



How to have your cake and eat it too, recharging with Reverse Tile Drains

Mike Busby PG EIT
Geologist and Engineer



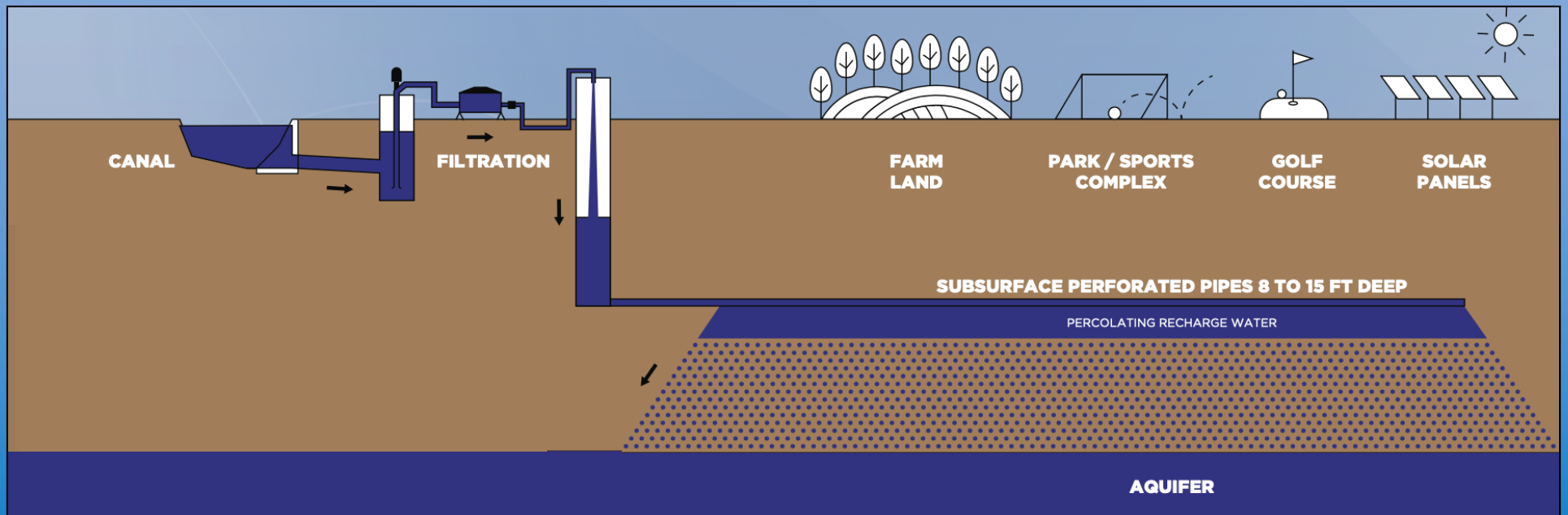
Curtis Lutje
Laurel Ag & Water



Glenn Drown
LIDCO

Tile Recharge

Also known as Reverse Tile Drain and Subsurface Recharge



Profile View

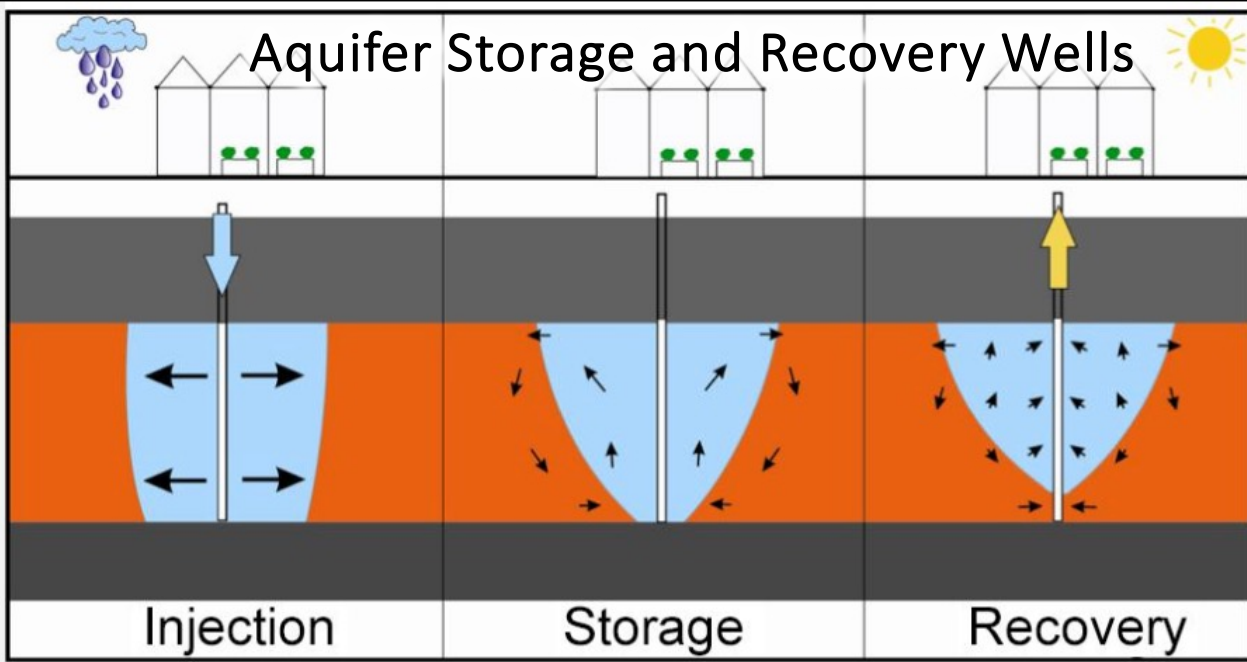
Recharge Basins



Stormwater Chambers



Aquifer Storage and Recovery Wells



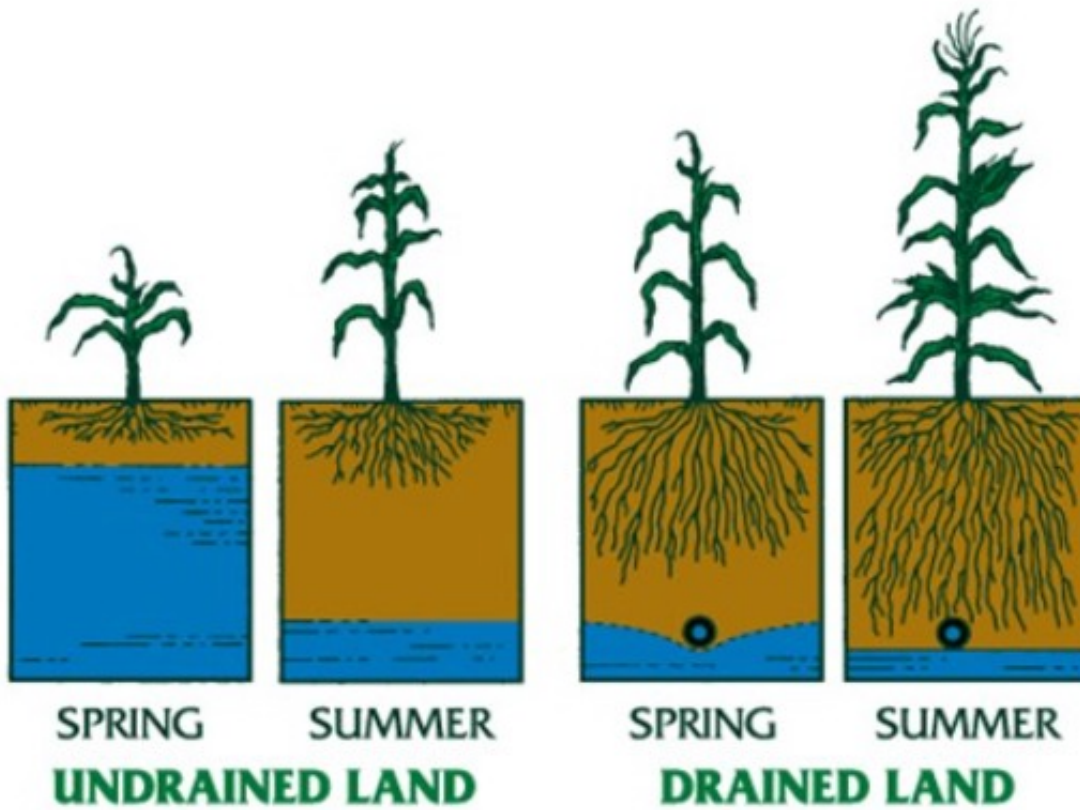
FloodMAR



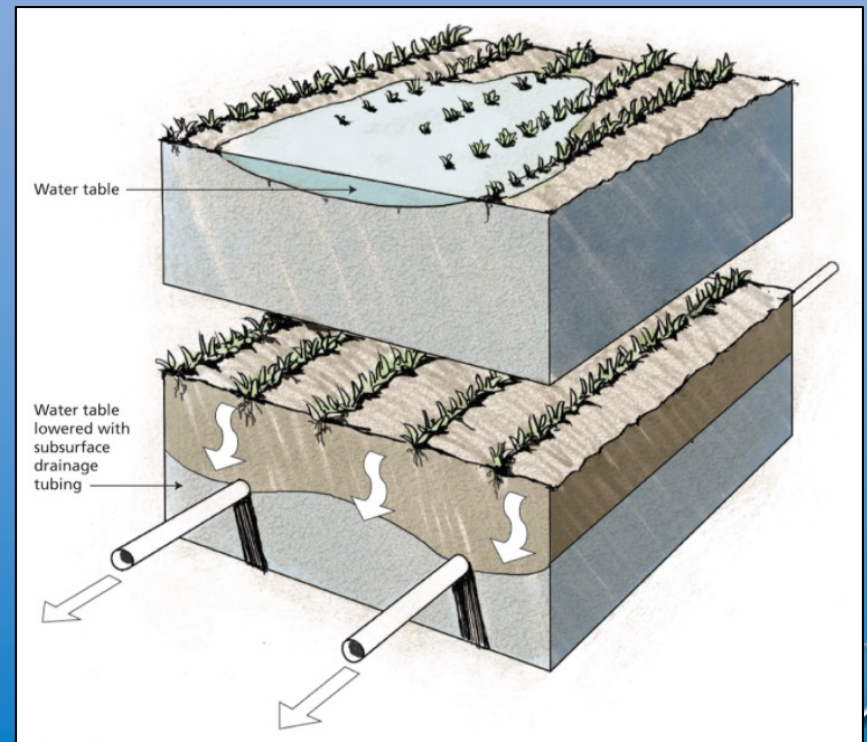
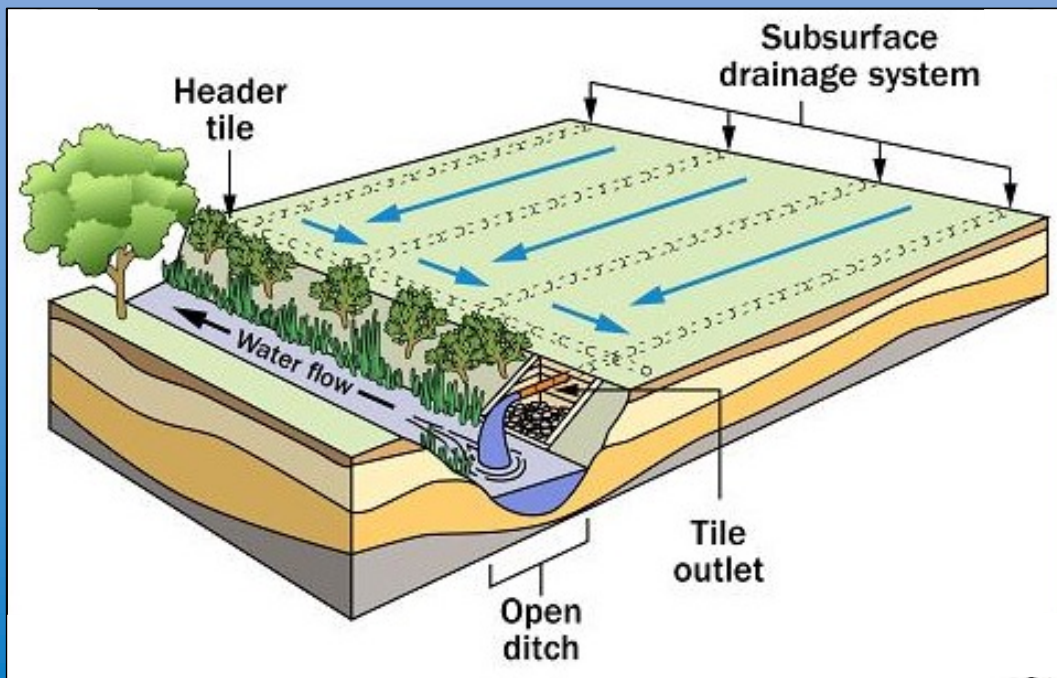
Tile Recharge
also known as
Reverse Tile Drainage



