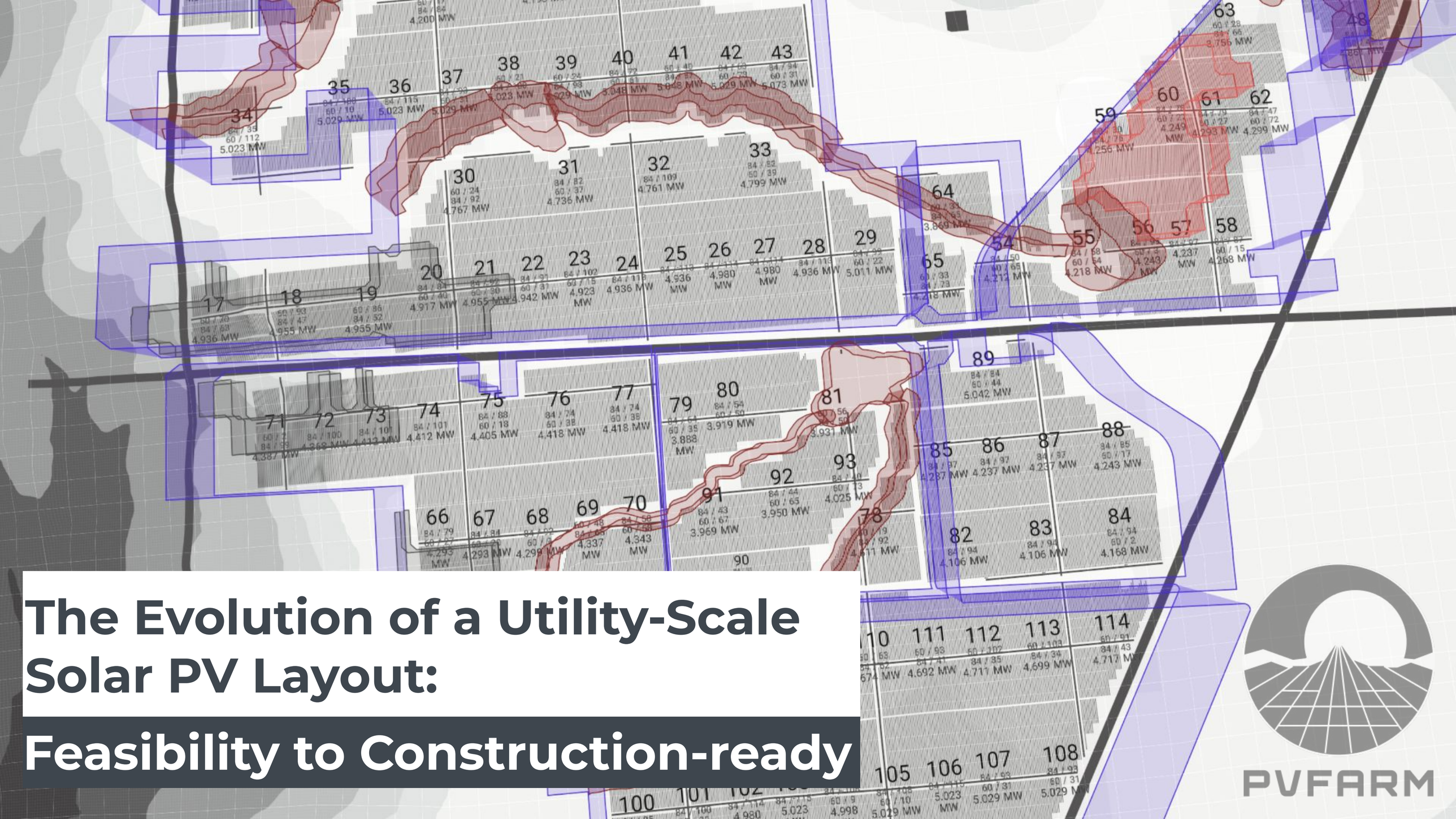
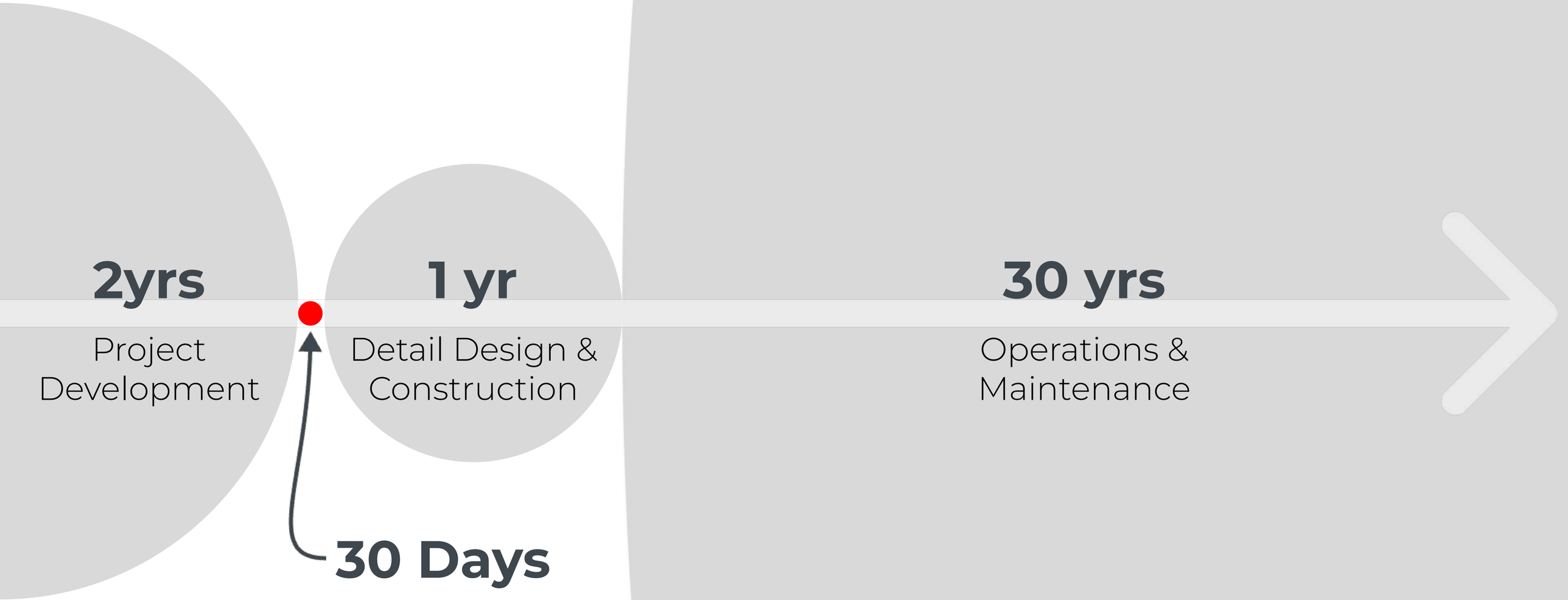
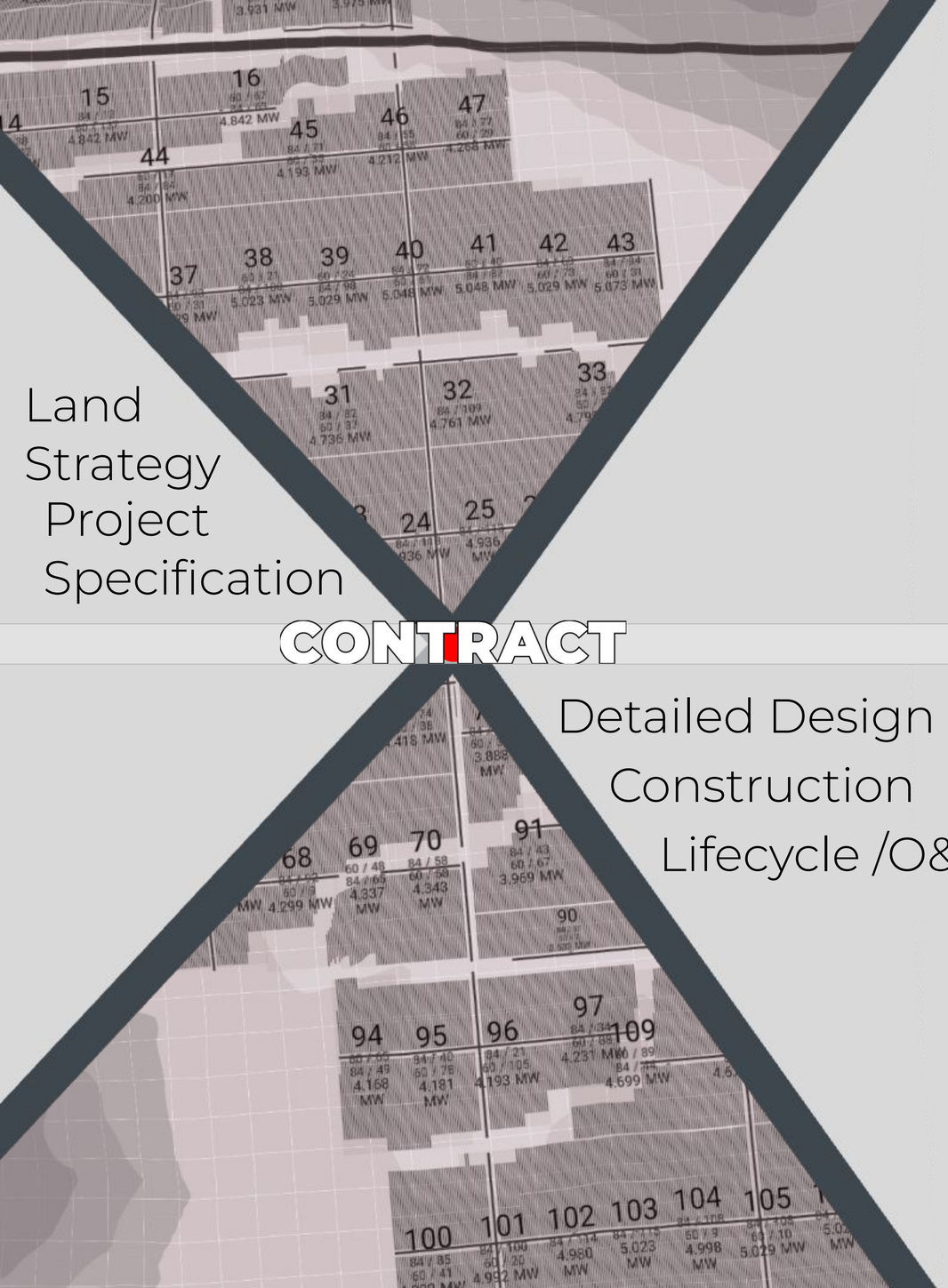


The Evolution of a Utility-Scale Solar PV Layout:

Feasibility to Construction-ready

PVFARM


2yrs
Project Development
1 yr
Detail Design & Construction
30 yrs
Operations & Maintenance
30 Days



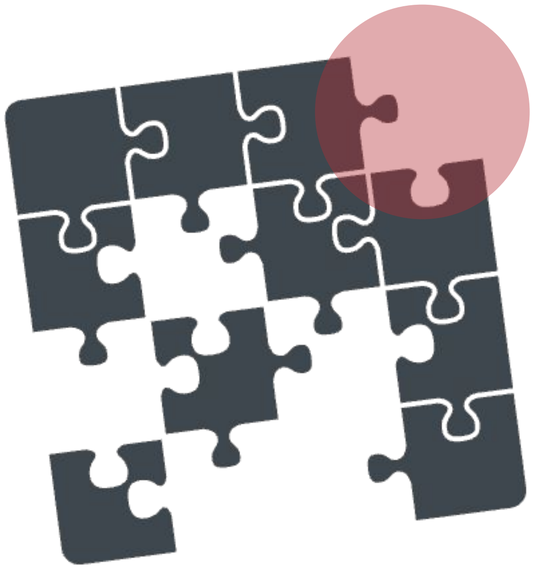
Land
Strategy
Project
Specification

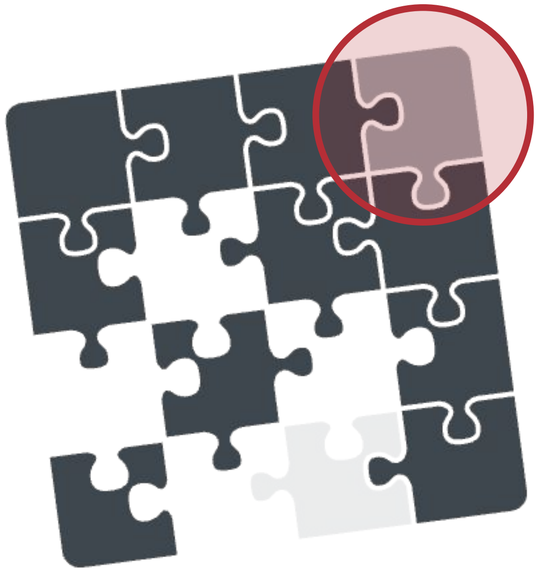
CONTRACT

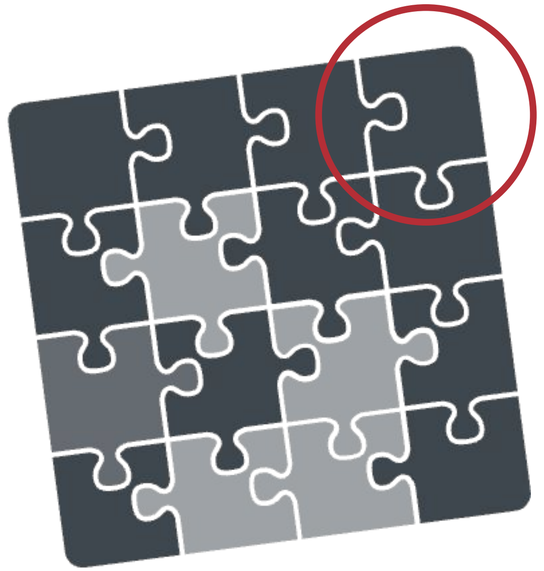
Detailed Design
Construction
Lifecycle /O&M

PVFARM

WHY DOES A LAYOUT EVOLVE?







