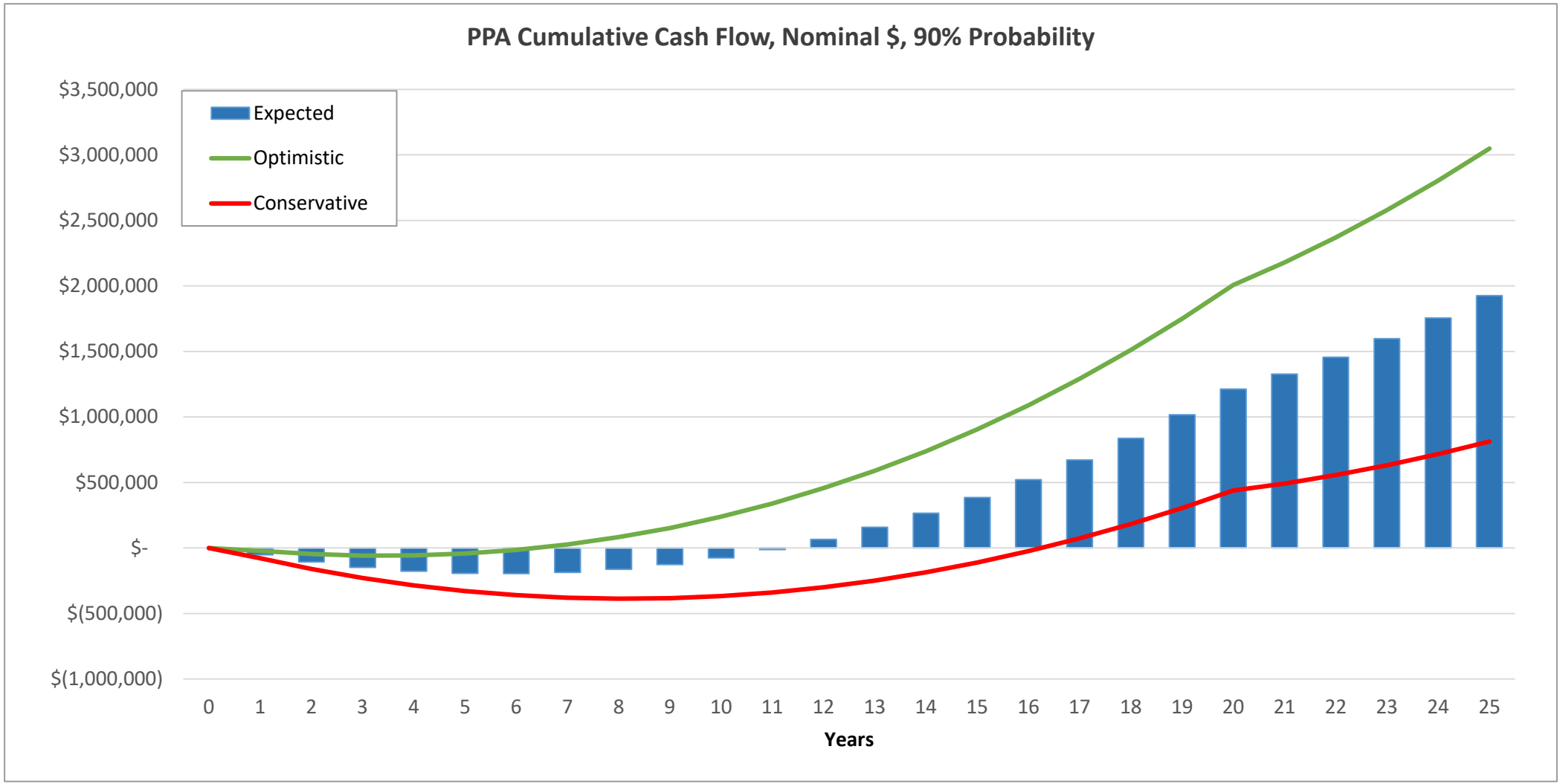
CASH – CUMULATIVE PROJECT CASH FLOW (ALL SITES)



TELP – CUMULATIVE PROJECT CASH FLOW (ALL SITES)