Tile Drainage



Tile Drainage – soil dewatering



HISTORY OF TILE DRAINAGE

200BC 1st use of Tile Drainage

Roman Empire, Clay terracotta tiles

1838 1st used in United States

1860 Henry French wrote a book on farm drainage, nicknamed "French Drain"

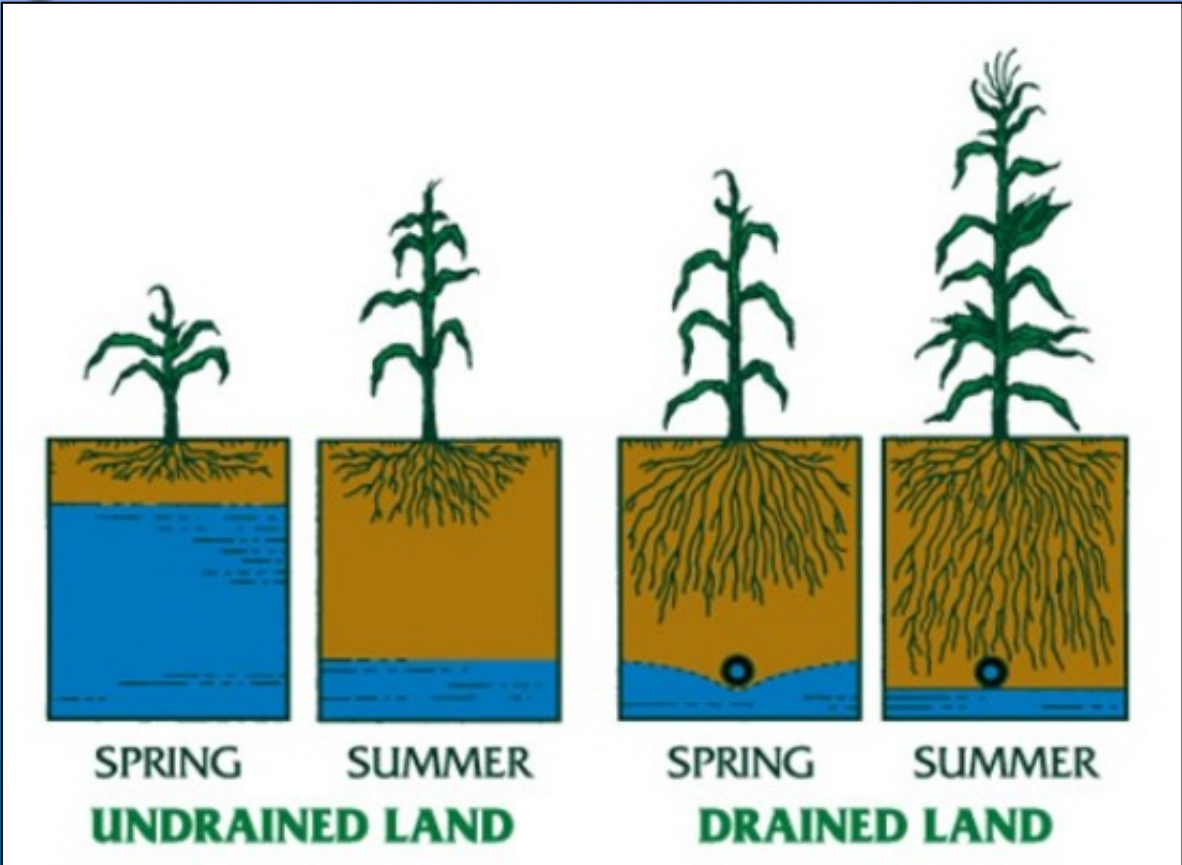
1960 Plastic corrugated perforated drainpipe

1960 Lidco starts install tile drainage

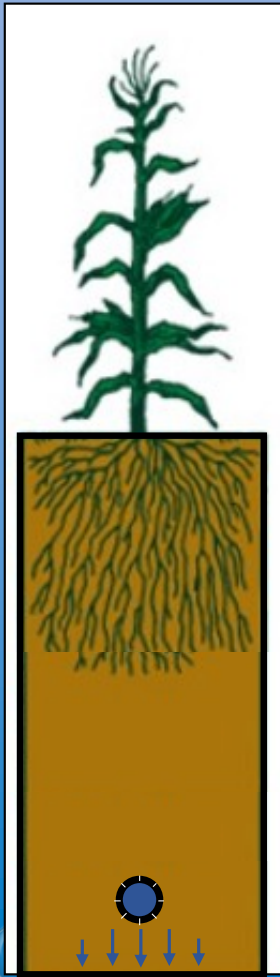
2017 Reverse Tile Drainage or Tile Recharge