Gaps and Unknowns

Identifying missing information and uncertainties in designing layout, highlighting areas for further research

Assumptions

Developing hypotheses to bridge knowledge gaps, using available data and trends

Verified/Reliable Data

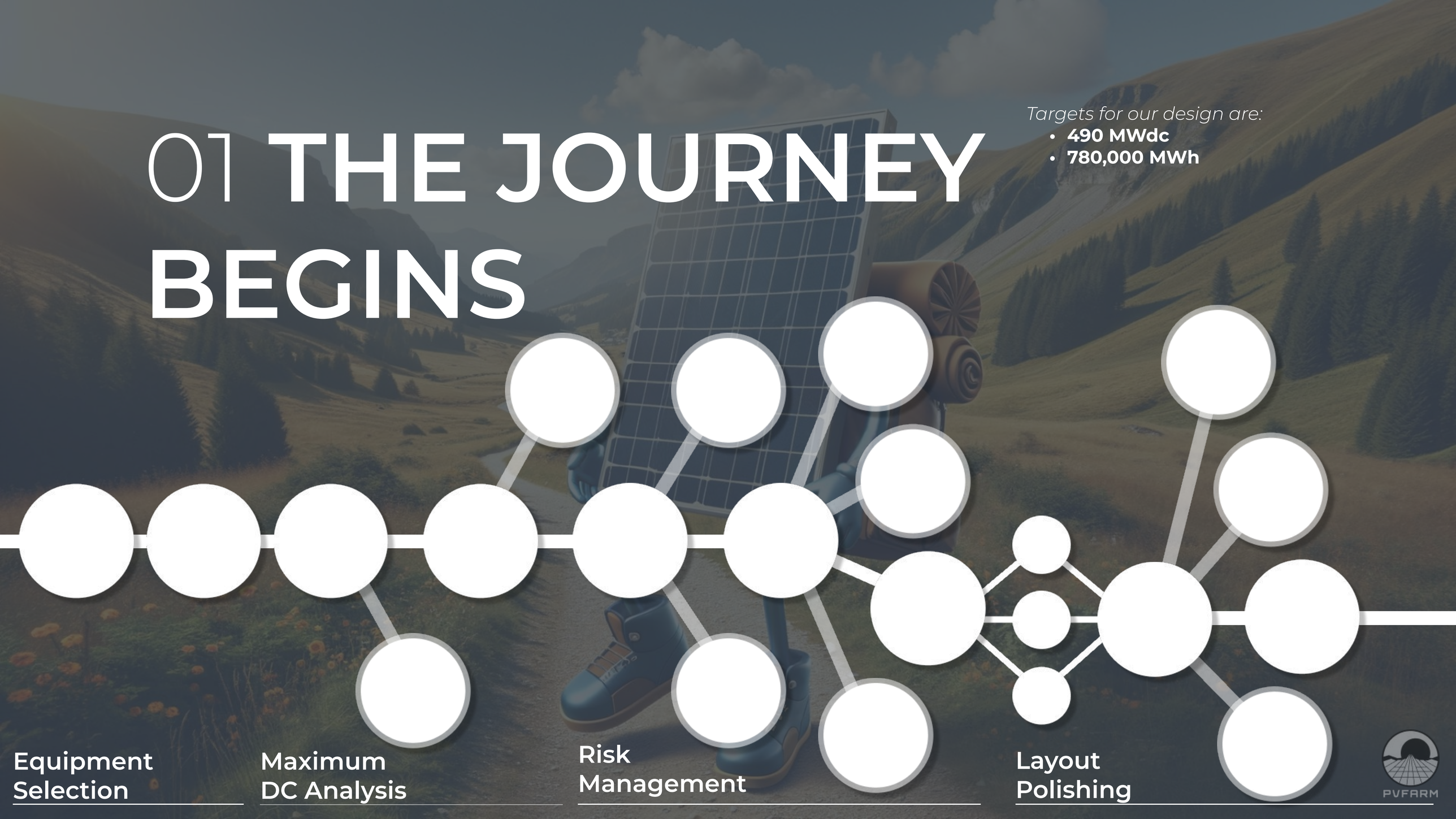
Consolidates verified and accurate data, providing a solid foundation to support or challenge assumptions

PVFARM

01 THE JOURNEY BEGINS

Targets for our design are:

- **490 MWdc**
- **780,000 MWh**



Equipment Selection

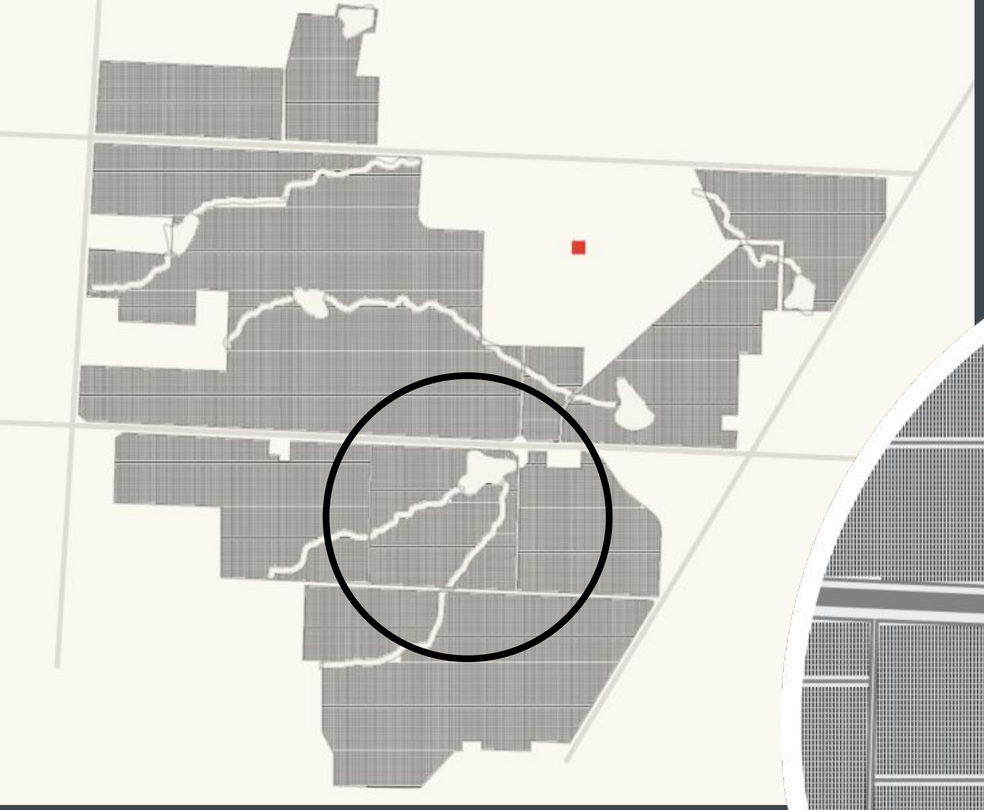
Maximum DC Analysis

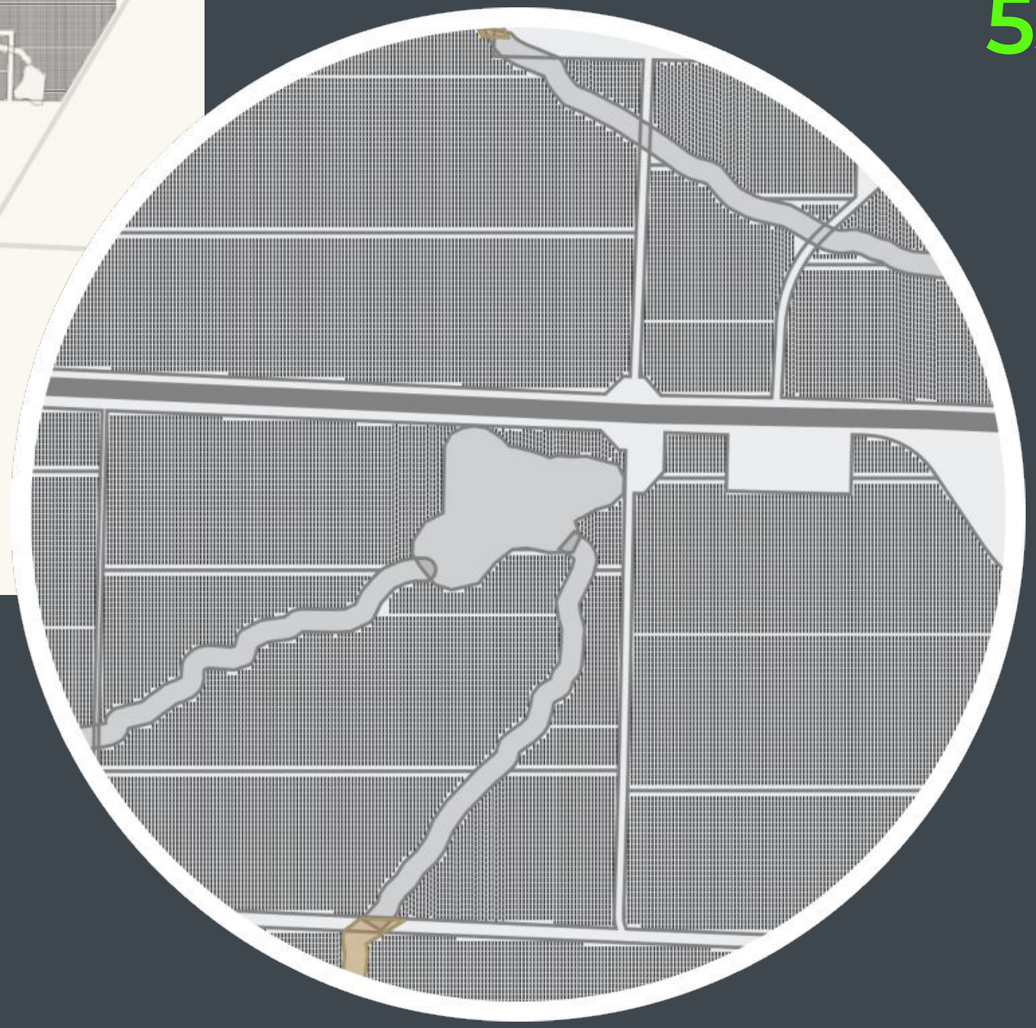
Risk Management

Layout Polishing

PVFARM

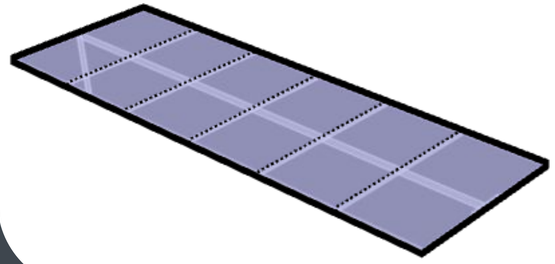

WHAT YOU OWN
+
WHERE YOU CAN LEGALLY BUILD
=
LAYOUT
...but is it practical?
PVFARM