PPA – CUMULATIVE PROJECT CASH FLOW (ALL SITES)



CUMULATIVE PROJECT CASH FLOW - BEST VALUE SITES

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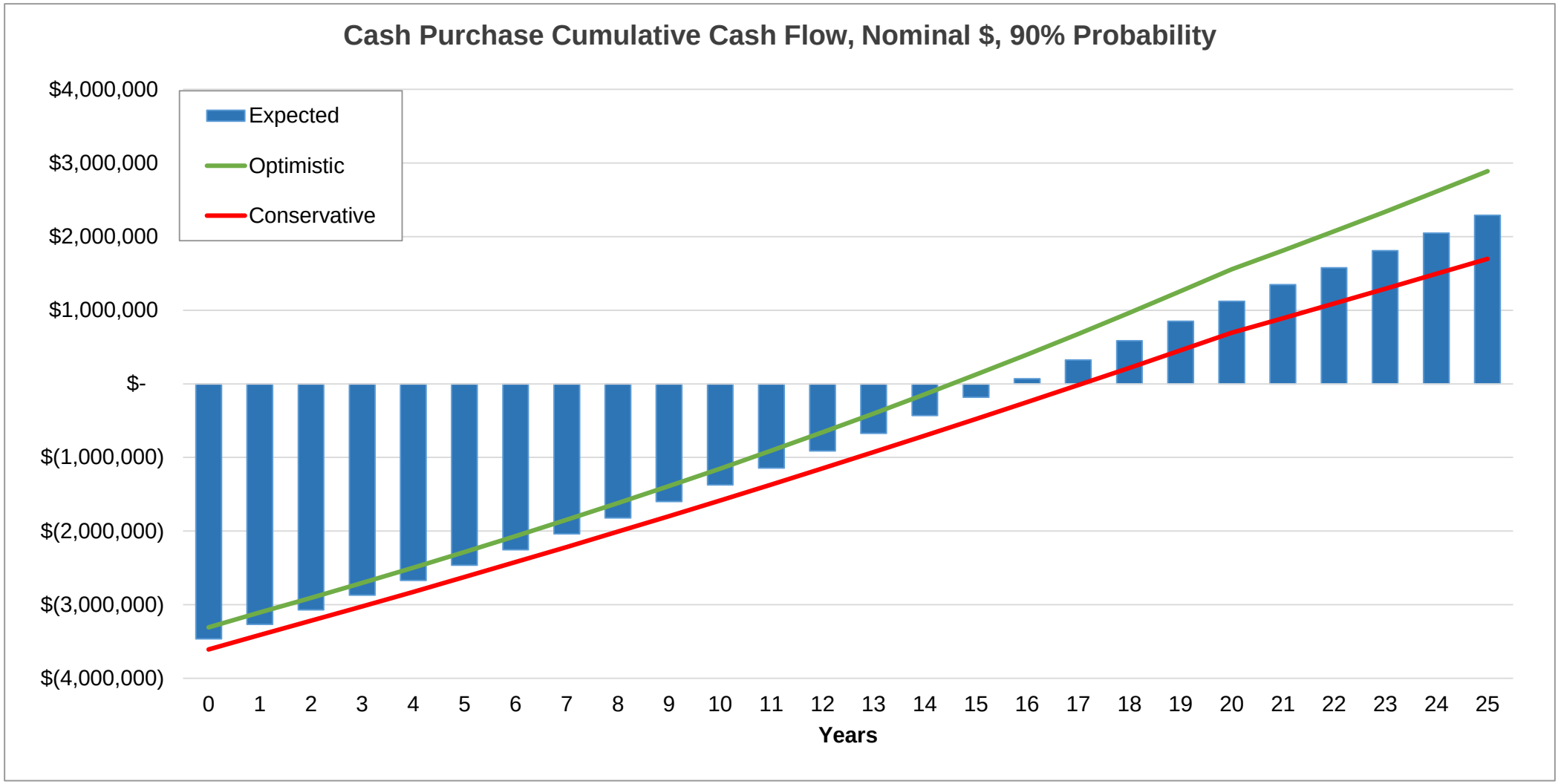