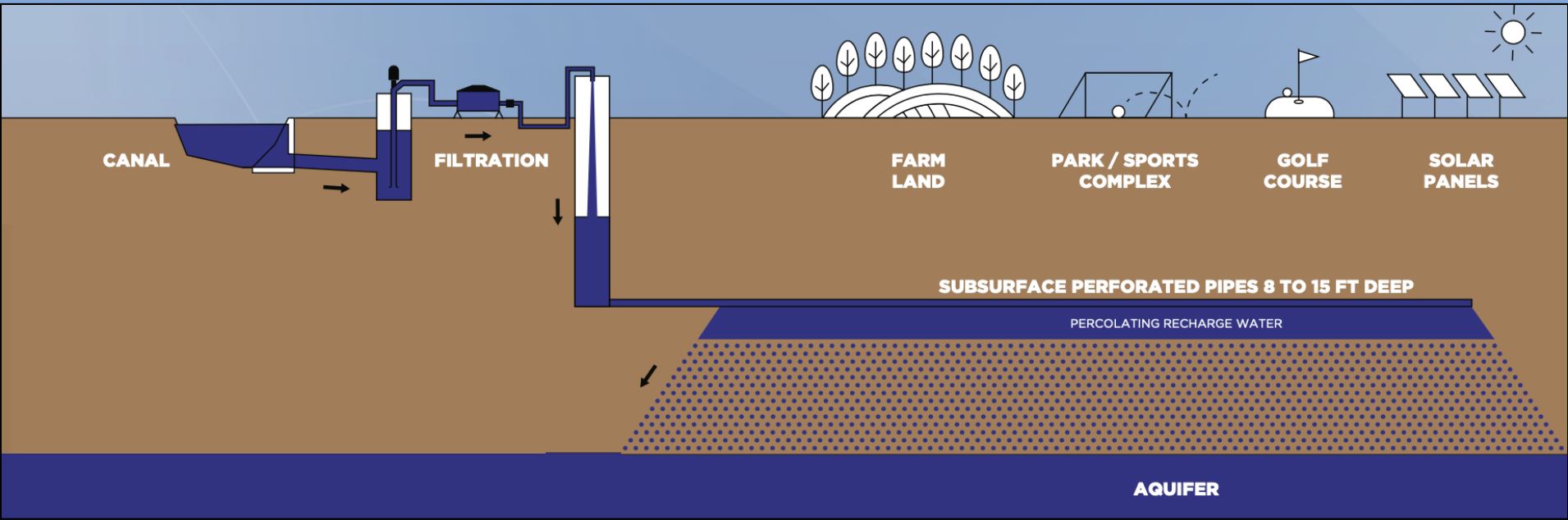
Tile Drainage



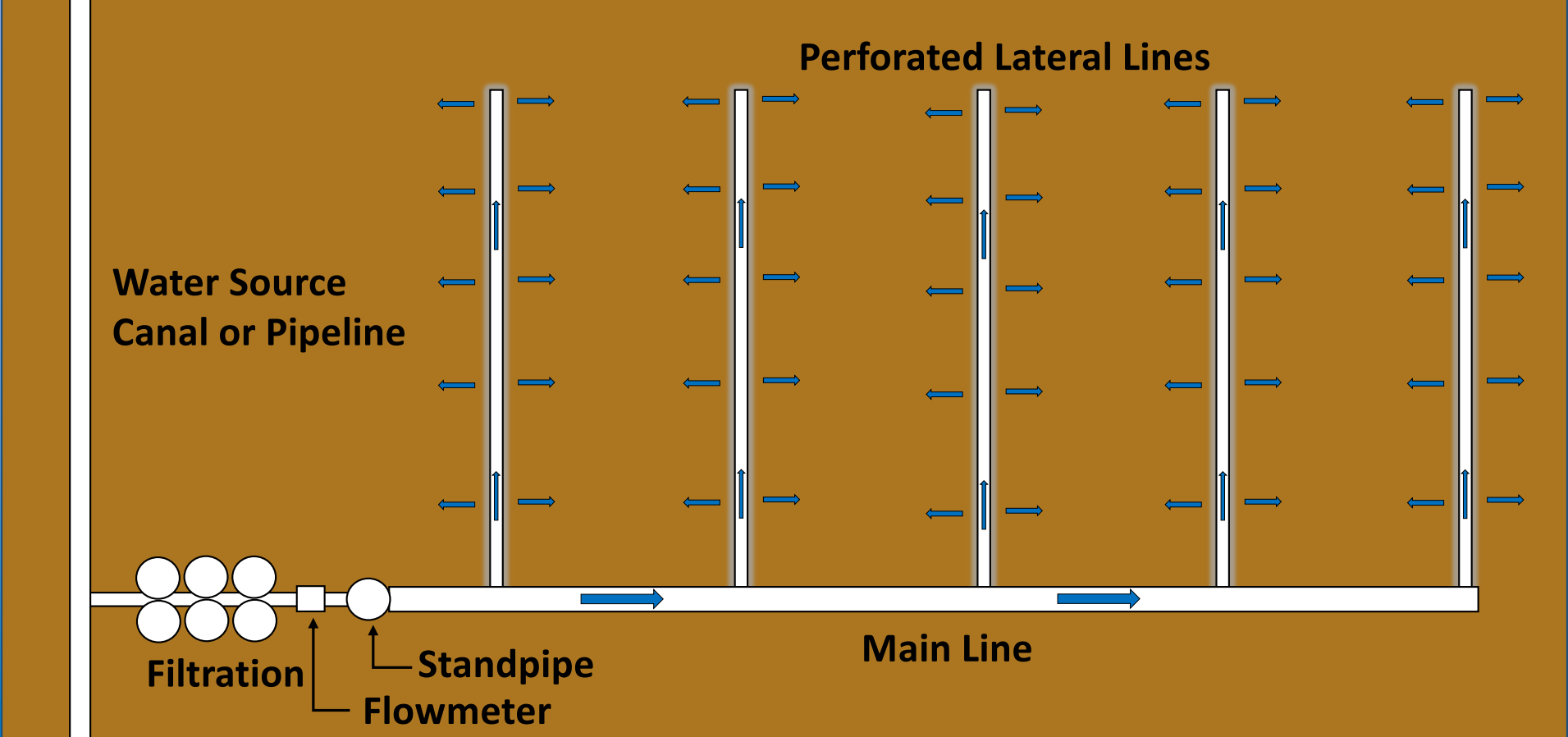
Tile Recharge



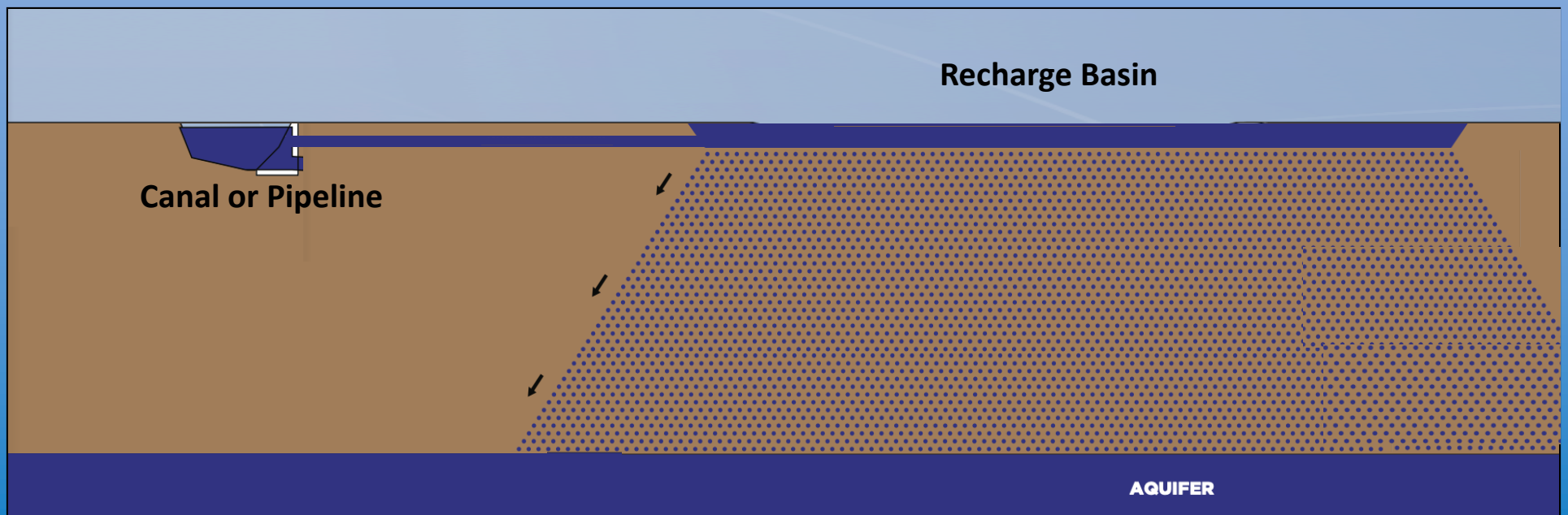
Tile Recharge System Profile View



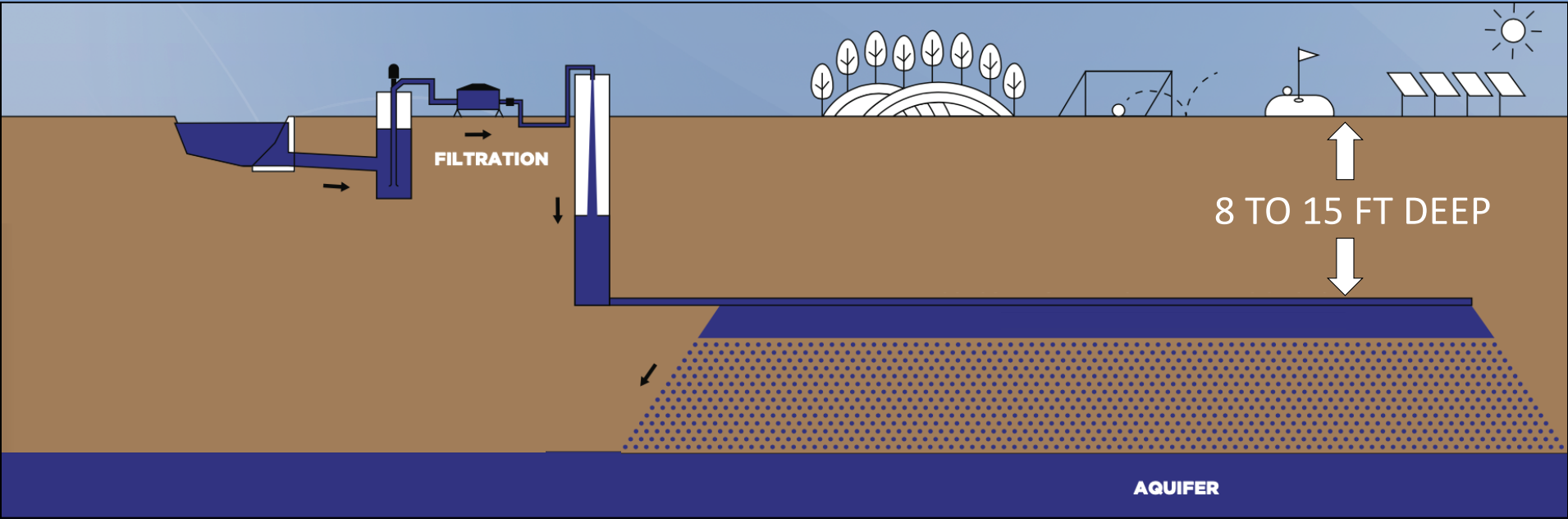
Tile Recharge System Bird's Eye View



Spreading Basin Profile View



Tile Recharge System Profile View



Installation of Tile Recharge









Magnetic flow meter



Standpipes

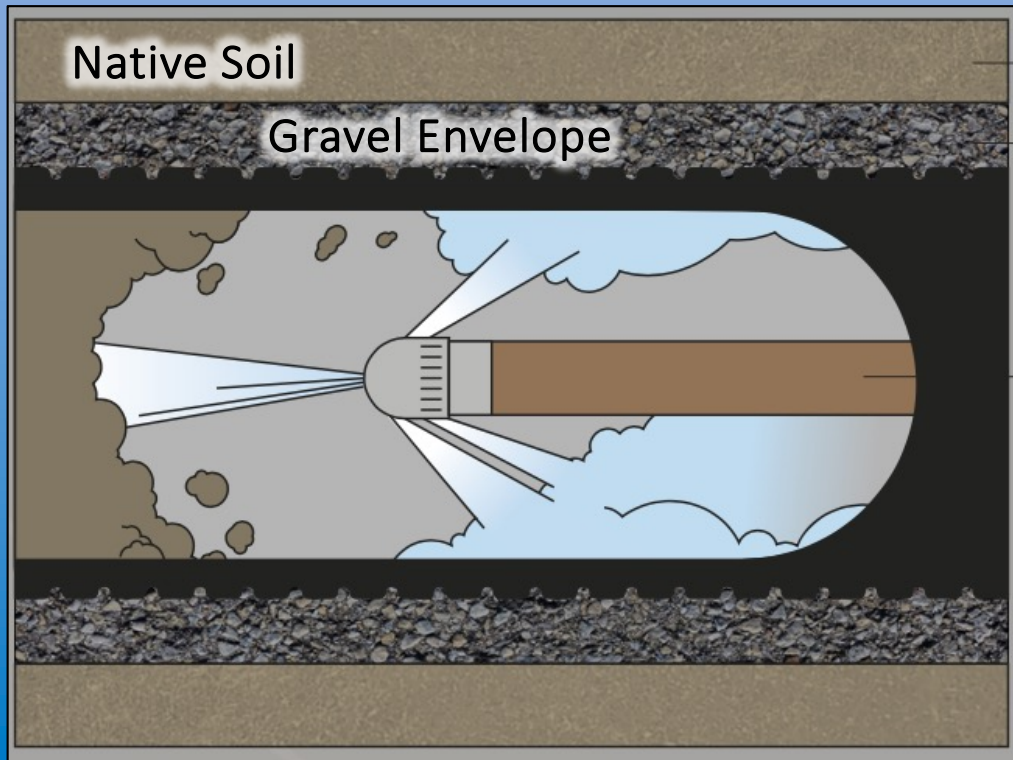