533.5 MWdc

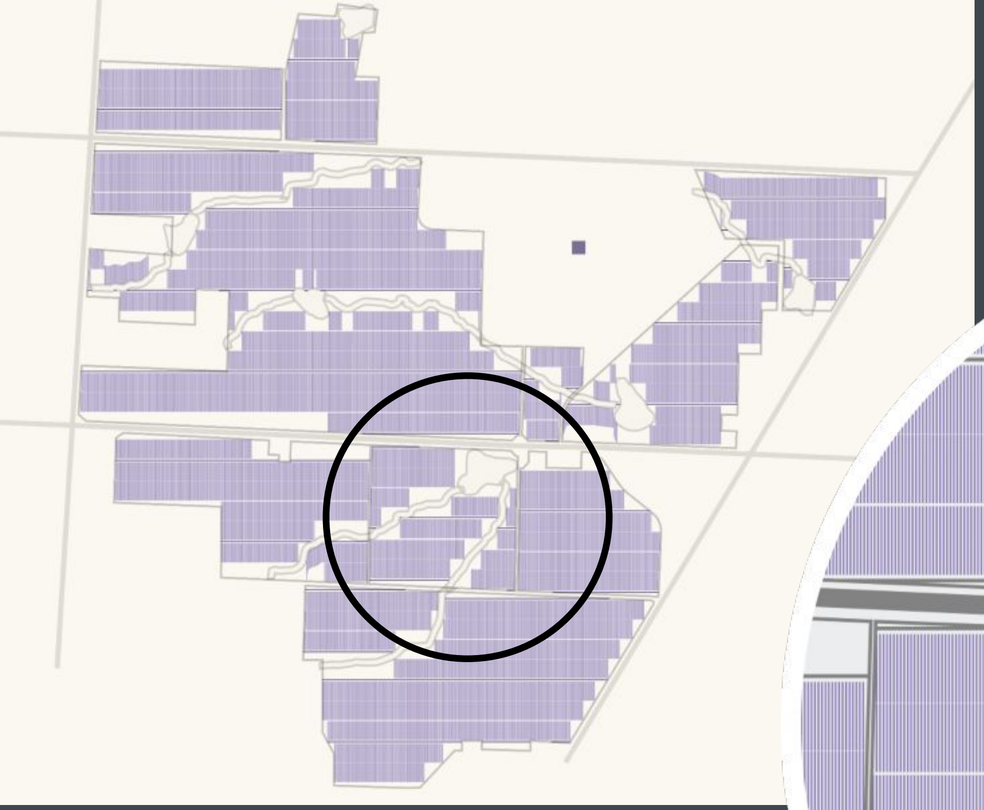
6 mod, 1 string table

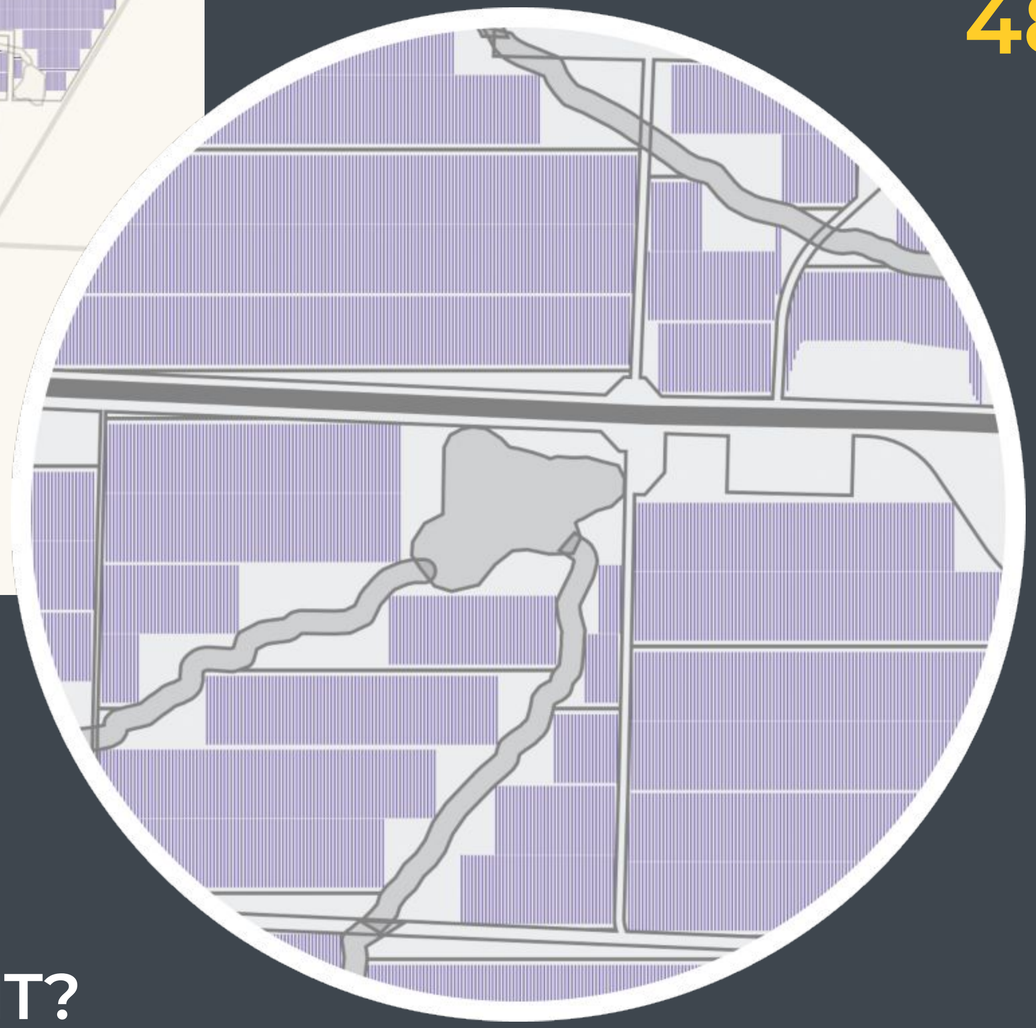


HOW MUCH DC CAN WE FIT?

"He who seeks to mount the sun's chariot with hardware not found in market or craft, dreams of a carriage without horses."
- Plato

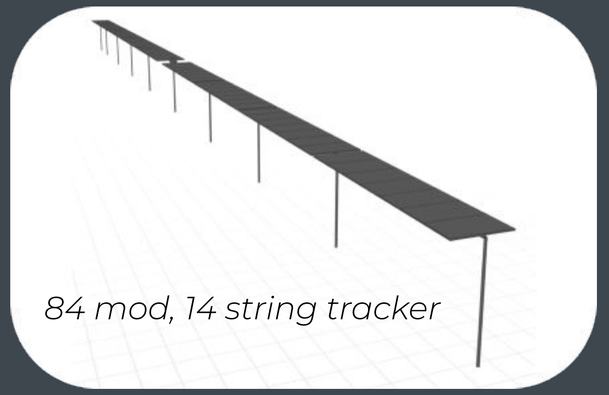
PVFARM





486.7 MWdc↓

533.5 MWdc

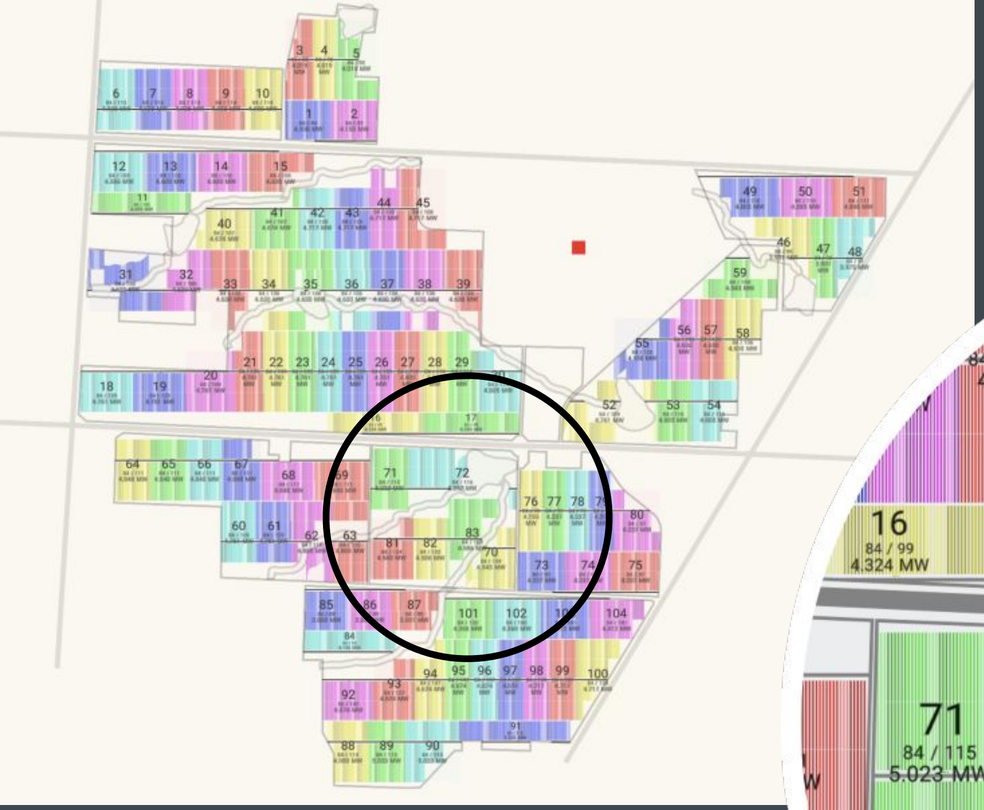


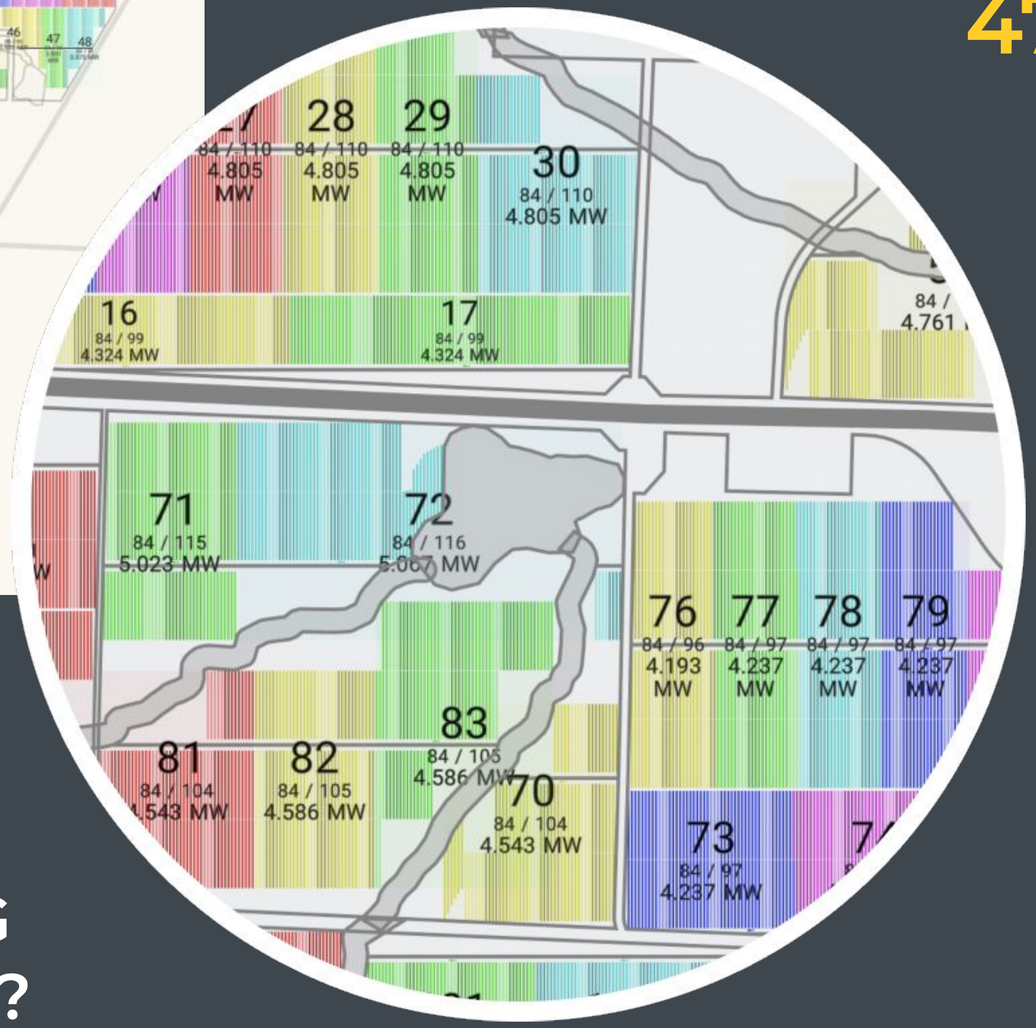
84 mod, 14 string tracker

HOW MANY TRACKERS CAN WE FIT?

"In the tapestry of solar energy, omitting inverters is akin to leaving out the threads that bind the pattern."
- Friedrich Nietzsche

PVFARM



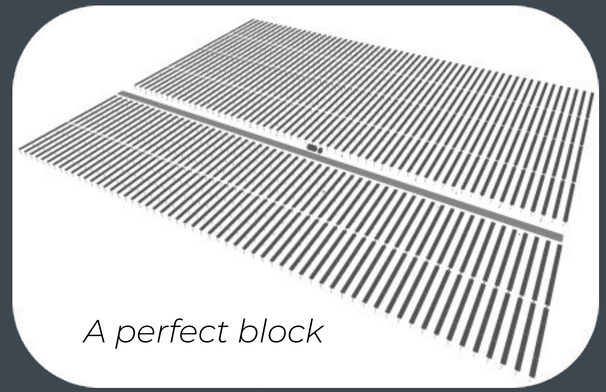


478.4 MWdc↓

486.7 MWdc

533.5 MWdc

HOW WILL BLOCKING AFFECT OUR OUTPUT?



A perfect block

"Even the most exquisite block, hewn with perfection, holds no purpose if it cannot be placed within the edifice." - Aristotle

PVFARM

02 THE HUNT FOR DC

Targets for our design are:

- **490 MWdc**
- **780,000 MWh**

Current Plant Capacity:

- **478 MWdc**

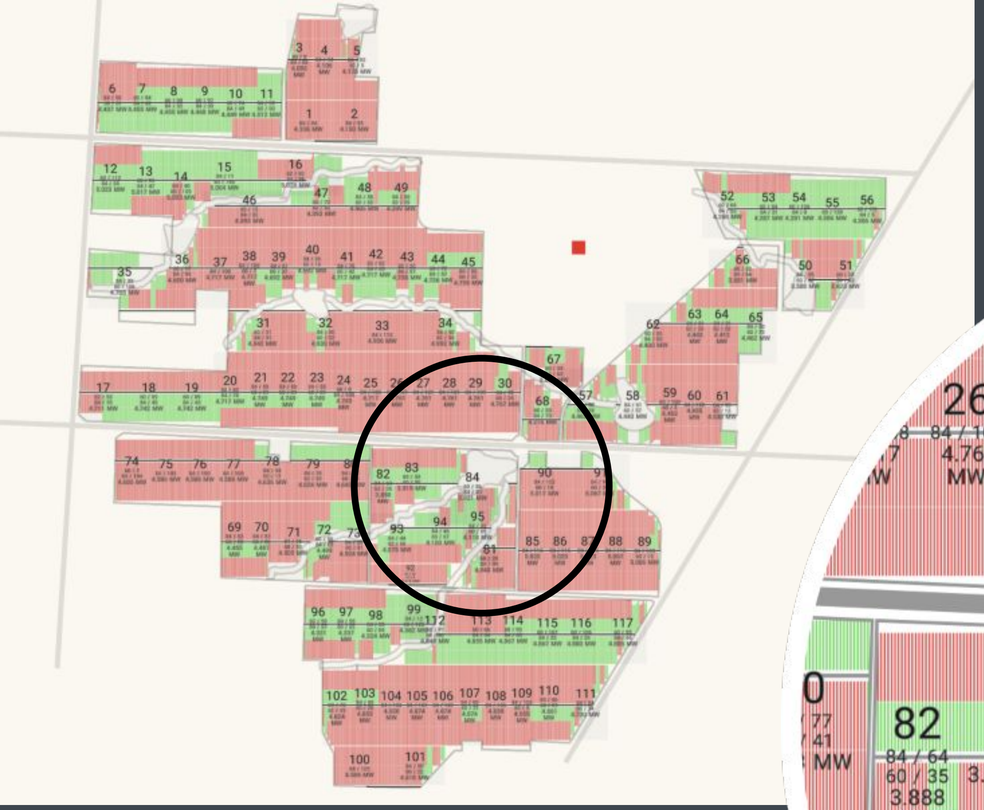
Equipment Selection

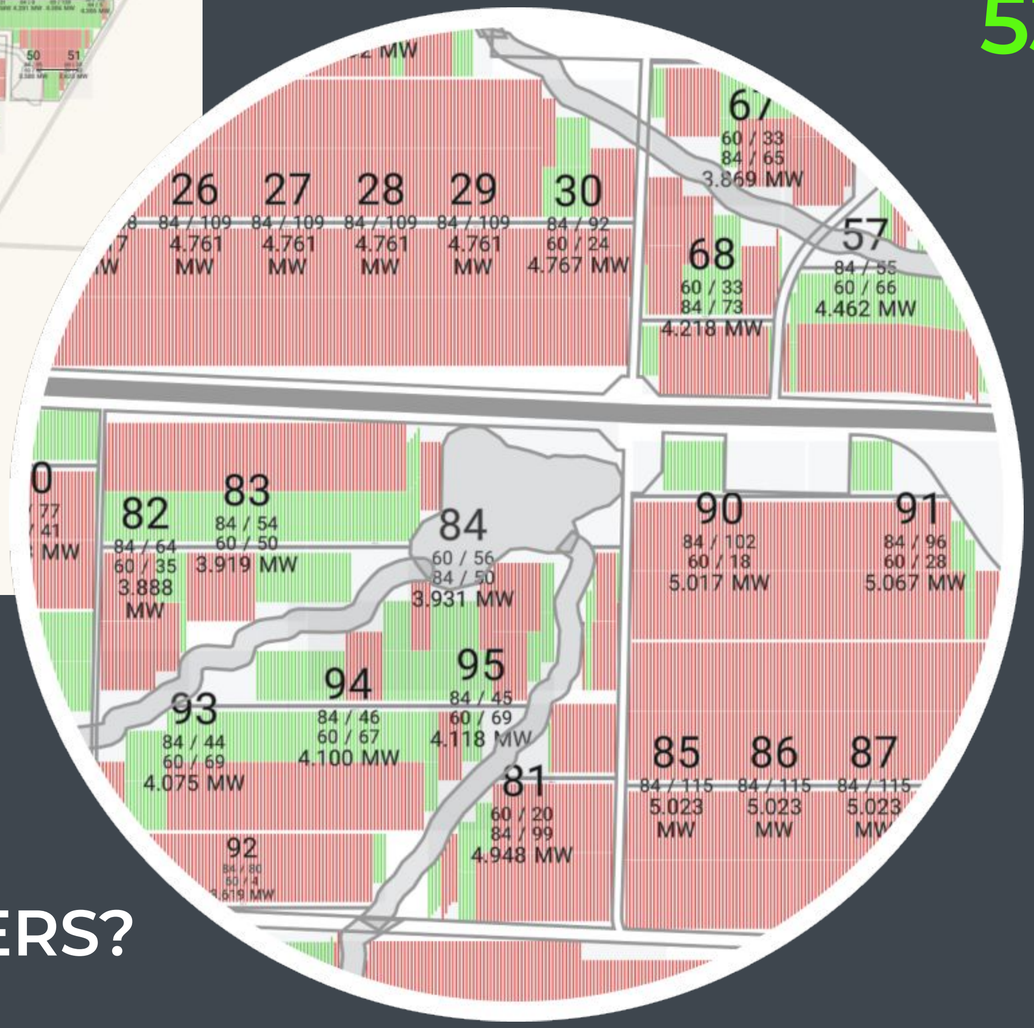
Maximum DC Analysis

Risk Management

Layout Polishing

PVFARM





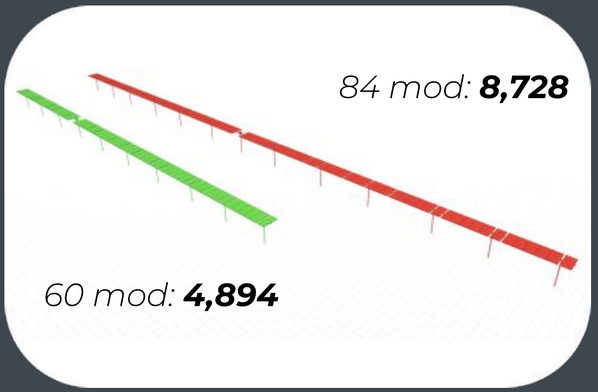
533.9 MWdc↑

478.4 MWdc

486.7 MWdc

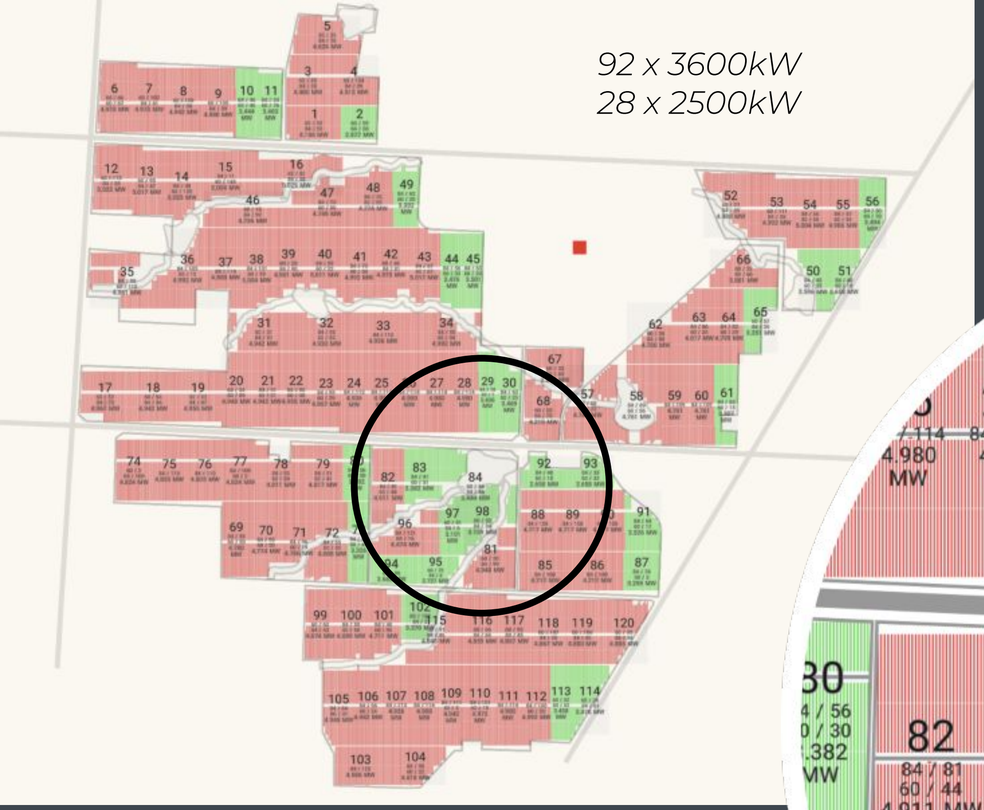
533.5 MWdc

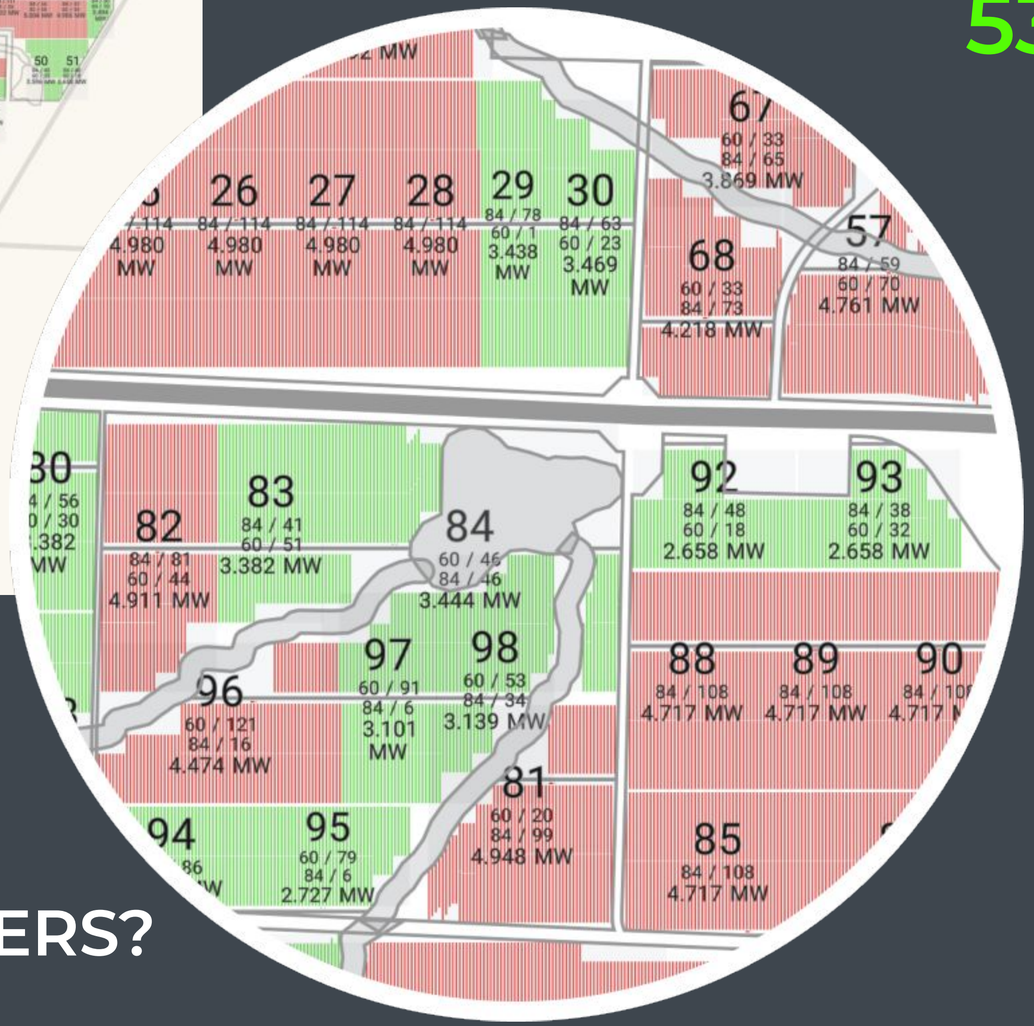
WHAT IF WE USE A MIX OF TRACKERS?



"The wise builder knows that a structure's strength lies not in uniformity, but in the harmony of its varied parts."
- Vitruvius

PVFARM





534.4 MWdc↑

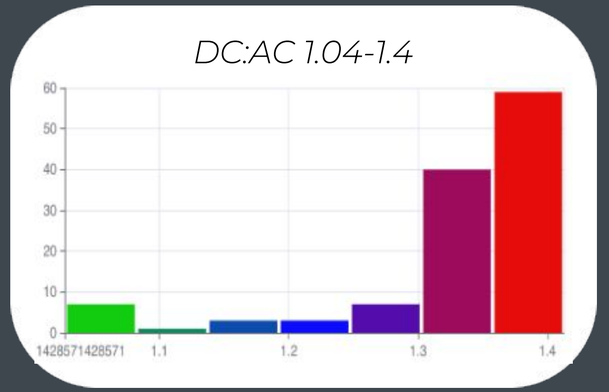
[533.9 MWdc]