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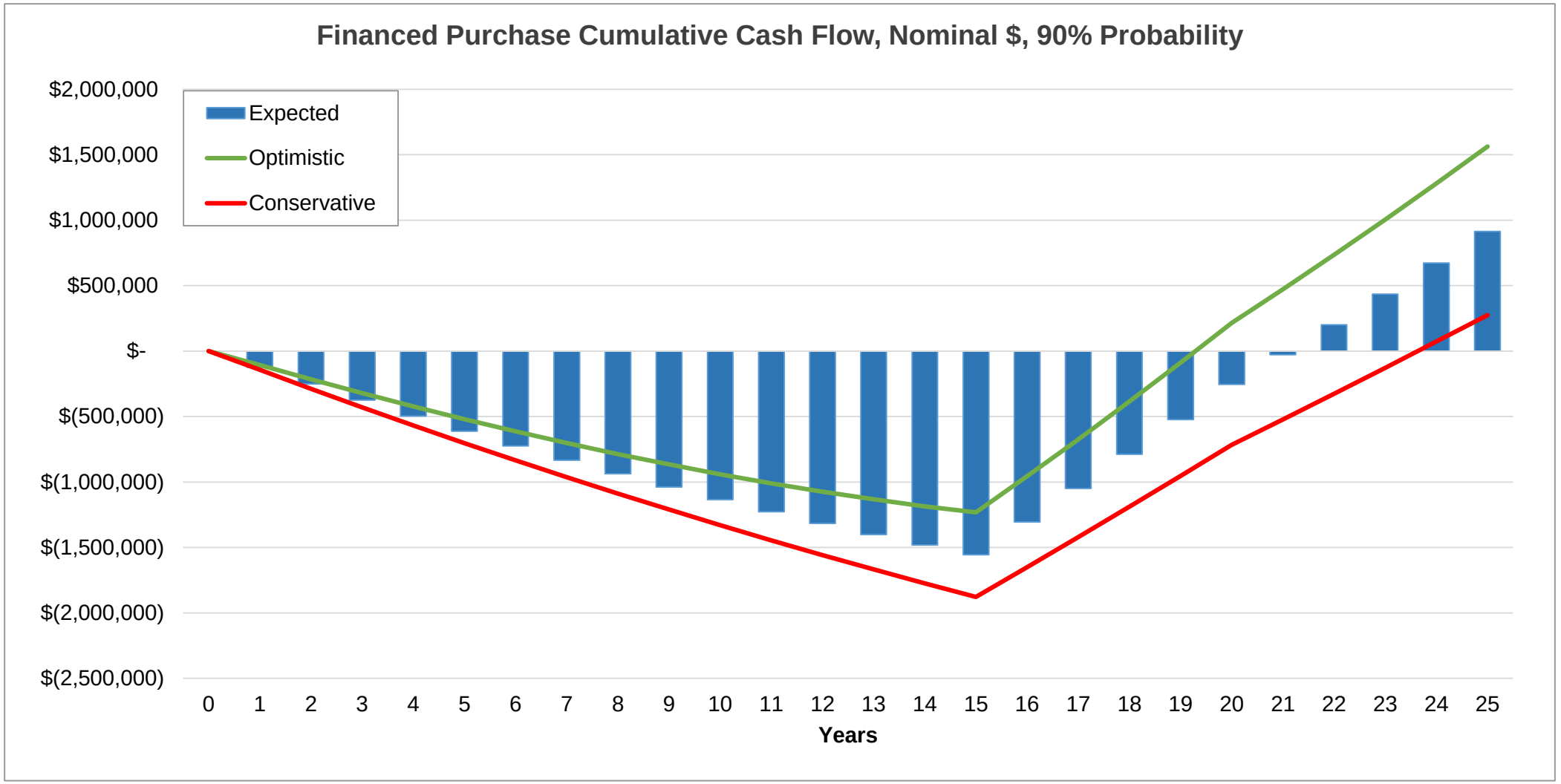

PPA – CUMULATIVE PROJECT CASH FLOW (BEST VALUE SITES)