Mini-Standpipes
for each lateral

Filtration – Sand Media



Tile Cleaning with High-Pressure Water Jetting





Tile Recharge Systems

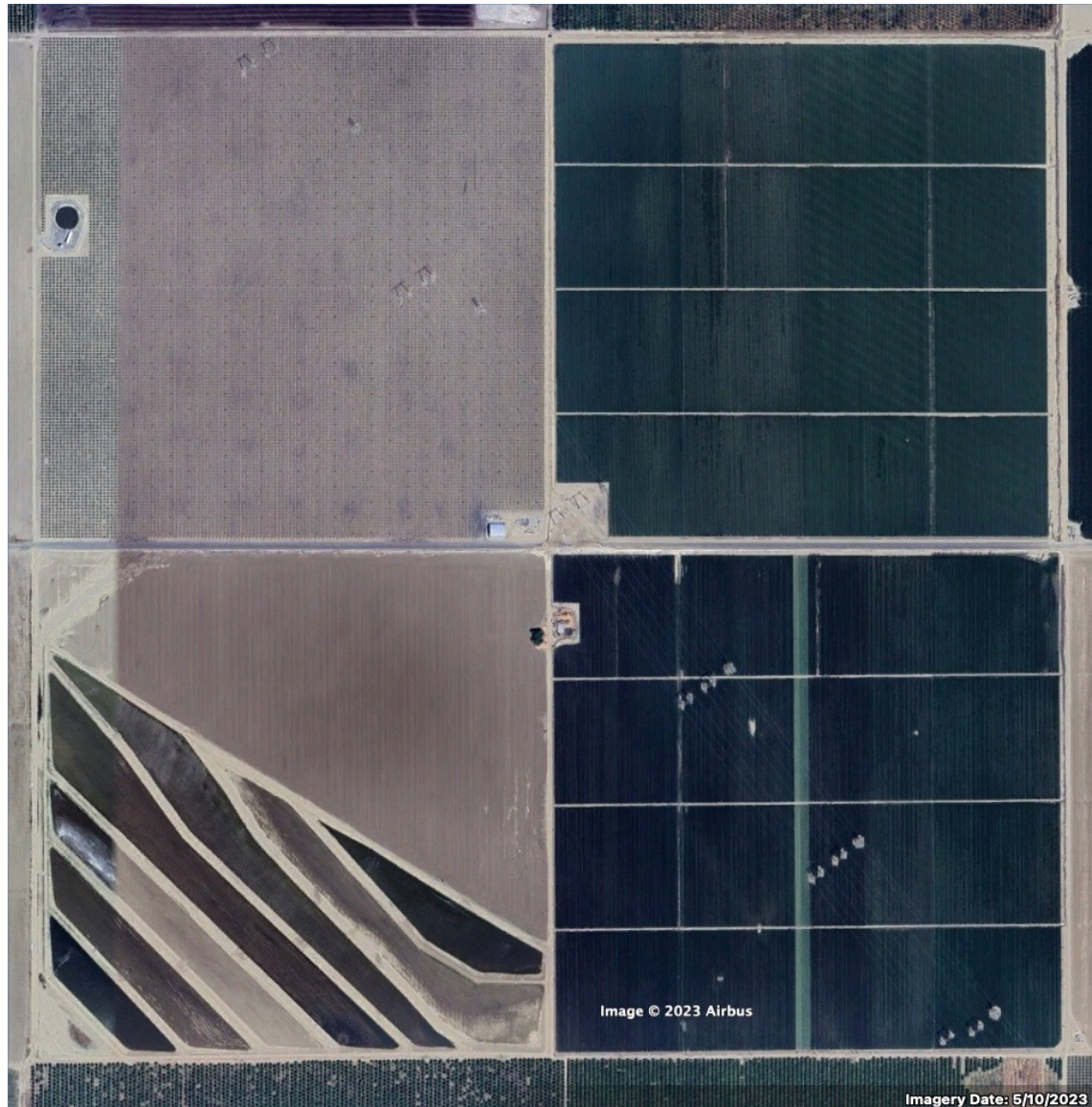
as of October 2023

Over 25 systems installed

Crops: Almonds, Grapes, Row Crops

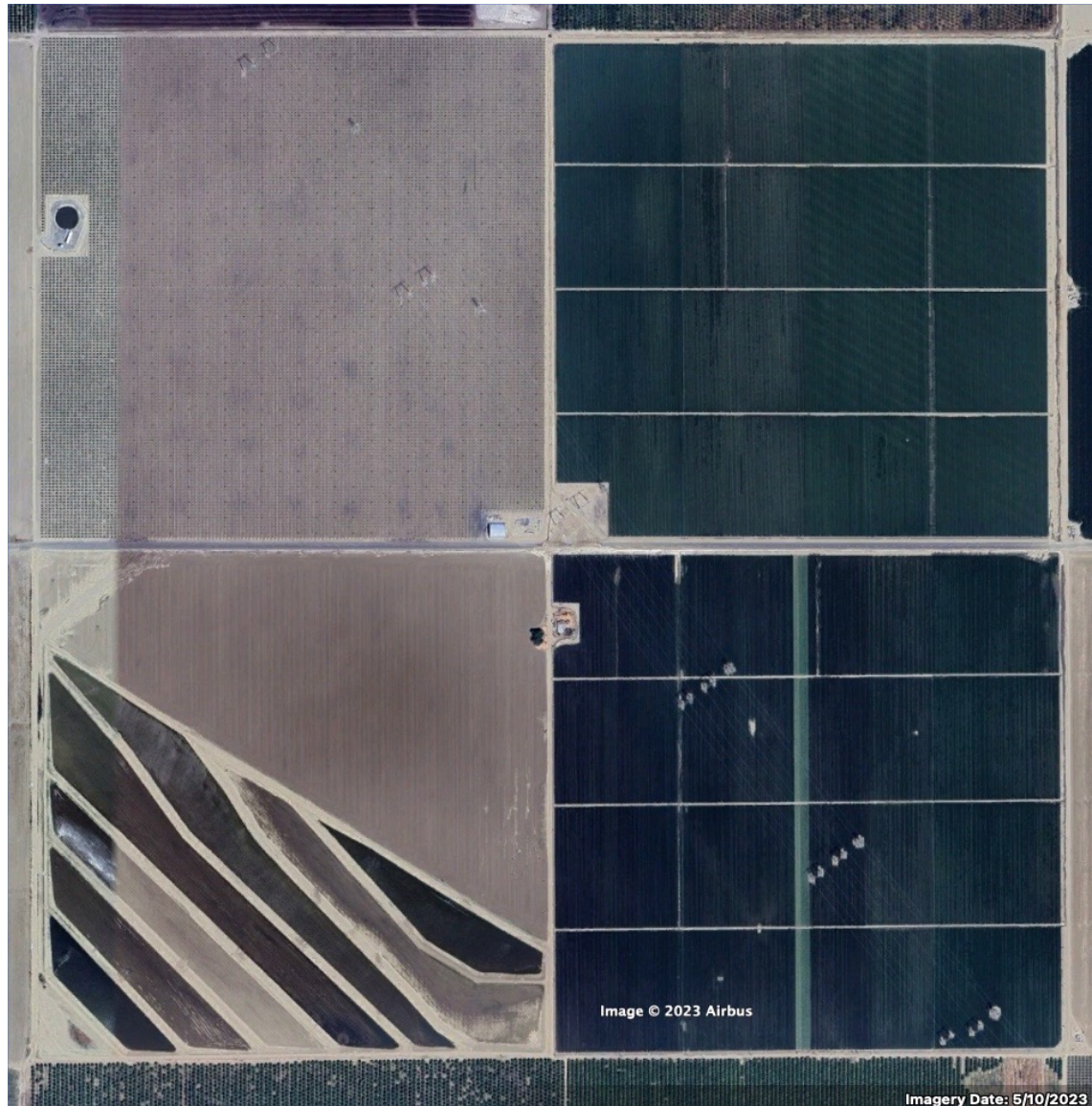
Water Districts:
Westlands, SWID, Semi-Tropic, North Kern Water Storage District, Saucilito, Fresno ID, Merced ID, and Others