478.4 MWdc

486.7 MWdc

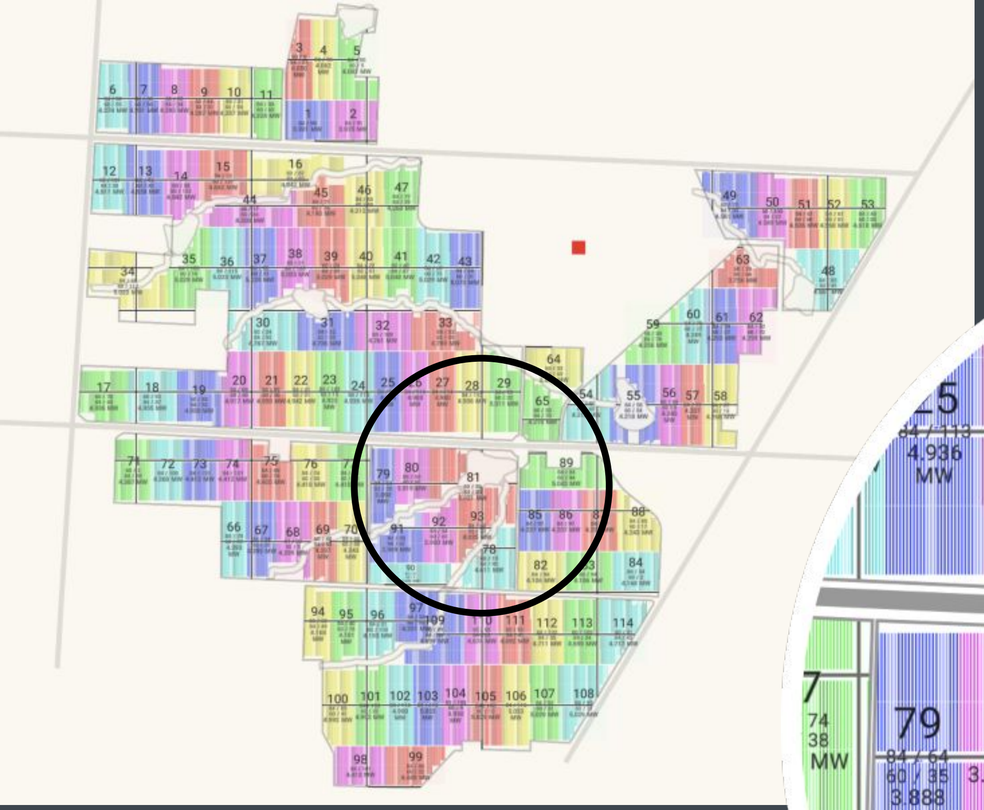
533.5 MWdc

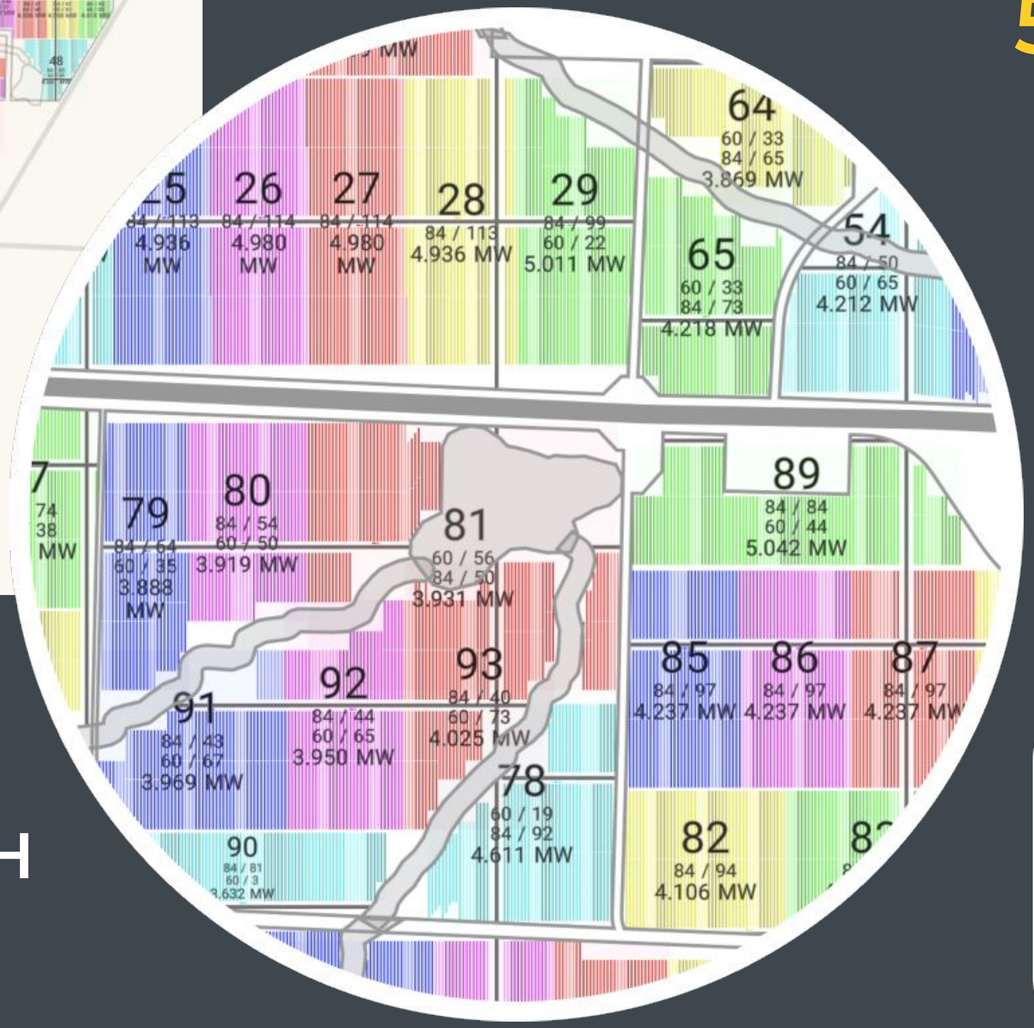
WHAT IF WE USE A MIX OF INVERTERS?



"In the realm of power, like in a well-tended garden, a variety of inverter sizes may bloom into a fuller harvest of energy."
- Voltaire

PVFARM





516.1 MWdc↓

534.4 MWdc

533.9 MWdc

478.4 MWdc

486.7 MWdc

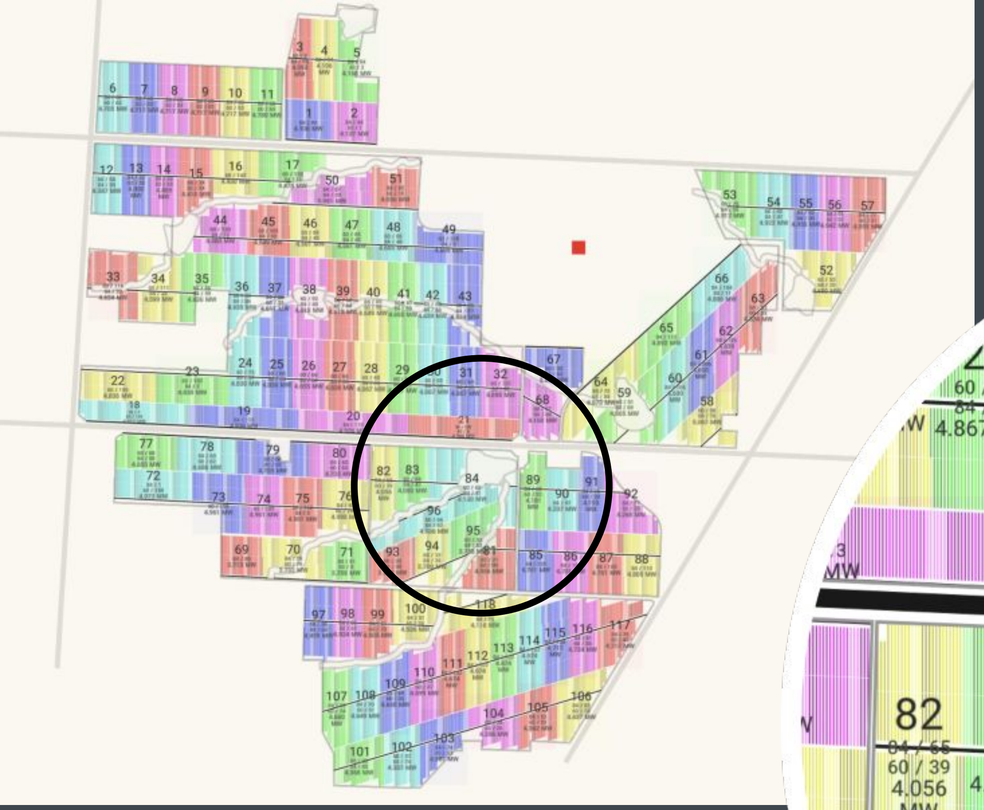
533.5 MWdc

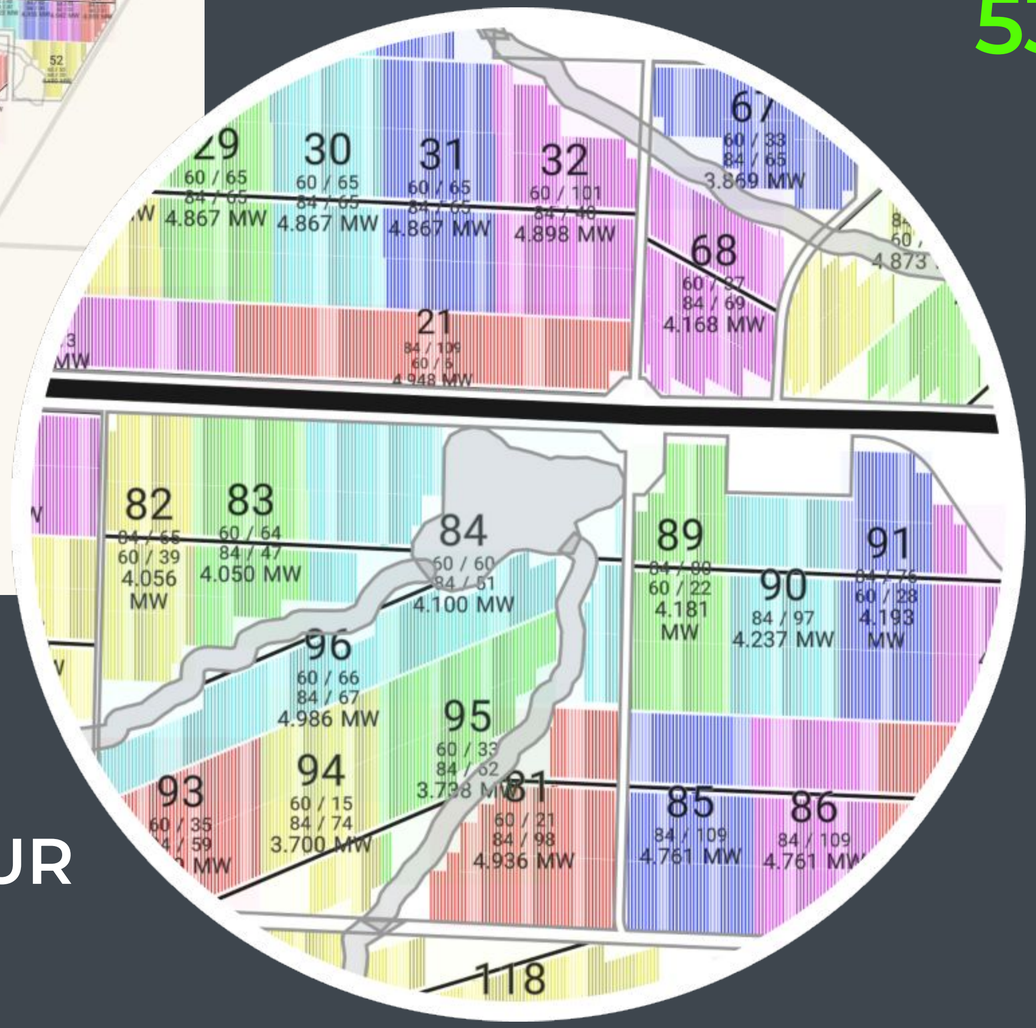
DO WE HAVE ENOUGH ROOM FOR SITE ACCESS?

Placeholder vs Polished

"We lay our roads as the desert traveler marks the sand, temporary guides for a journey that will shape itself with time."
- Al-Kindi

PVFARM





539.4 MWdc↑

[516.1 MWdc]

534.4 MWdc

533.9 MWdc

478.4 MWdc

486.7 MWdc

533.5 MWdc

“SHIFTED” Trackers

WHAT IF WE SHIFT OUR TRACKERS TO GET MORE DC?

"Shifting the trackers, like the wise farmer turning his field, may yield a richer harvest, yet the effort weighs heavy on the oxen."
- Confucius

PVFARM

03 **CIVIL ANALYSIS**

Targets for our design are:

- **490 MWdc**
- **780,000 MWh**

Current Plant Capacity:

- **516.1 MWdc**

Equipment Selection

Maximum DC Analysis

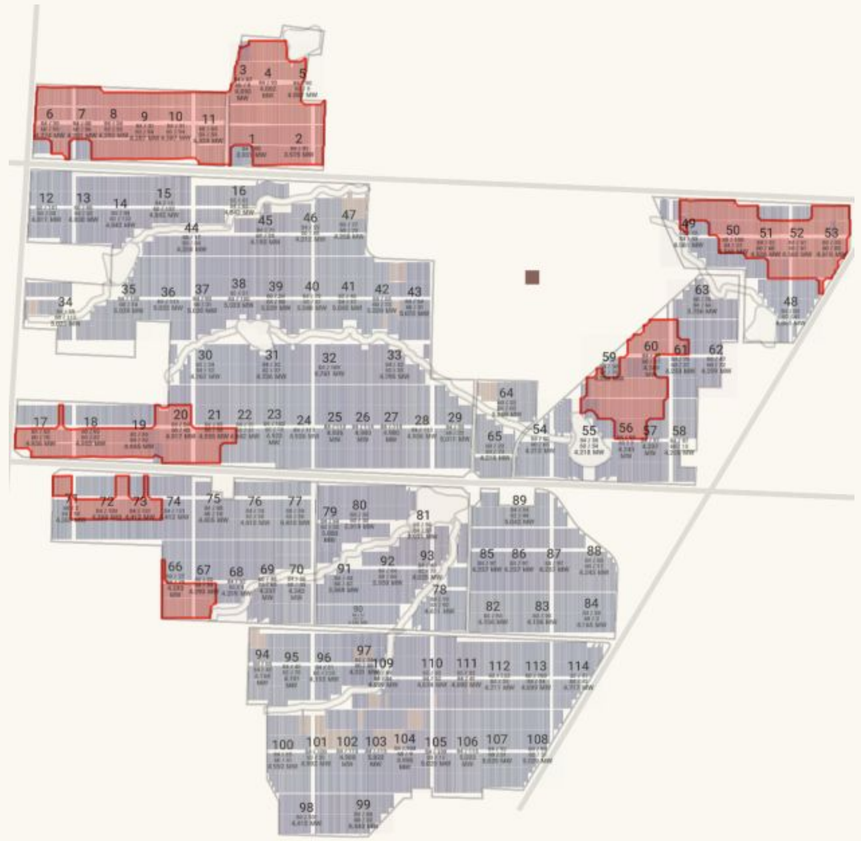
Risk Management

Layout Polishing

PVFARM

Assuming our layout

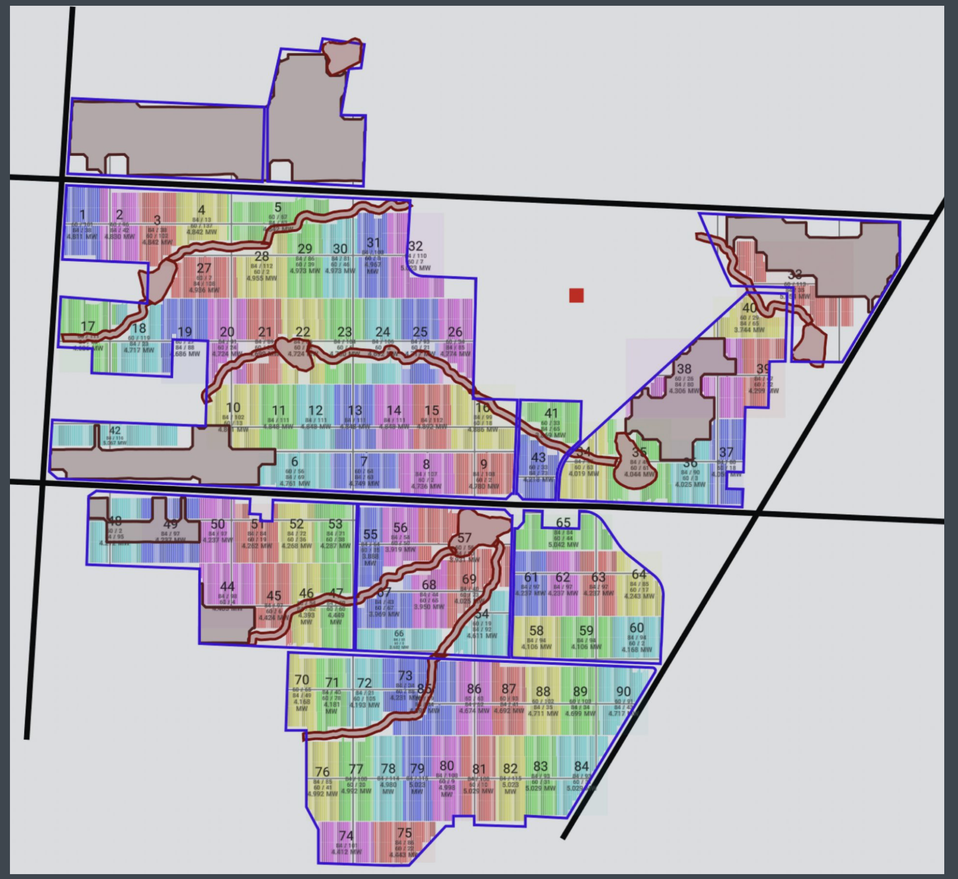
WHERE SHOULD WE BUILD?



min slope	max slope	quantity	share	color
0.0000 %	10.0000 %	10292	78.4212 %	
10.0000 %	64.8500 %	2833	21.5864 %	

Assuming we remove those areas

WHAT DC WOULD WE GET?