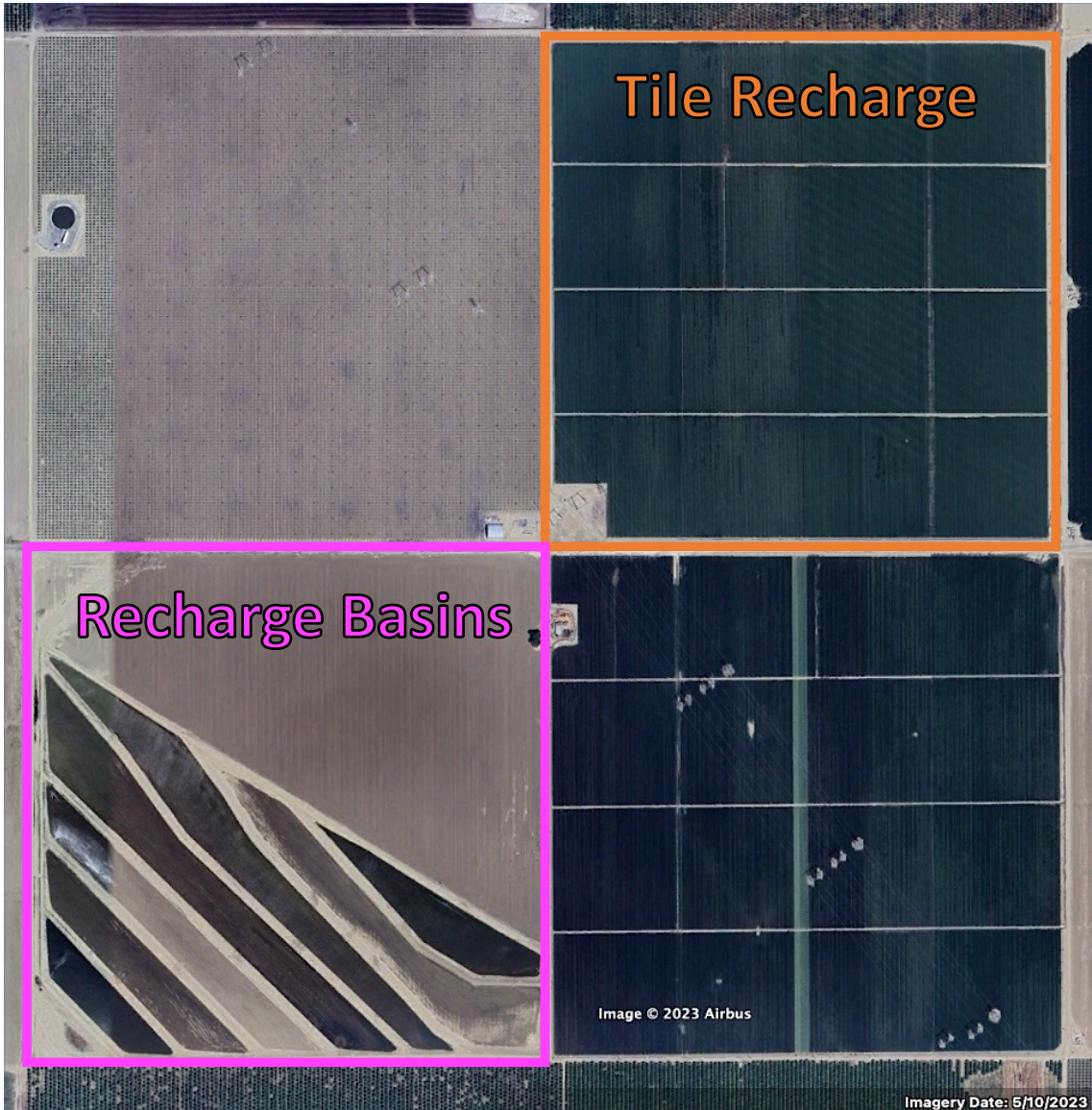
First system installed in 2017



**How to have your cake
and eat it too,**

Tile Recharge **VS** Recharge Basins

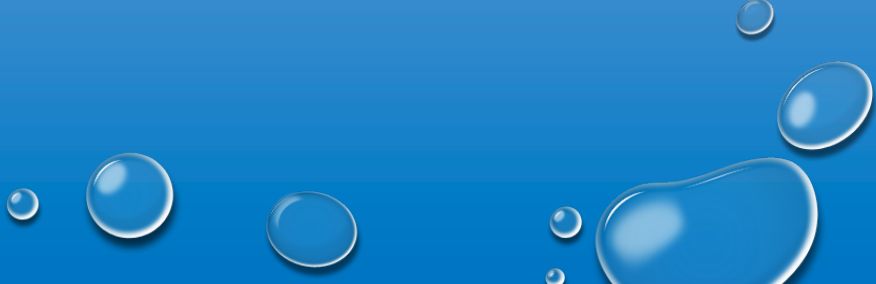


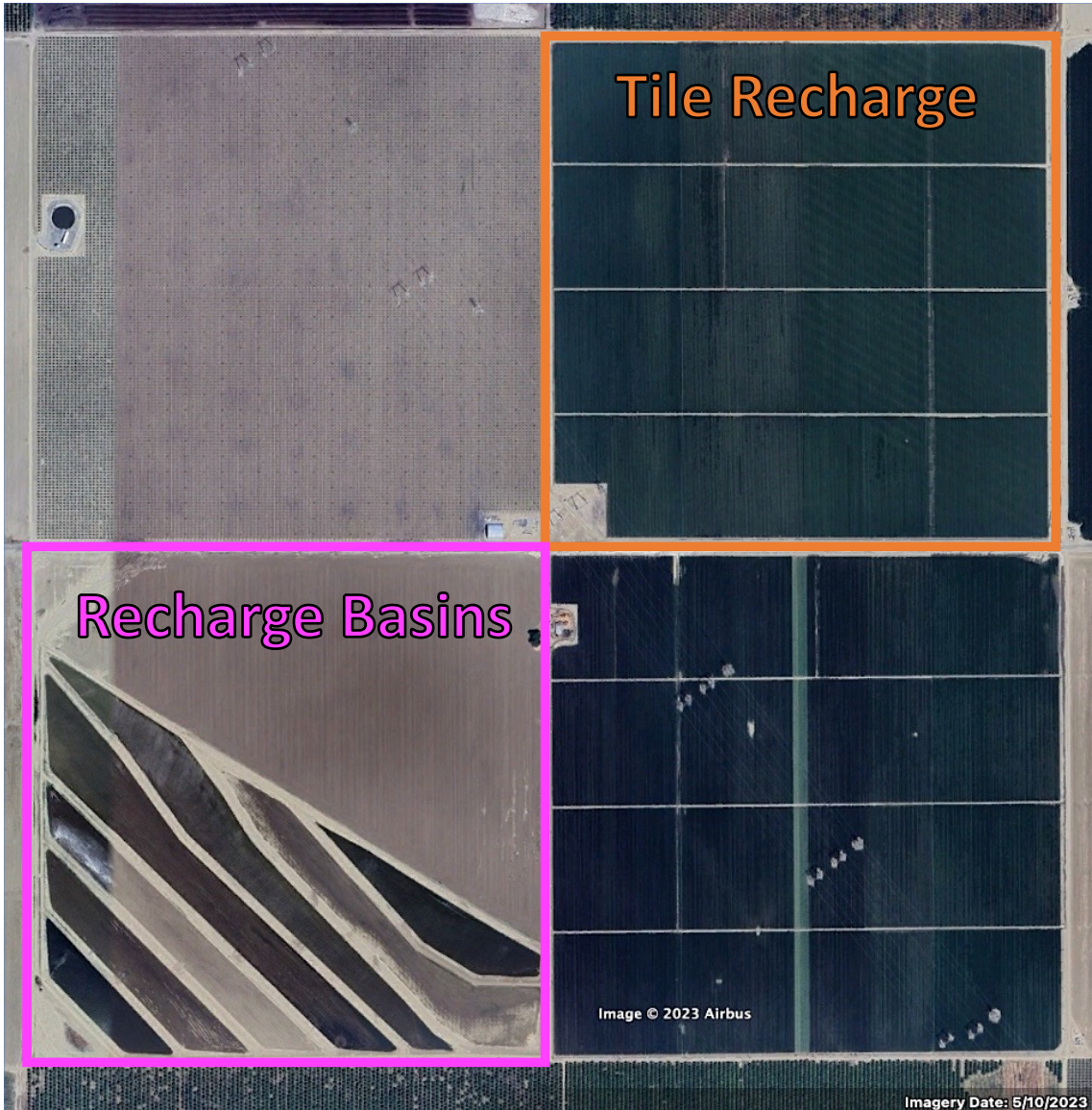


Tile Recharge

Recharge Basins

Tile Recharge **VS** Recharge Basins





Tile Recharge

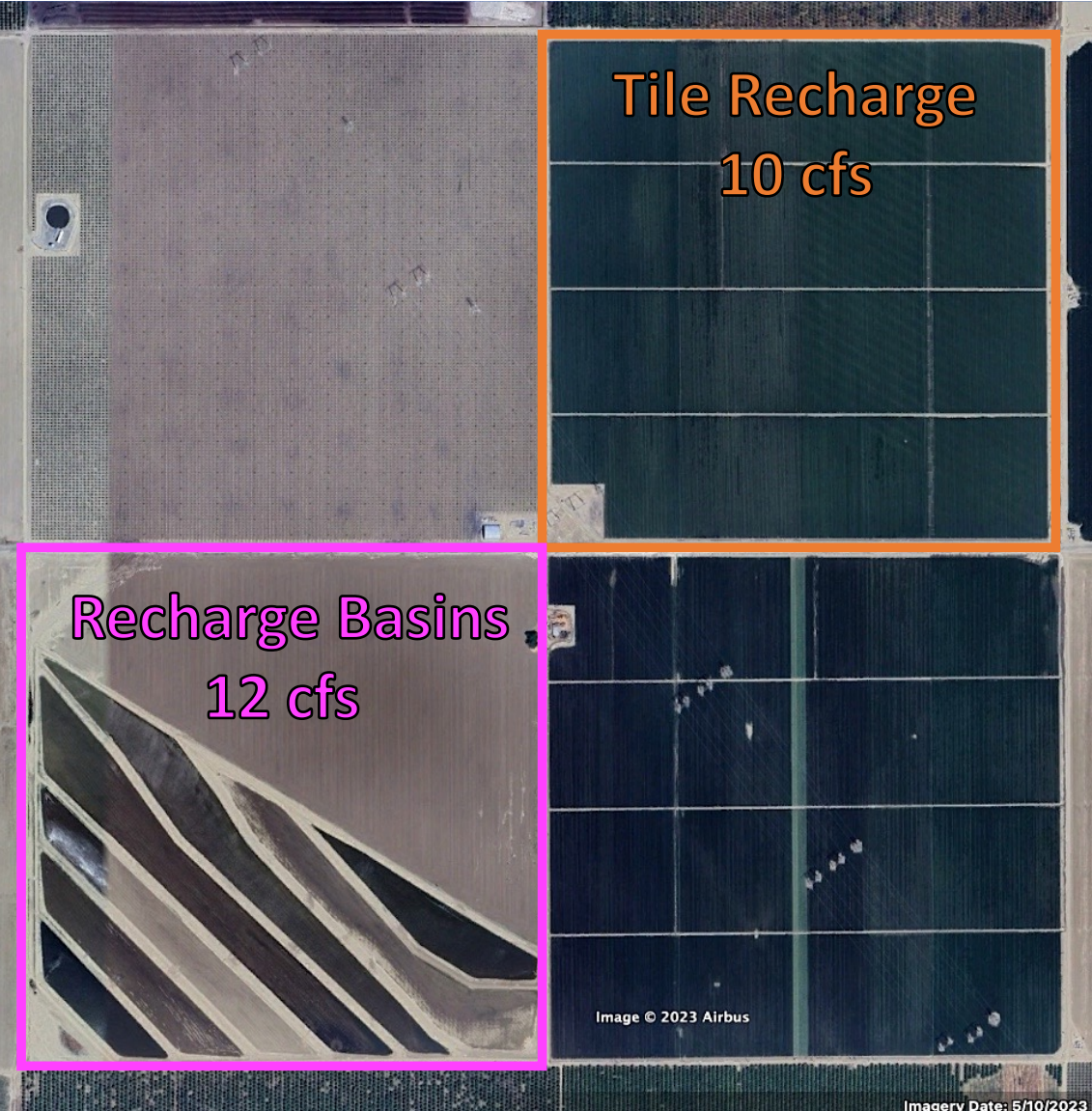
vs

Recharge Basins

**Both Recharge Systems:
on 160 acres w/ row crops**



Tile Recharge
10 cfs



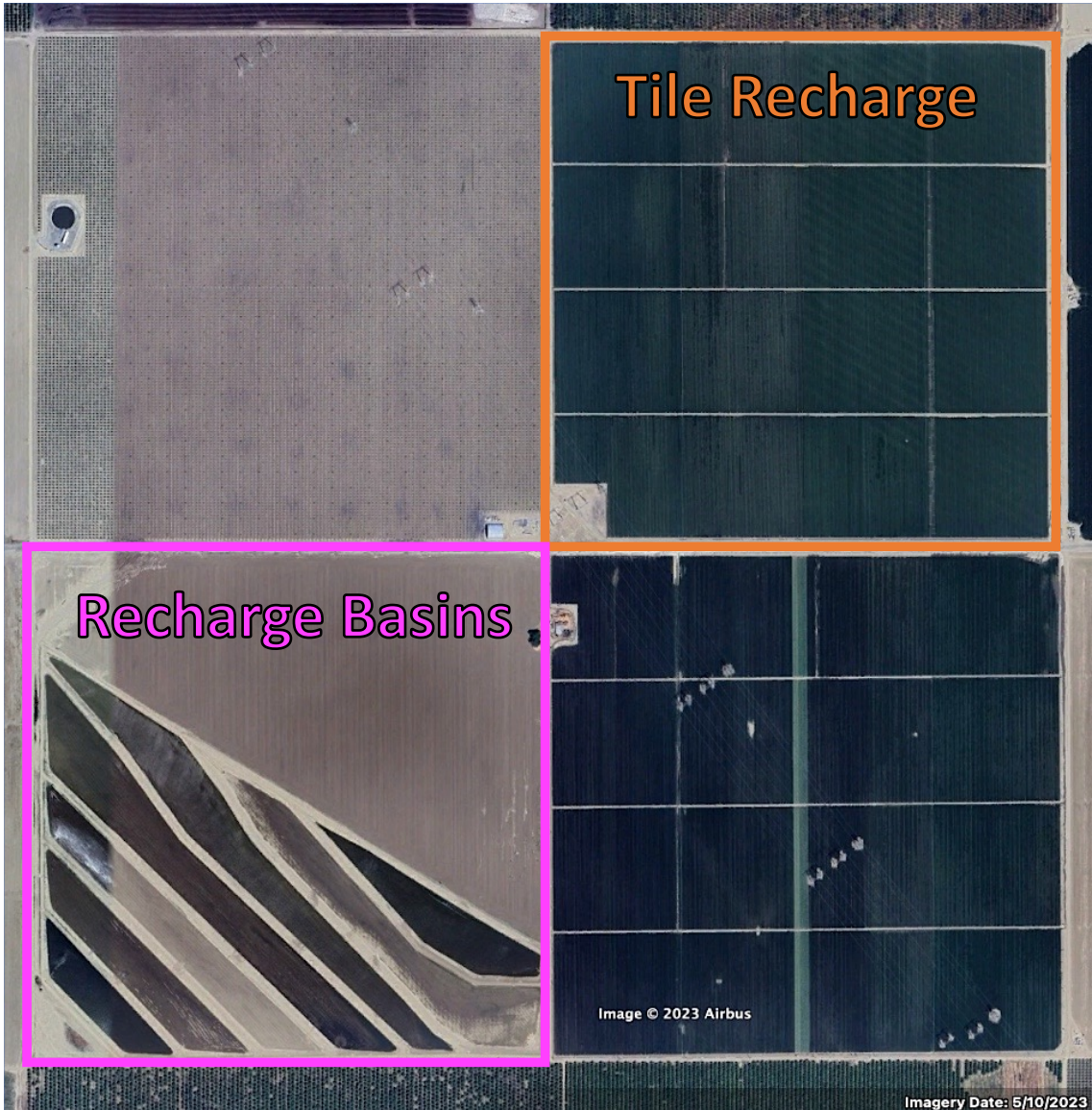
Recharge Basins
12 cfs

Image © 2023 Airbus

Imagery Date: 5/10/2023

Tile Recharge vs Recharge Basins

Both Recharge Systems:
on 160 acres w/ row crops
Maximize Turnout Flow Rate

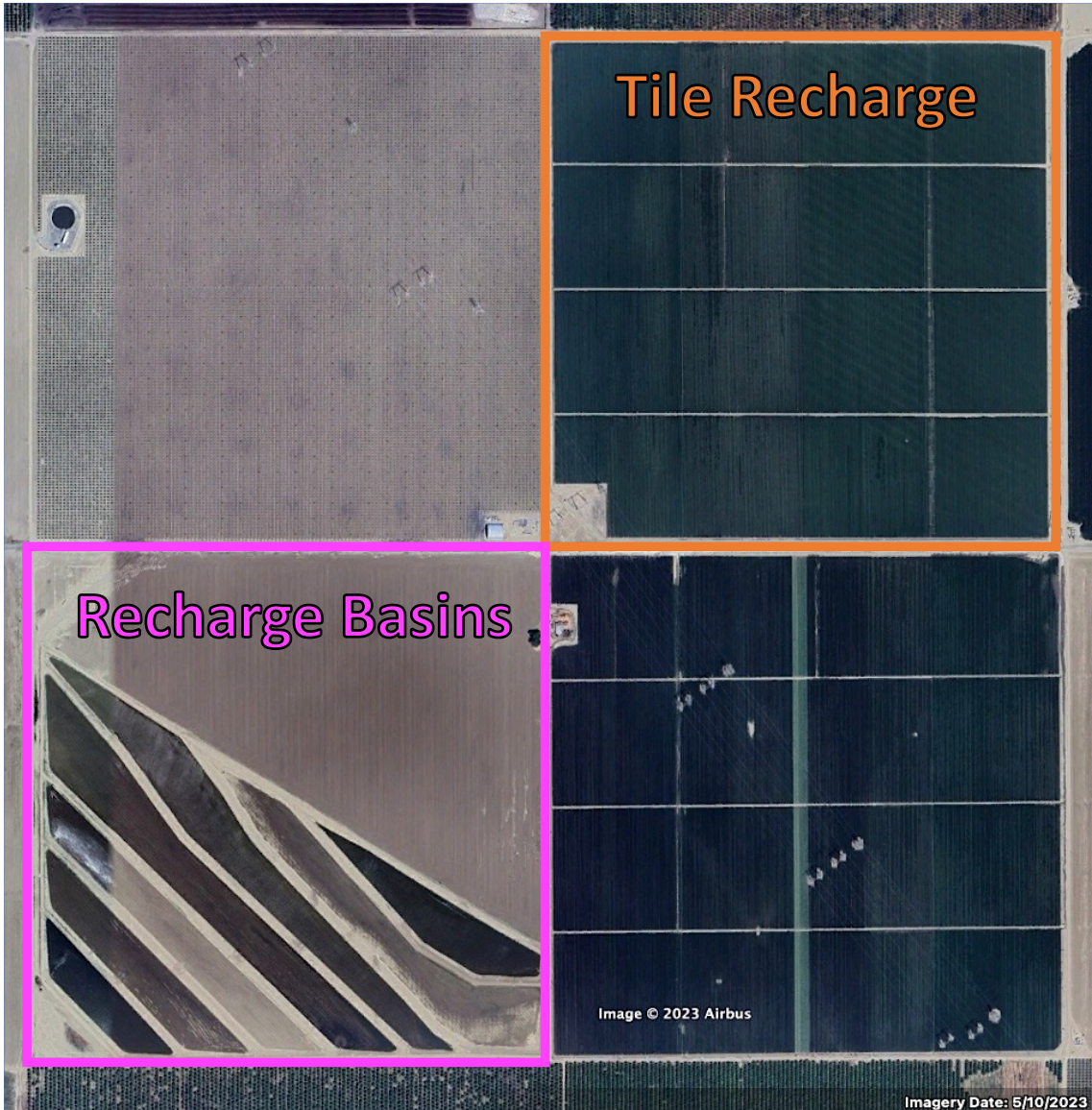


Tile Recharge

vs

Recharge Basins

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In 2023 both systems
operated from spring through
summer and into the fall



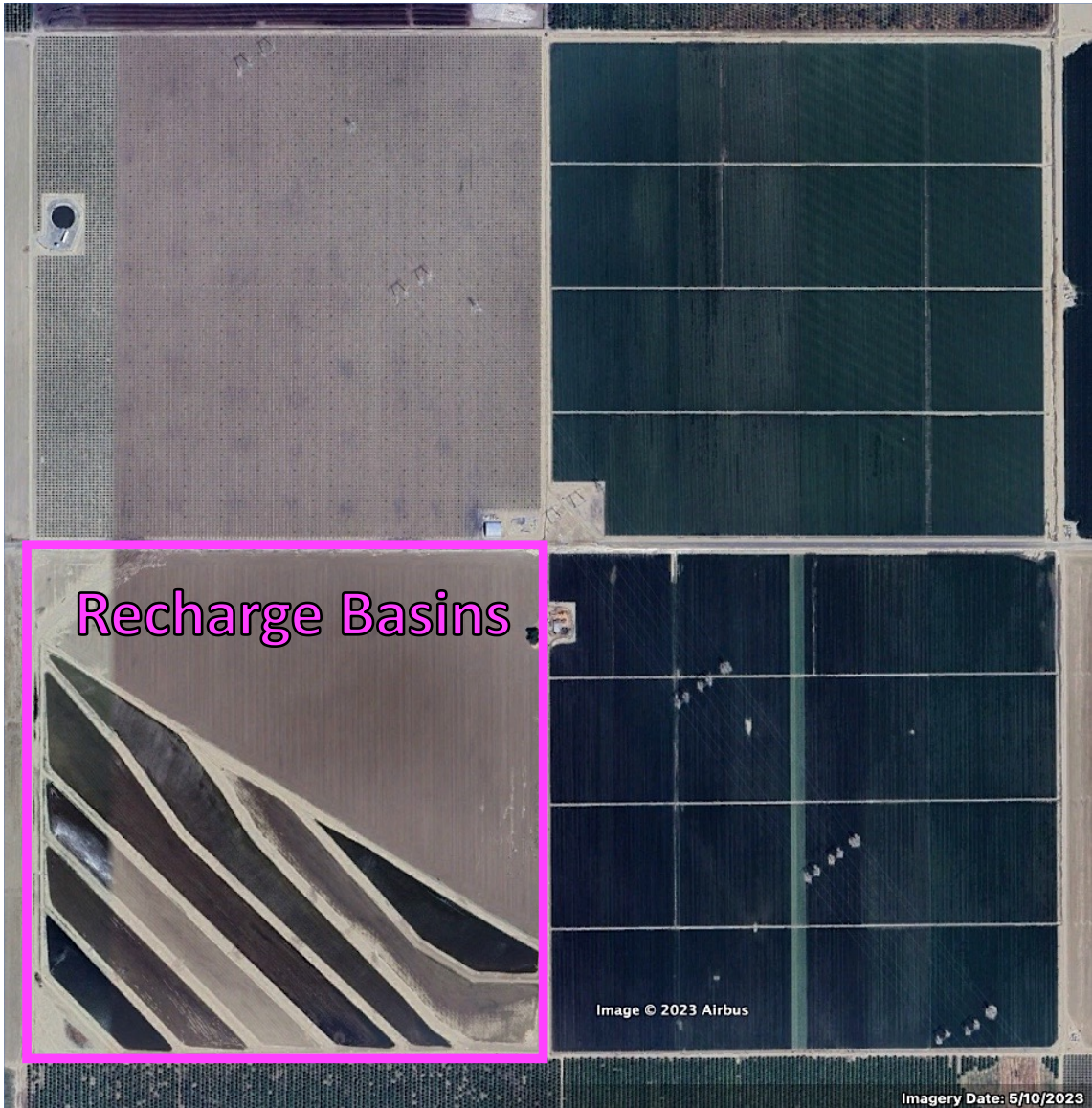
Tile Recharge

VS

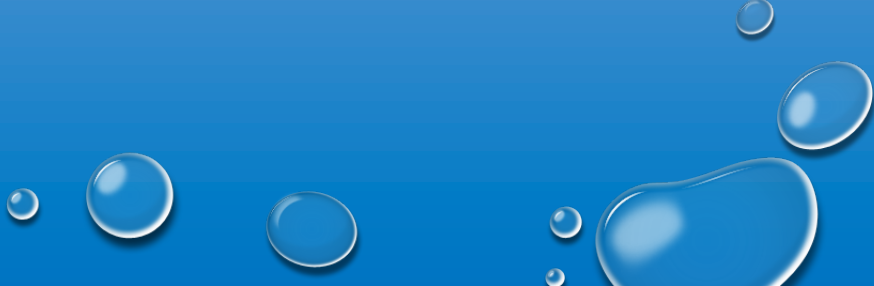
Recharge Basins

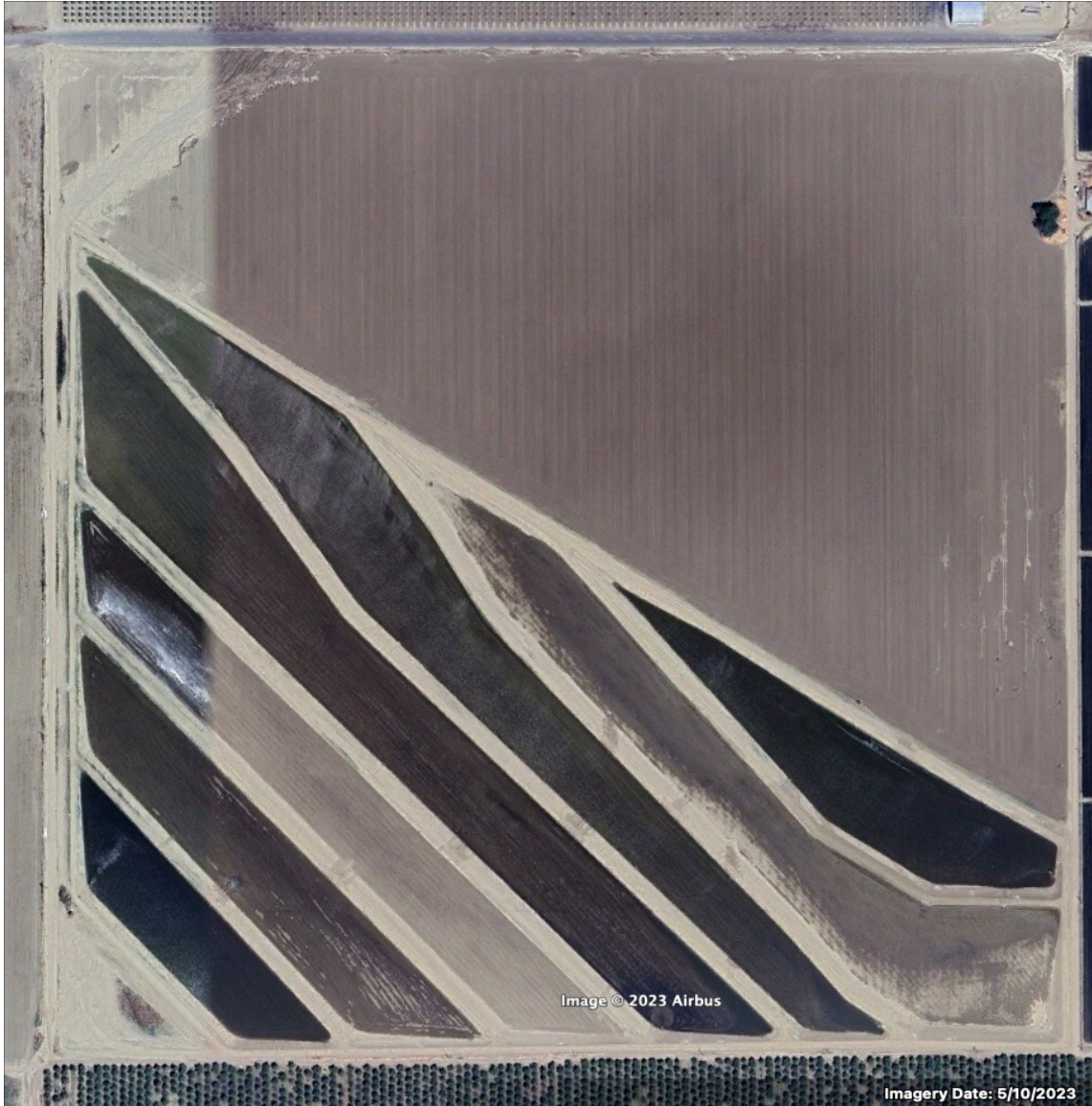
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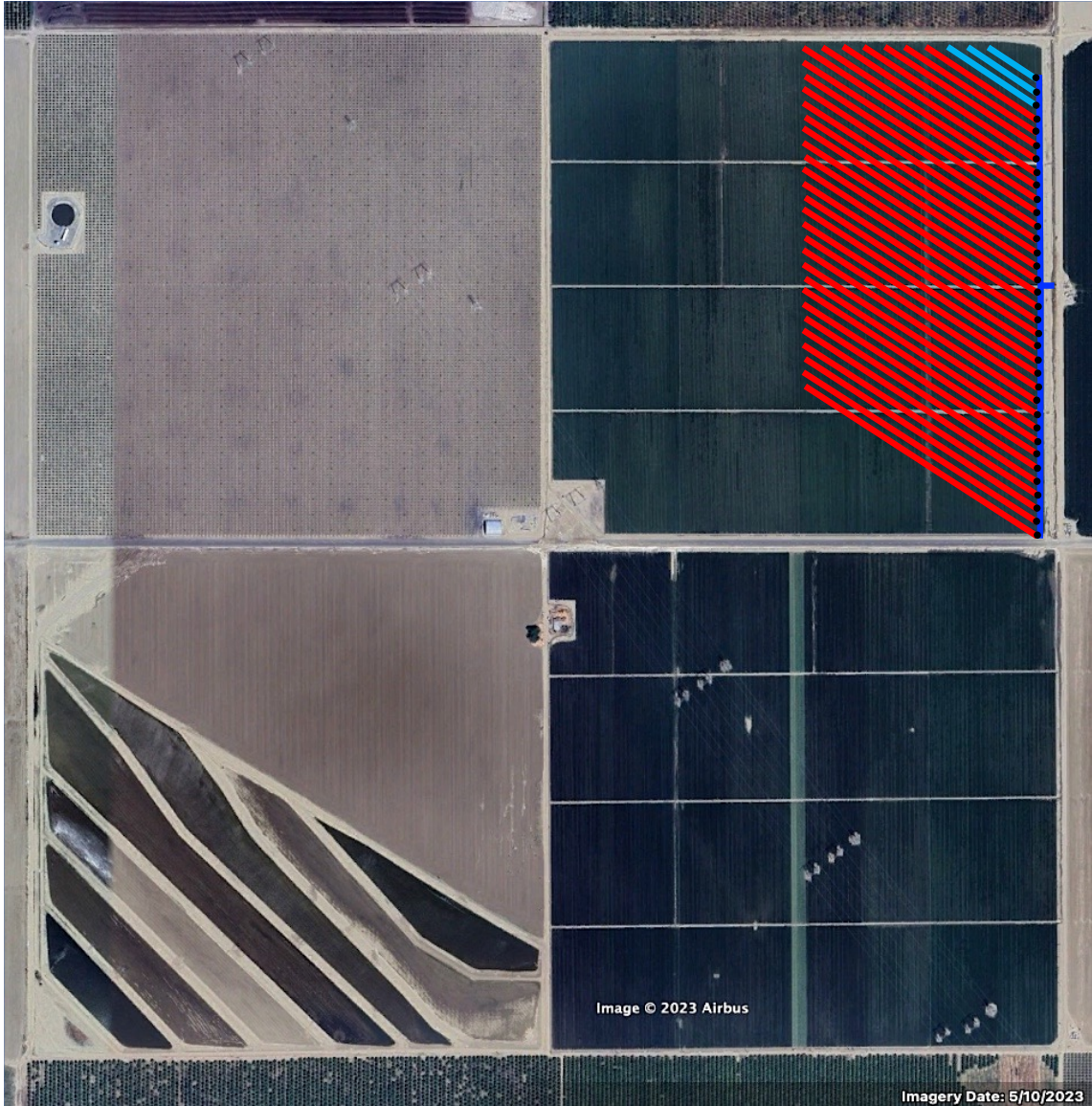