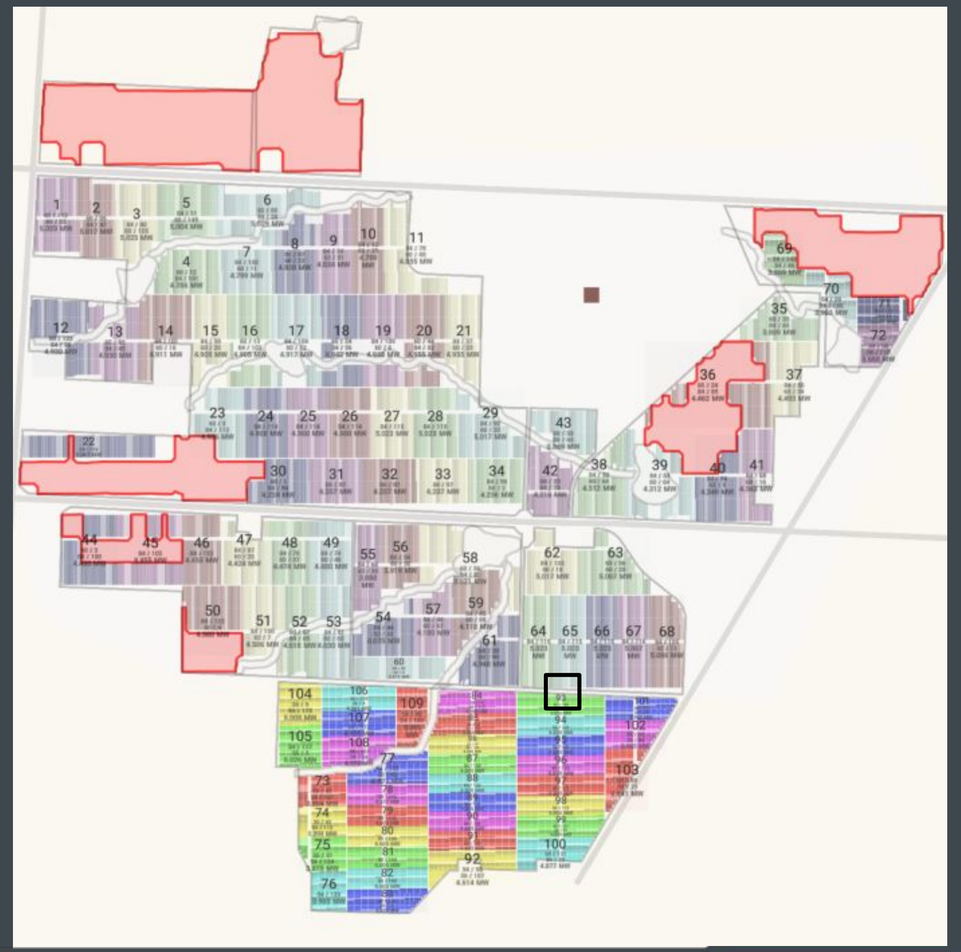
409.3 MWdc ↓

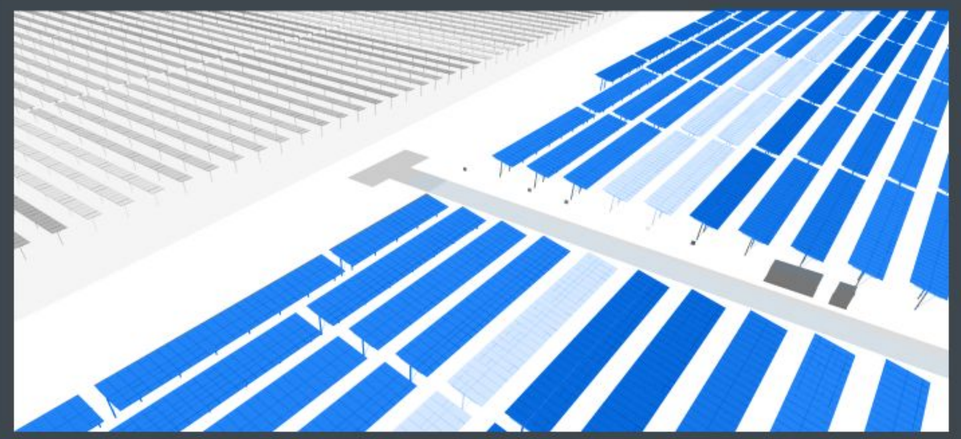
516.1 MWdc

PARTIAL FIXED TILT

492.4 MWdc
780,000 MWh Target

690,560 MWh



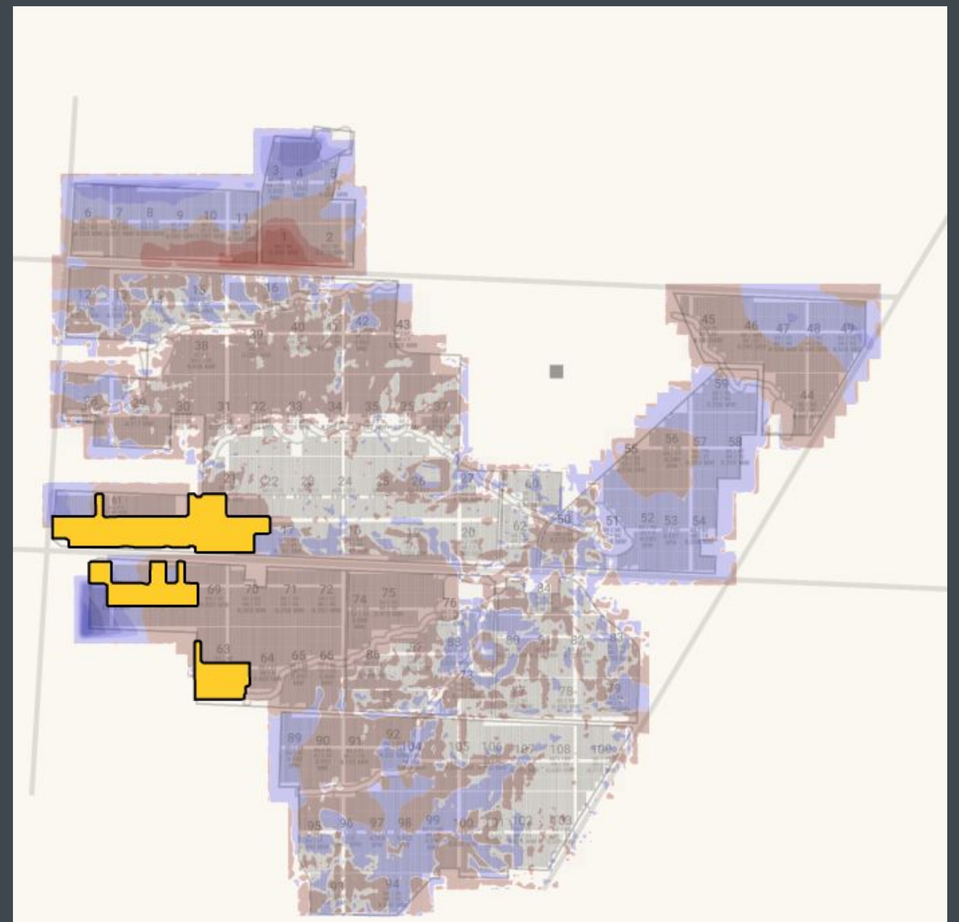


GRADING SCENARIO A

491.3 MWdc

788,475 MWh **$2.6m**

Cut/Fill

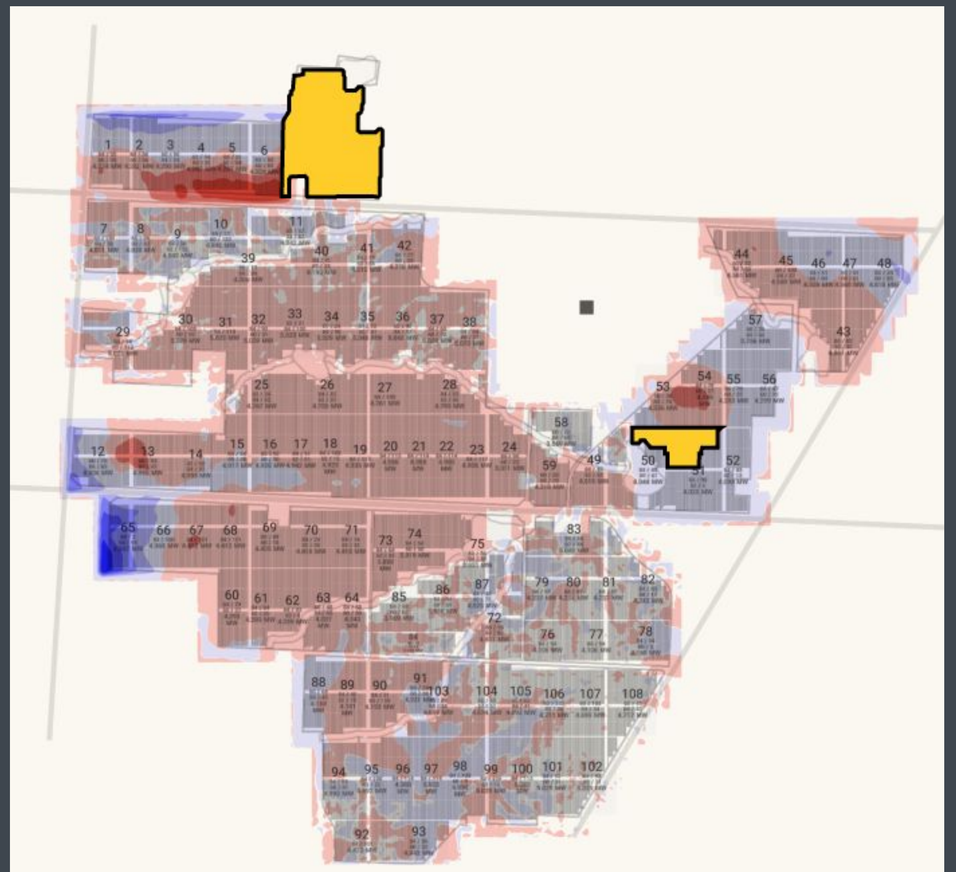


min cutfill	max cutfill	area	share	volume	volume sha...	color
-263.8123 ft	-188.2291 ft	16.6351 ac	0.4363 %	5689060.7581	6.9111 %	
-188.2291 ft	-112.6458 ft	33.3071 ac	0.8737 %	7347201.8670	8.9255 %	
-112.6458 ft	-0.3281 ft	1244.7901 ac	32.6515 %	28469678.65...	34.5854 %	
-0.3281 ft	0.3281 ft	1691.5132 ac	44.3693 %	146133.8174	0.1775 %	
0.3281 ft	114.1040 ft	740.1215 ac	19.4138 %	18415882.61...	22.3719 %	
114.1040 ft	189.6872 ft	56.2143 ac	1.4745 %	12059717.1331	14.6503 %	
189.6872 ft	265.2705 ft	21.8361 ac	0.5728 %	6810175.3401	8.2731 %	
265.2705 ft	340.8537 ft	5.6083 ac	0.1471 %	2231567.6399	2.7109 %	
340.8537 ft	416.4370 ft	2.3218 ac	0.0609 %	1147079.7561	1.3935 %	

GRADING SCENARIO B

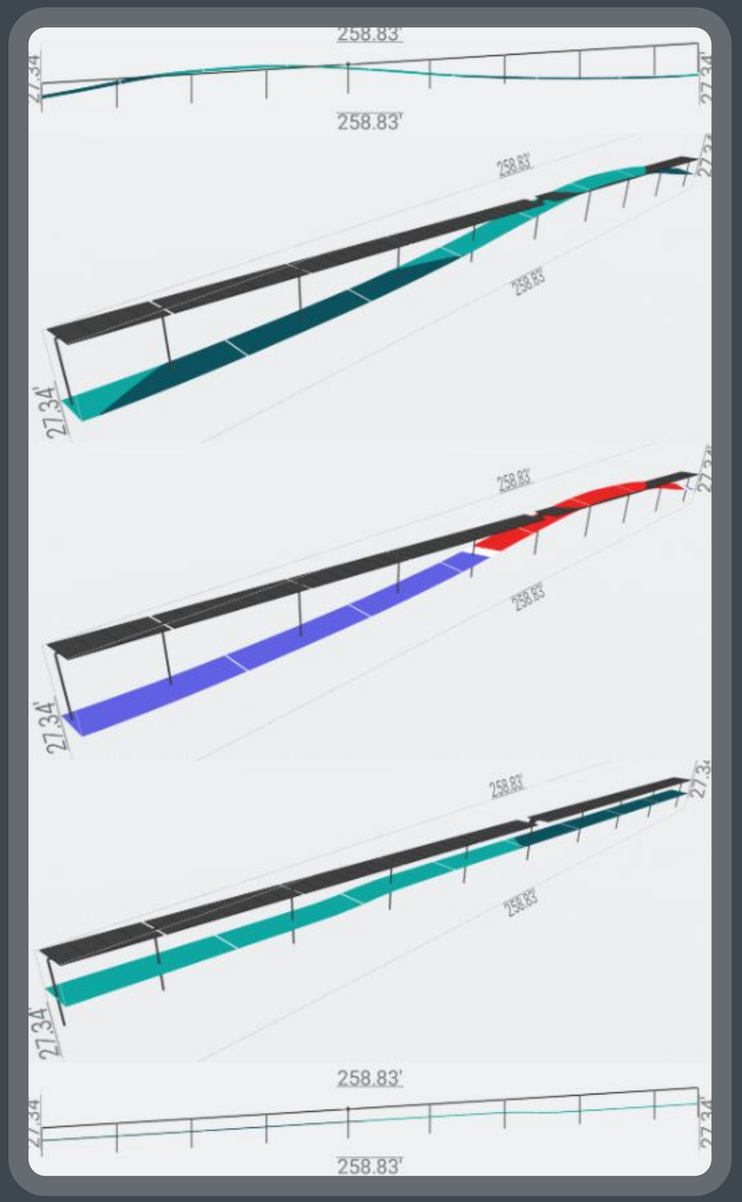
491.5 MWdc
788,670 MWh

$1.9m Cut/Fill

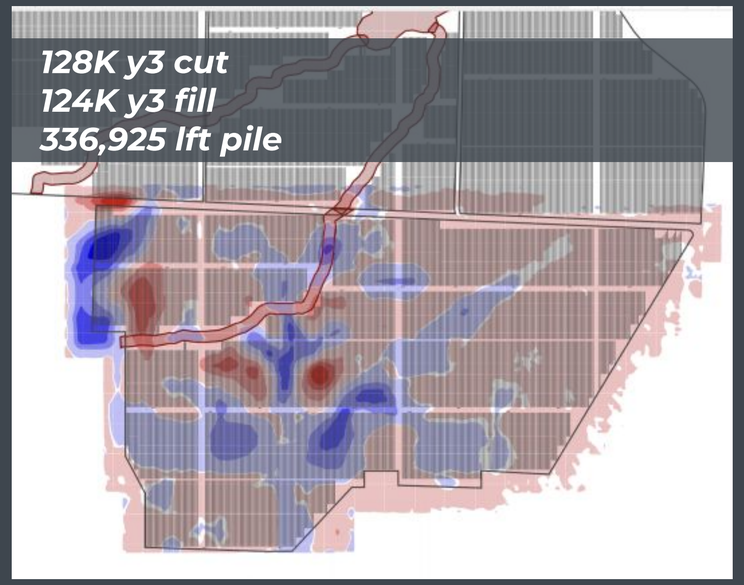


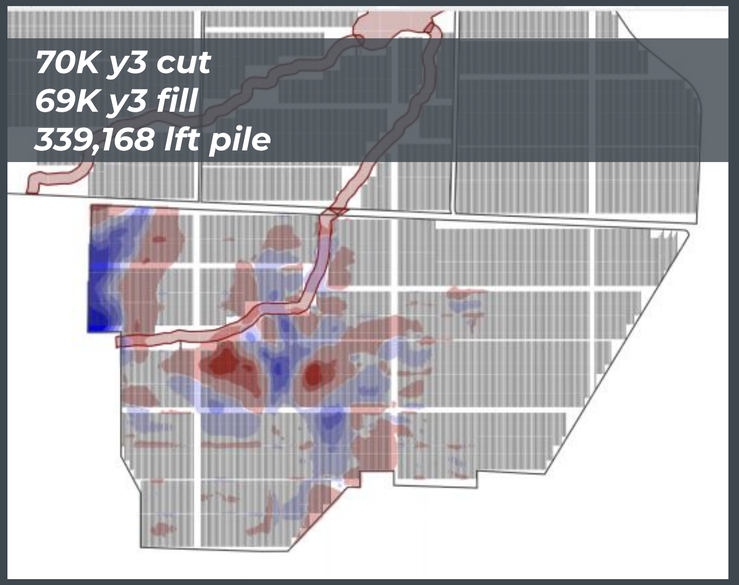
min cutfill	max cutfill	area	share	volume	volume sha...	color
-217.3885 ft	-149.3293 ft	14.6242 ac	0.3907 %	3891972.7066	4.9873 %	
-149.3293 ft	-81.2700 ft	36.5847 ac	0.9775 %	6038335.4207	7.7377 %	
-81.2700 ft	-0.3281 ft	1452.5195 ac	38.8083 %	28673576.75...	36.7429 %	
-0.3281 ft	0.3281 ft	1469.9047 ac	39.2728 %	104842.7581	0.1343 %	
0.3281 ft	122.9076 ft	697.3969 ac	18.6330 %	20291047.84...	26.0014 %	
122.9076 ft	190.9668 ft	46.8804 ac	1.2525 %	10315606.20...	13.2186 %	
190.9668 ft	259.0260 ft	15.3571 ac	0.4103 %	4707012.1946	6.0317 %	
259.0260 ft	327.0852 ft	6.9748 ac	0.1864 %	2788940.4897	3.5738 %	
327.0852 ft	395.1444 ft	2.5598 ac	0.0684 %	1226350.8762	1.5715 %	

CUT AND FILL VS PILES OPTIMIZATION

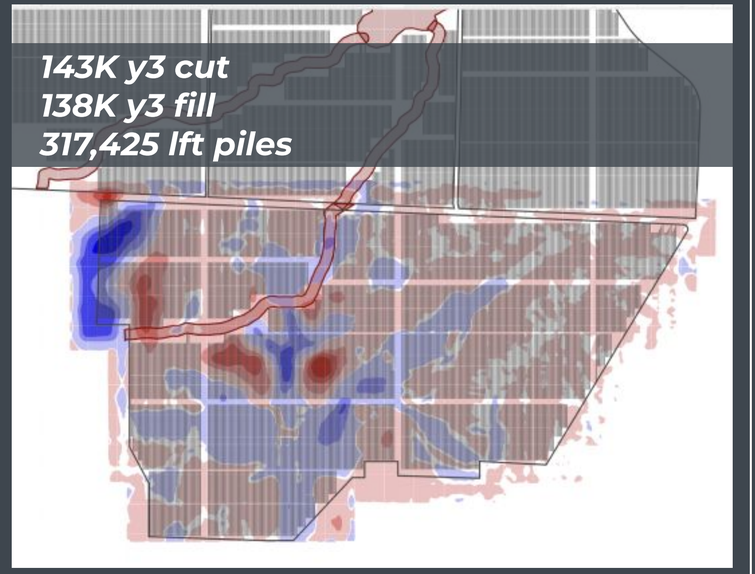


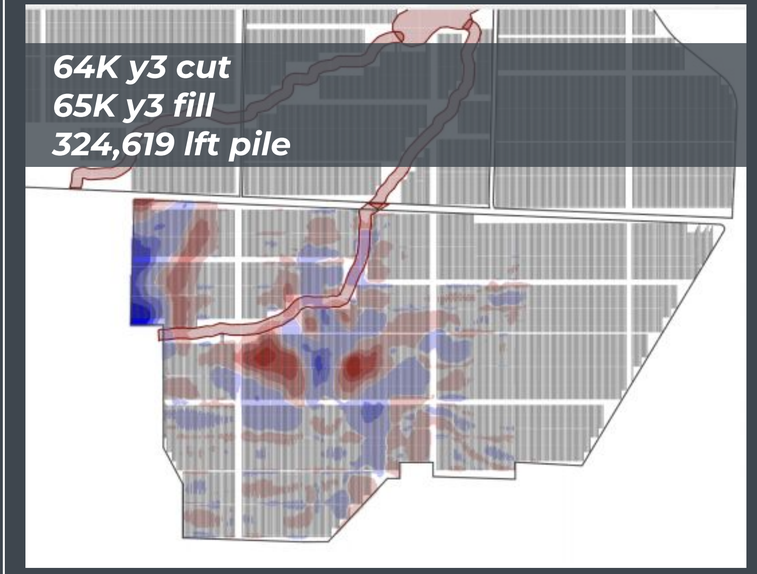
1 ft
Grading Window





0.5 ft
Grading Window





10 ft
Grid

1 ft
Grid

PVFARM

04 LAYOUT POLISHING

Targets for our design are:

- **490 MWdc**
- **780,000 MWh**

Current Plant Capacity:

- **512 MWdc**

Equipment Selection

Maximum DC Analysis

Risk Management

Layout Polishing

PVFARM

SUBAREAS DRILL DOWN

175.4 MWdc

Total, all subareas

Subarea 1

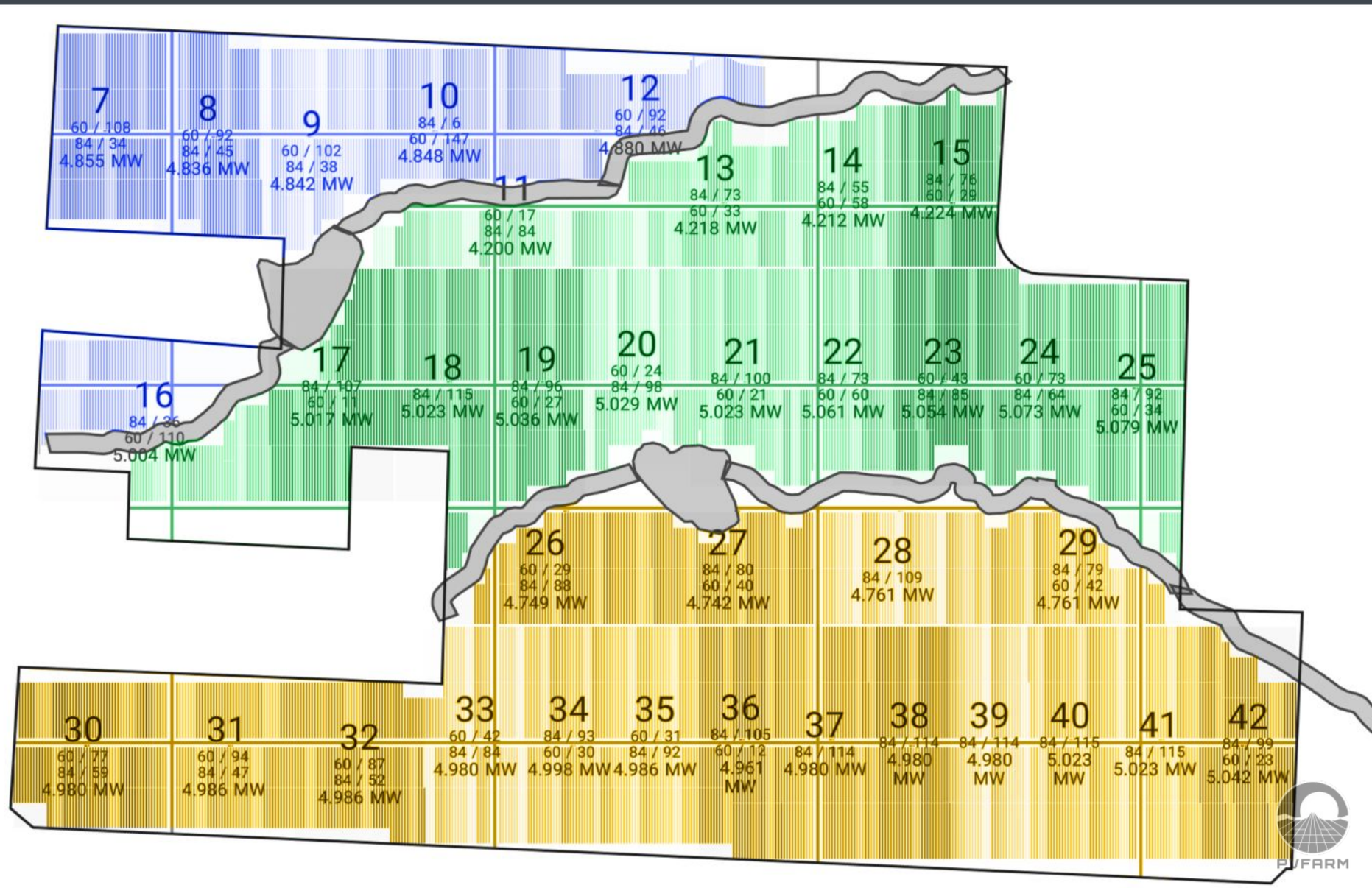
27.43 MWdc

Subarea 2

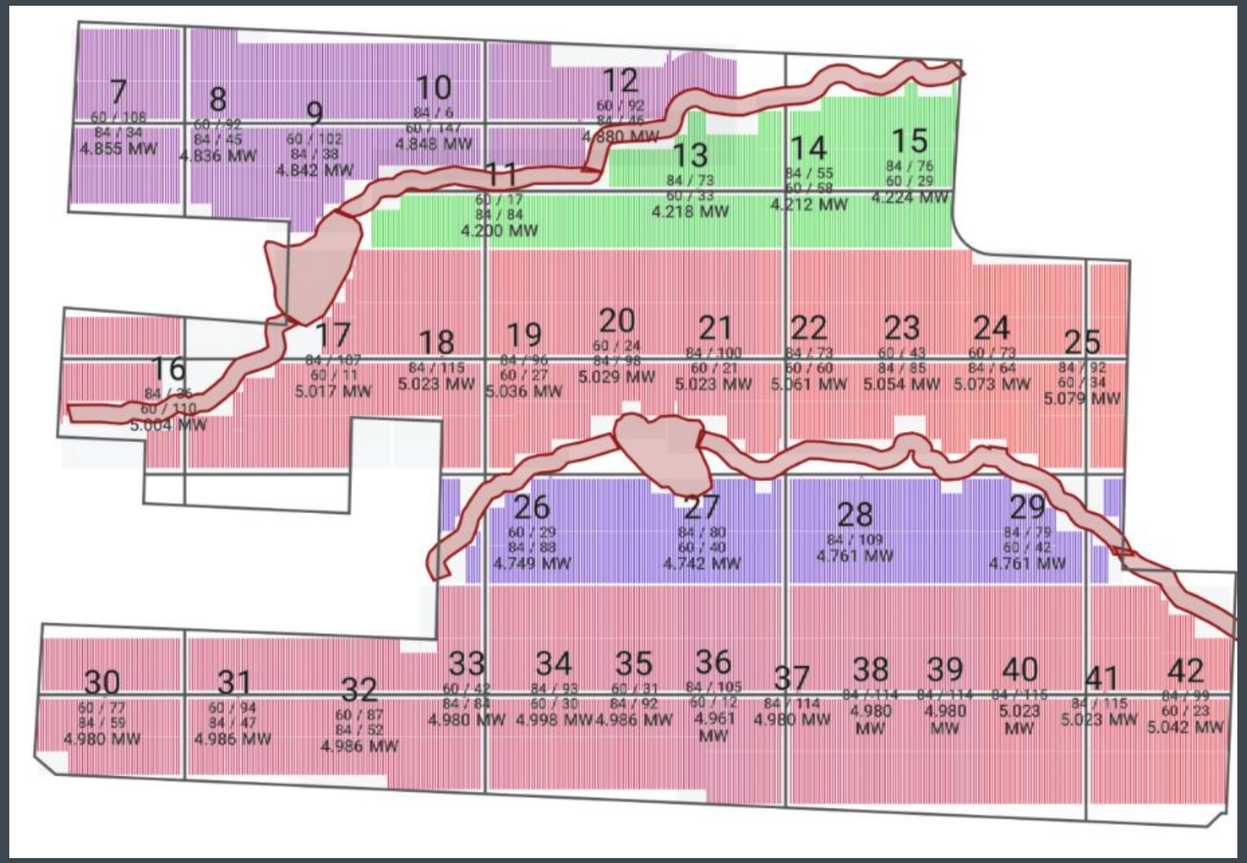
64.63 MWdc

Subarea 3

83.34 MWdc



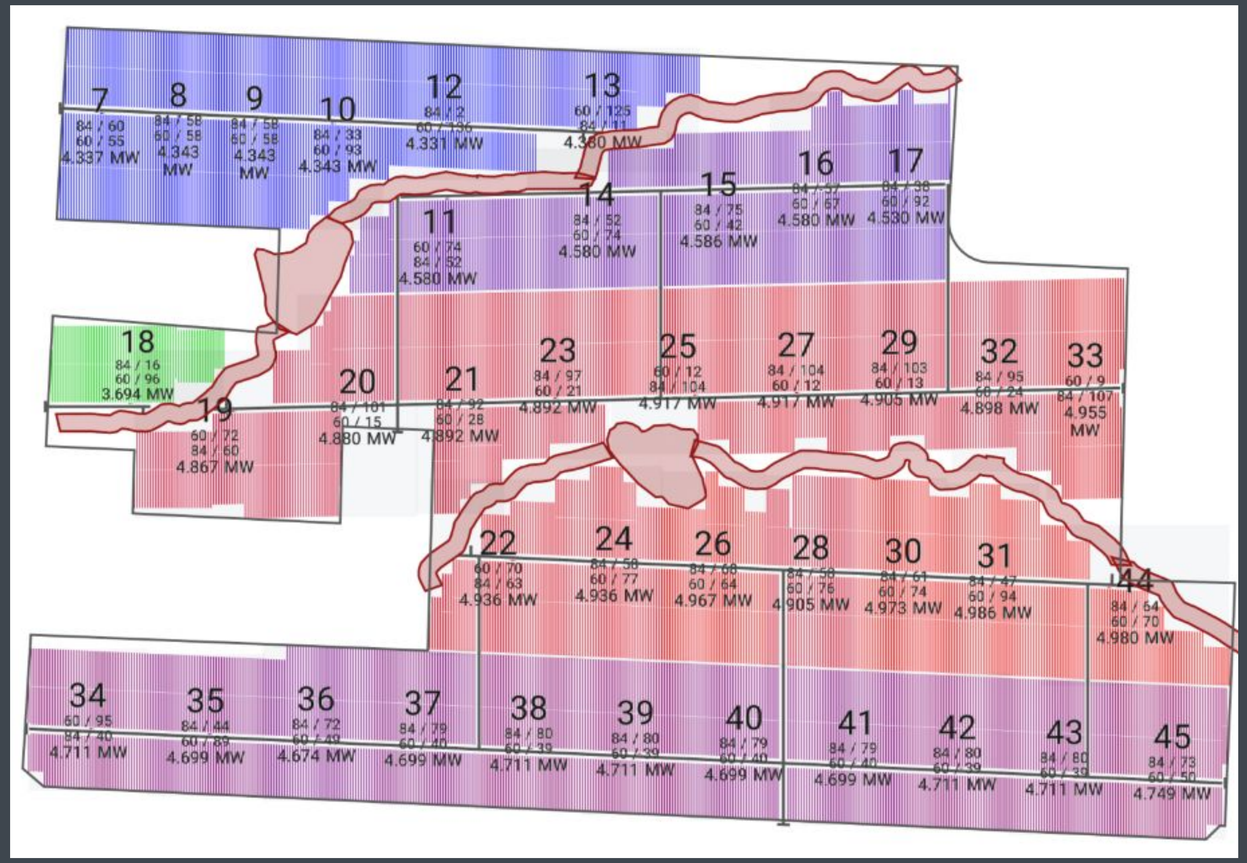
BLOCKING AND ROADS POLISHING



175.4 MWdc

892,899 ft2

Roads Area



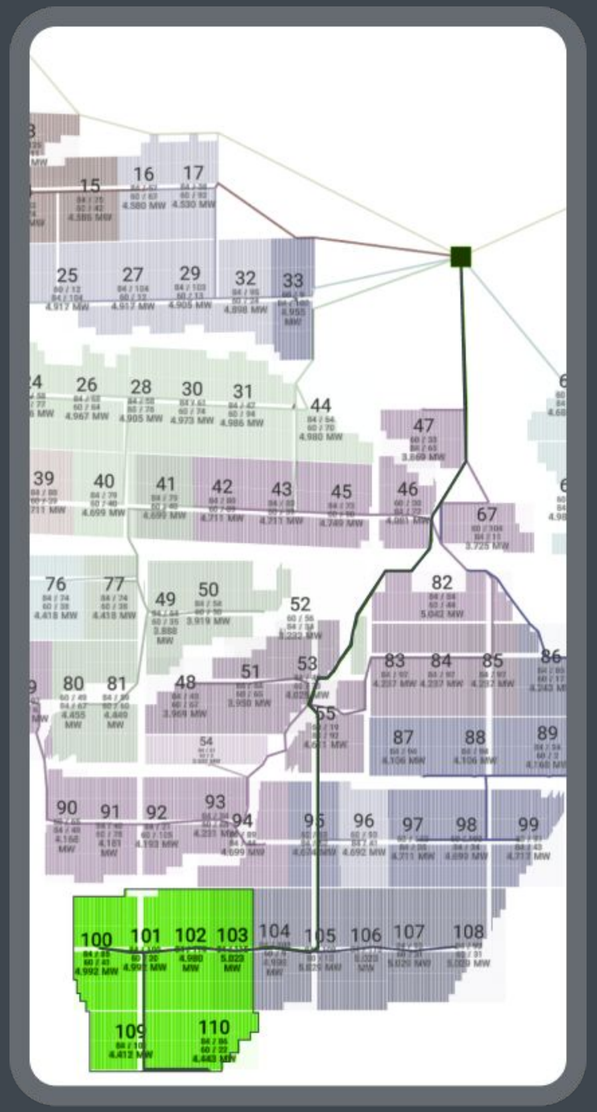
183.2 MWdc

732,817 ft2

Roads Area

PVFARM

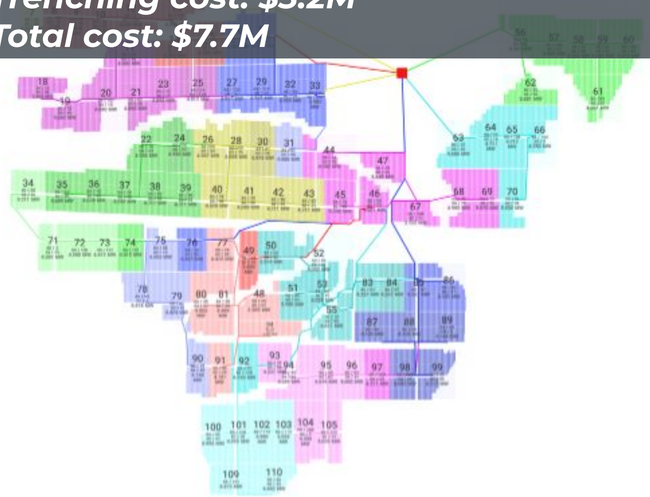
MV WIRING



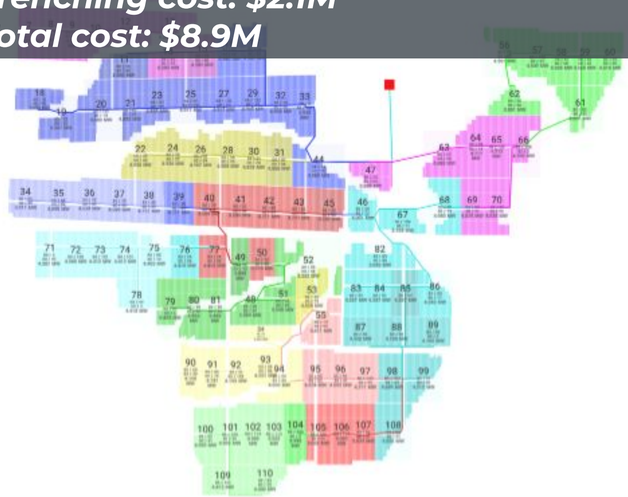
A

Substation Position

MV cables cost: $4.5M
Trenching cost: $3.2M
Total cost: $7.7M



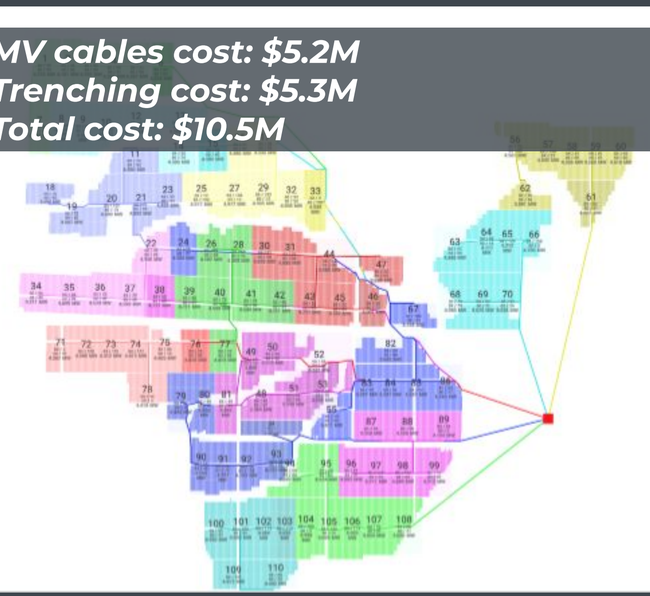
MV cables cost: $6.8M
Trenching cost: $2.1M
Total cost: $8.9M



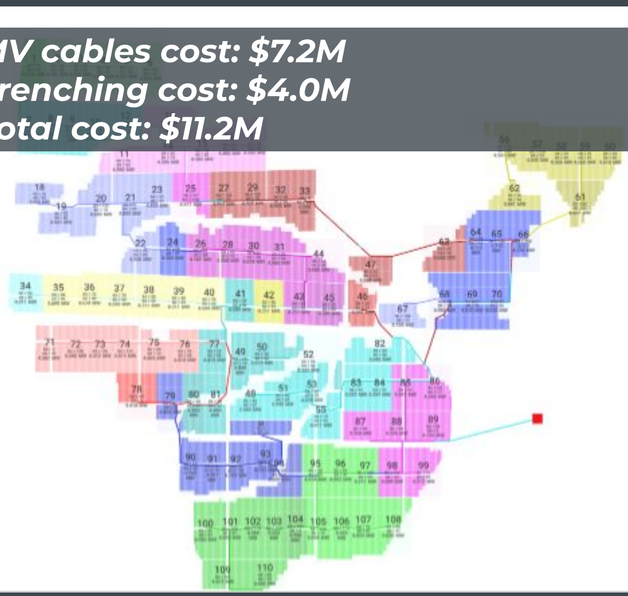
B

Substation Position

MV cables cost: $5.2M
Trenching cost: $5.3M
Total cost: $10.5M



MV cables cost: $7.2M
Trenching cost: $4.0M
Total cost: $11.2M



Less Wires

Optimisation bias

Less Trenches

Optimisation bias

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05 THE JOURNEY CONTINUES

Equipment Selection

Maximum DC Analysis

Risk Management

Layout Polishing

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THANK YOU

QUESTIONS?

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