Recharge Basins

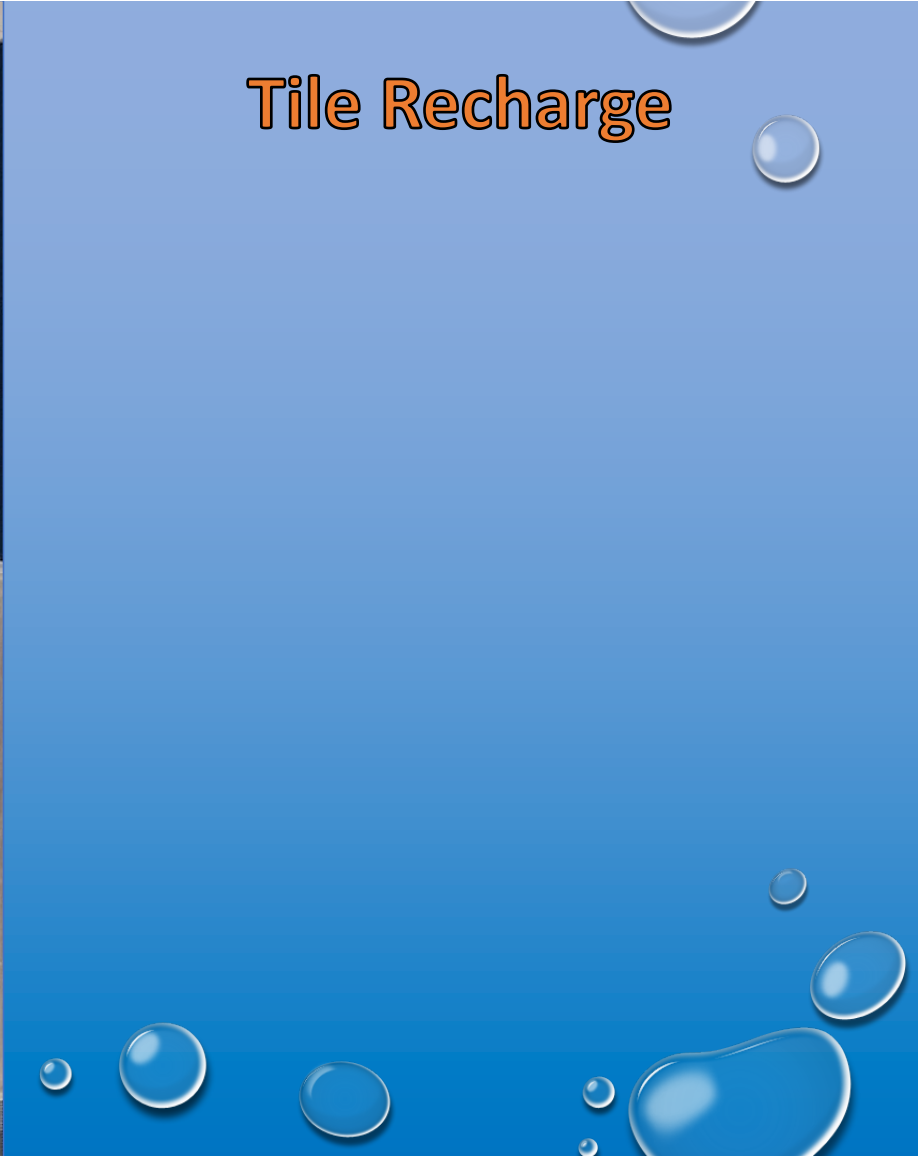


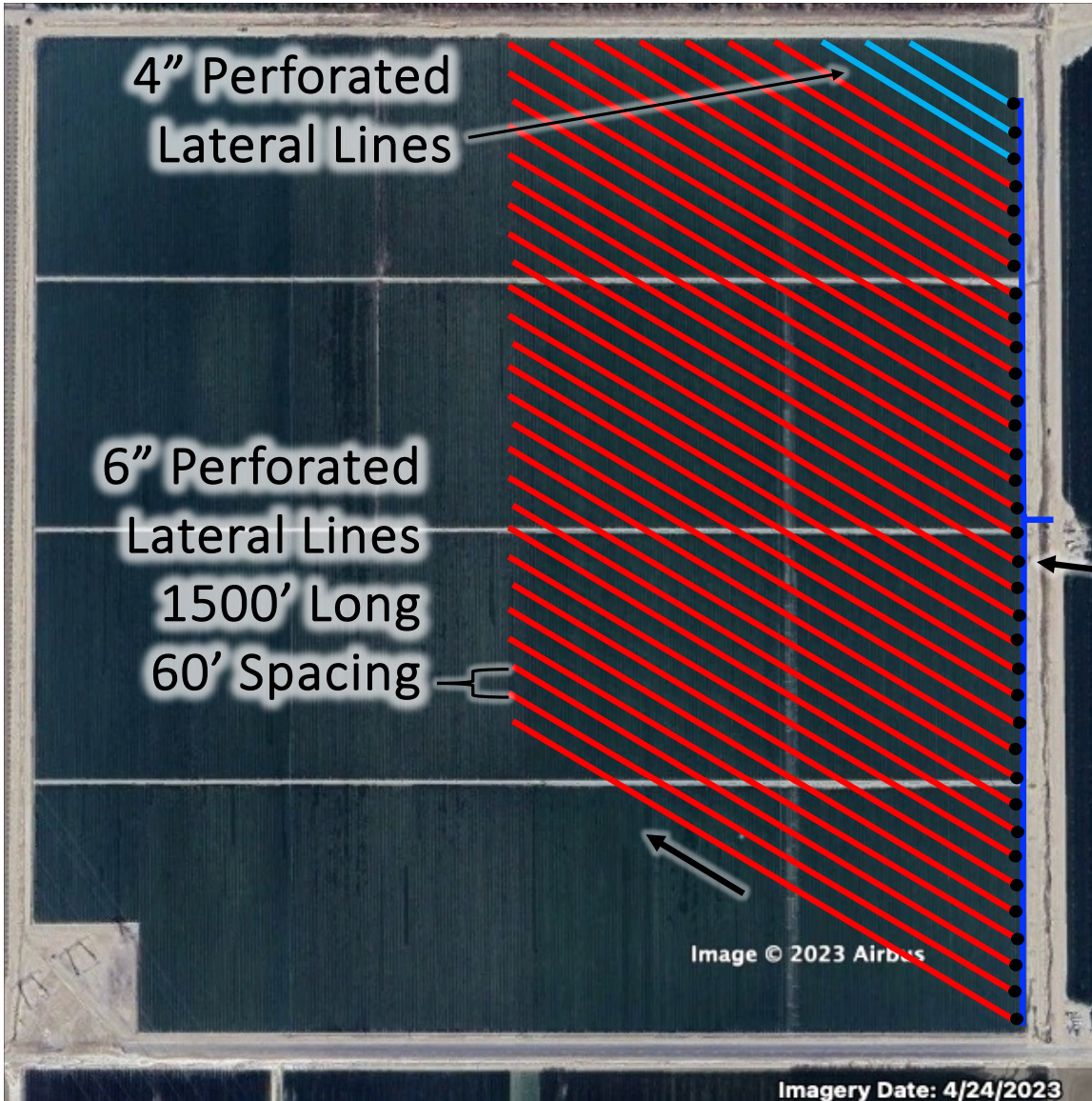
Recharge Basins





Tile Recharge



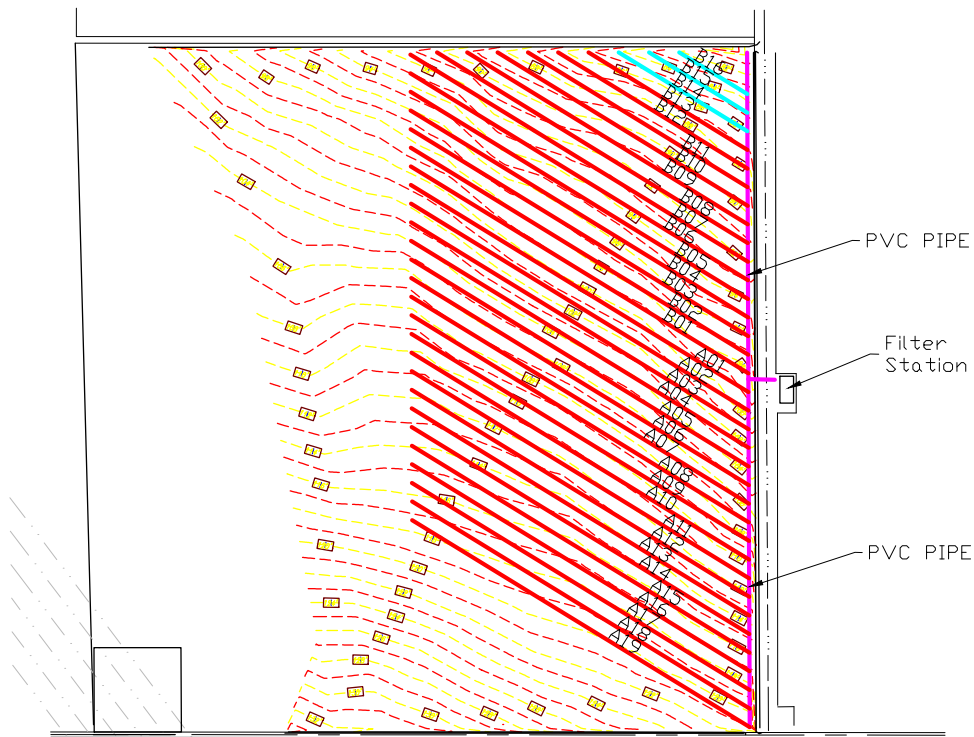


Case Study: D Farms Installed 2022

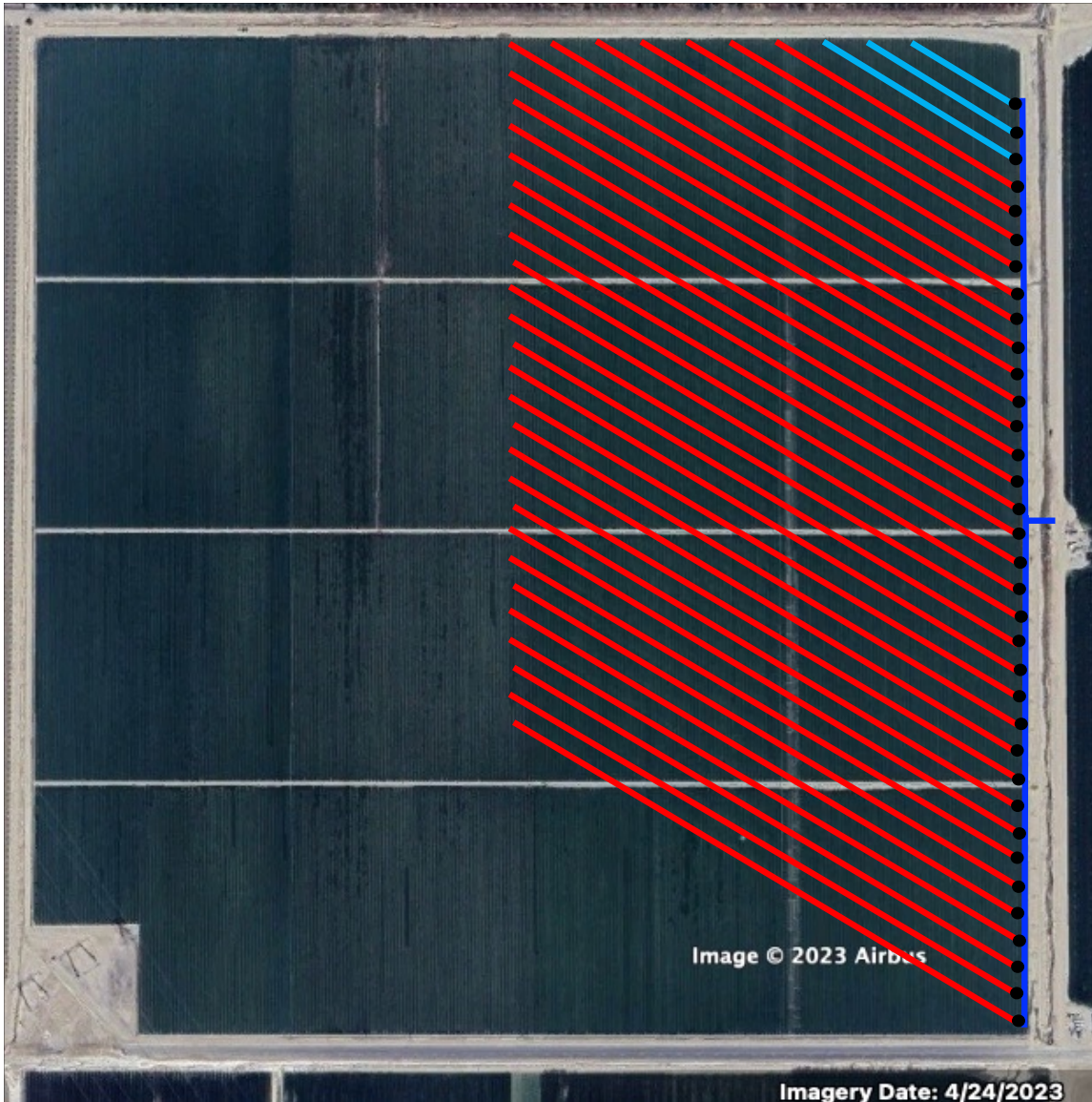
160-acre Field
62-acre Tile Recharge System
Row Crops

35 Mini-Standpipes
35 Perforated Lateral Line
Depth 8 ft to 14 ft

Mini-Standpipes and Sloped Land

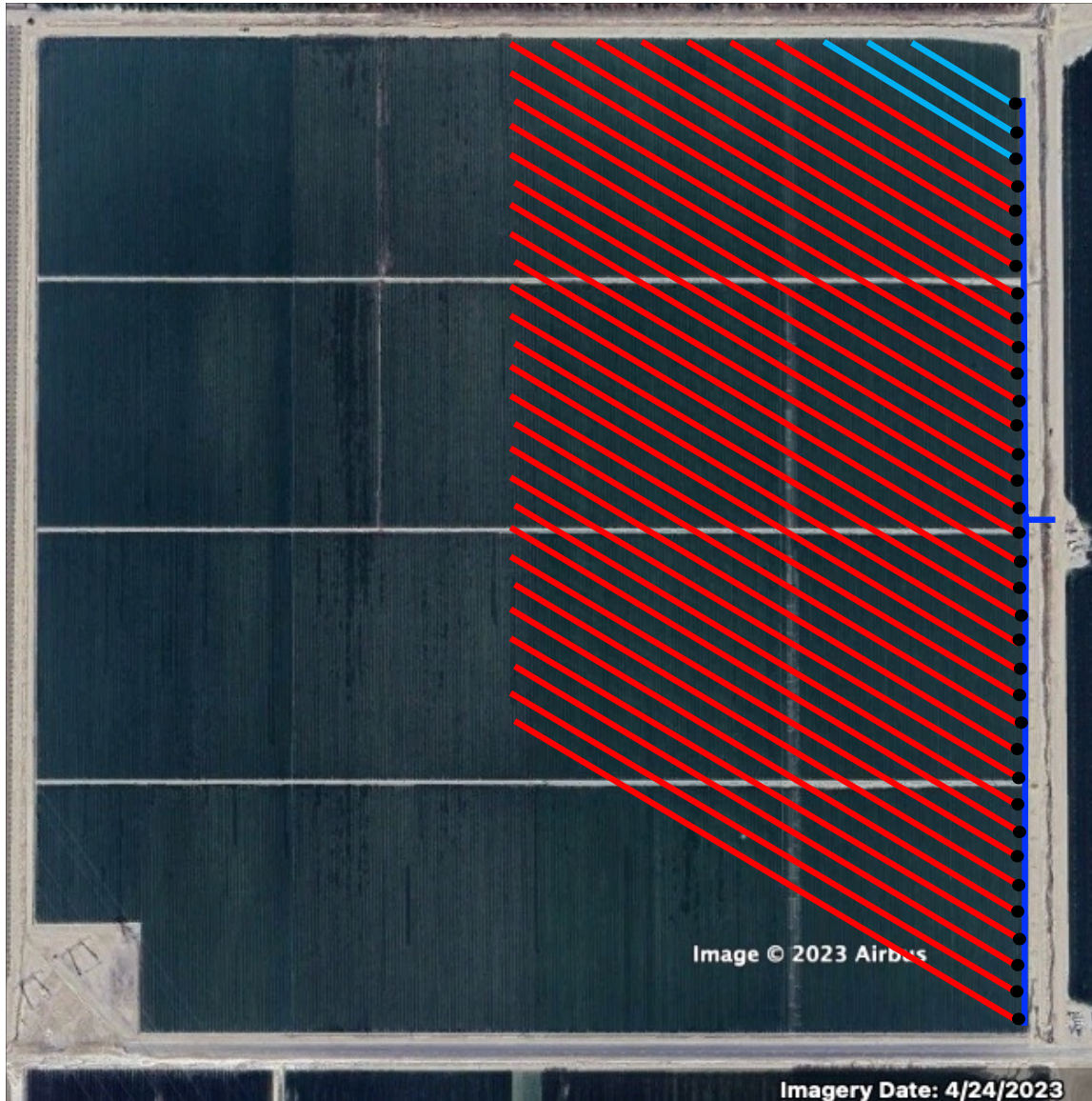






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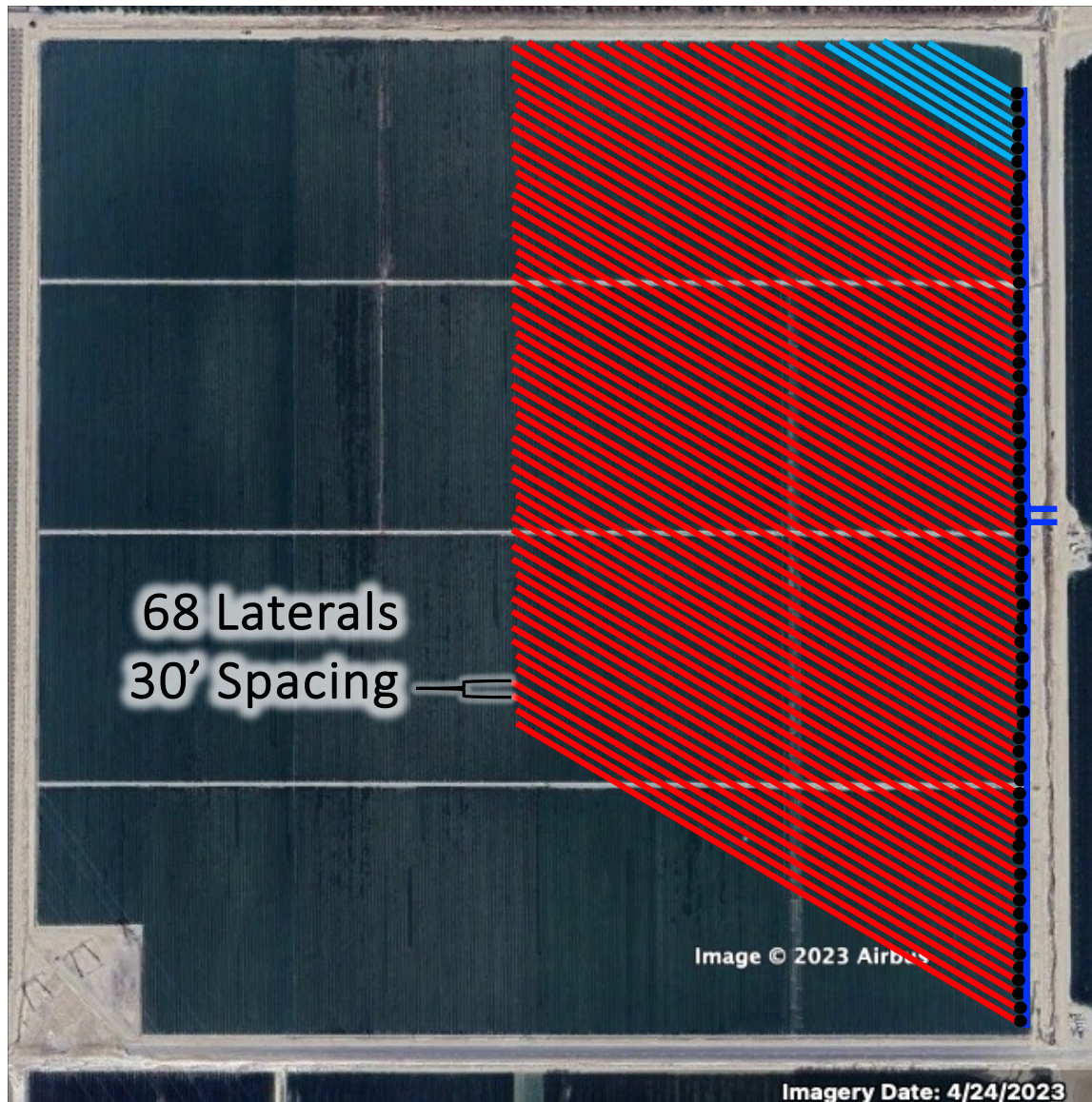
Design to
maximize turnout flowrate
10.4 cfs
4,650 gpm
20.5 AF/day



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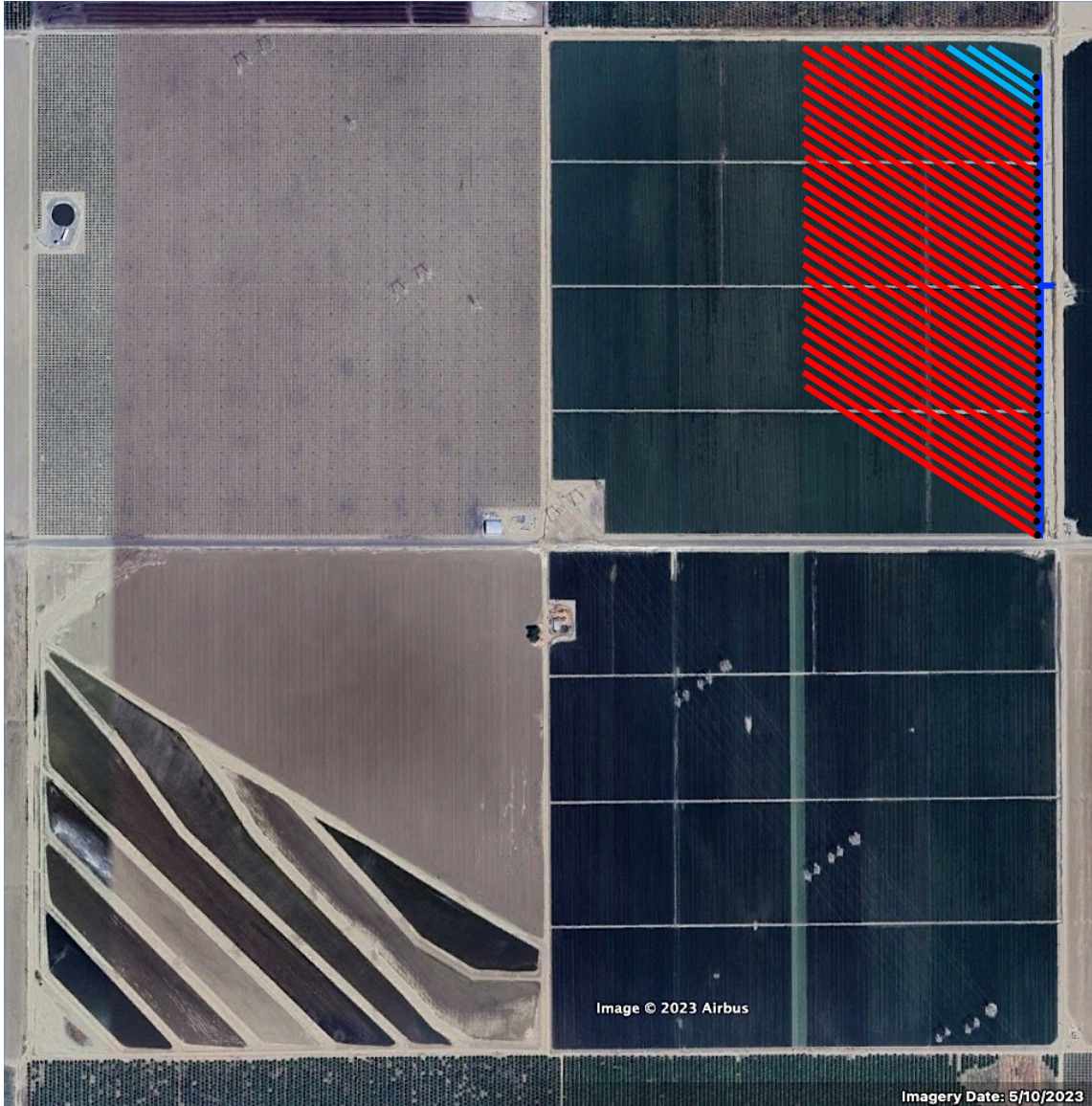
Recharged >3000 AF in 2023
(as of 9/29/2023)
AND still flowing



Case Study: D Farms
Original Installation
March 2022

**Doubled the size
of the system in
October 2023**

**New flowrate
20.5 cfs
9,200 gpm
40.4 AF/day**



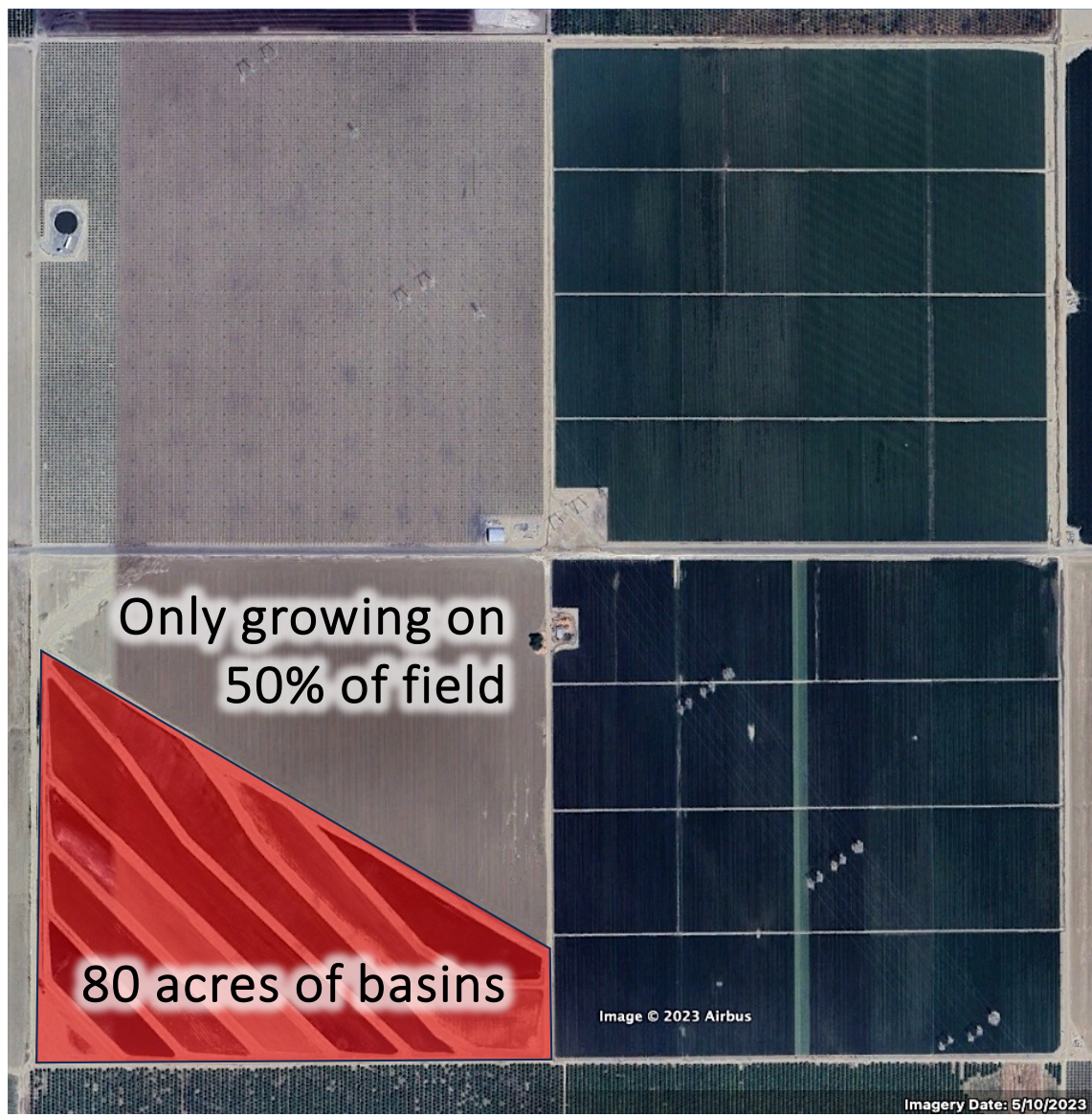
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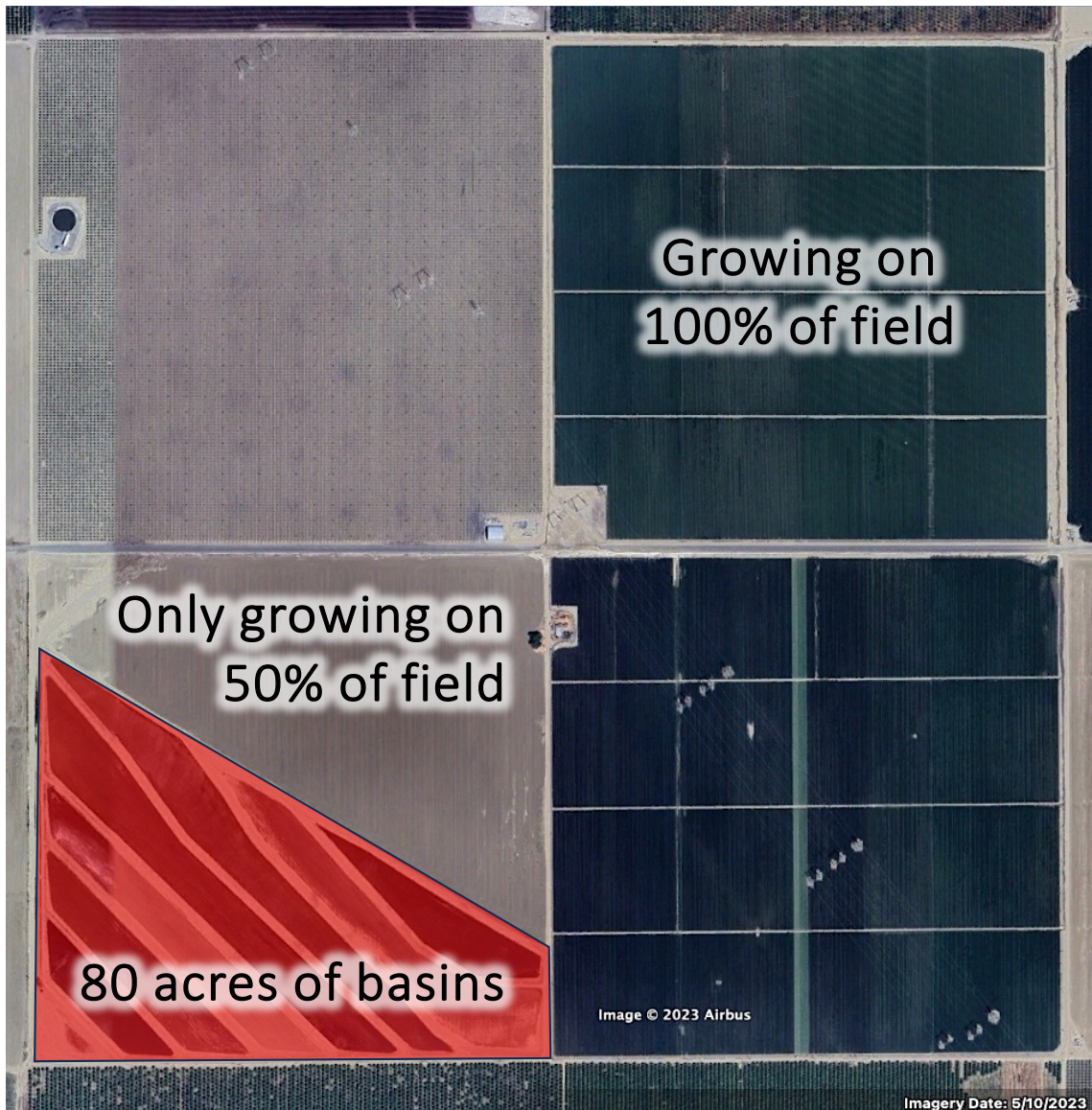
Tile Recharge **VS** Recharge Basins



Tile Recharge vs Recharge Basins



Tile Recharge vs Recharge Basins



System Costs and Return on Investment

It Depends...

Flow rate of available water

Infiltration rate of soil

Simple or complex control

Flow rates 400 gpm to 20,000 gpm

System sizes 2 acre to 500 acres



System Costs and Return on Investment

Roughly \$100 to \$175 per gpm
of flow capacity

(non-prevailing wage projects)

Pays for itself in 1 or 2 wet years



Advantages of Tile Recharge



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Affective way for individual farmers to earn water credits



FARM DRAINAGE &
RECHARGE SYSTEMS

Tile Recharge Securing Water for Tomorrow



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Mike Busby PG EIT
Engineer and Geologist
805-689-1099
Busby@LIDCOinc.com



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