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July 7, 2017

MANNING PARK STORMWATER RECYCLING AND PARK IRRIGATION PROJECT

County of Santa Barbara

Greetings County Officials and Park Directors...

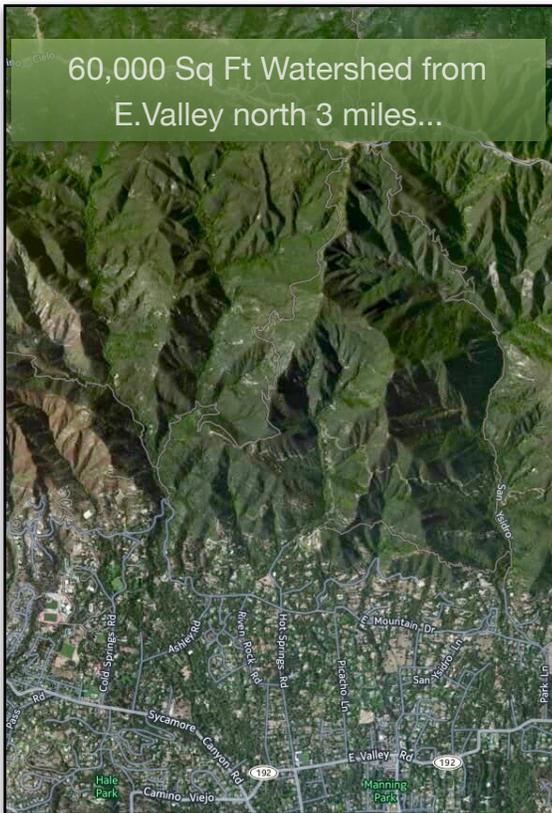
WATER SAVINGS FOR COUNTY PARKS

I am Thomas M. Cole, a 40 years builder/designer and patented inventor in Montecito. I have 35 years experience in designing and building *water drainage systems* as a licensed California General Contractor. Also an *EPA qualified Water Wise Landscape Professional (Green Gardens)*... My company designs creek and rainwater catchment systems for estates, government and businesses in Santa Barbara County. We recently designed a water catchment system for *Lotusland*, which *gathers and stores* in underground cisterns over 2,700,000 gallons per year for them at roughly one cent a gallon. We are using Lotusland parking lots, driveways and channels to collect water each rain and store it in underground cisterns.

I have created a survey for Manning Park using stormwater from the 60,000 square feet of drainage area above the park. Here are my findings.

SITE RAINWATER AMOUNTS AND CALCULATIONS

Capturing the rainwater runoff that traverses Oak Creek and the adjacent concrete drain chute at the corner of San Ysidro and E. Valley, we can gather more water than can be used in nearly five county parks. The watershed feeding these two points is 3,000' wide and about 15,000' deep. From East Valley Road and San Ysidro, about 3,000 feet wide, and halfway up to Camino Cielo at the top of the foothills. In fact on the coast we have nearly as much drainage area as the Cachuma reservoir, and more rainfall. The difference is the water here runs off in numerous creeks to the ocean. By collecting from these many smaller creeks, we can capture excess stormwater runoff. By storing and recycling this water into parks, freeway plantings and sending water in pipes back upstream, we can;



Manning Park - Watershed Area

3,000 X 20,000 + 60,000 SQ FT

**Or 1,377 acres above E. Valley,
3,000' wide**

20% Impermeable Coverage =

**275 Acres of streets, roofs,
driveways, sandstone**

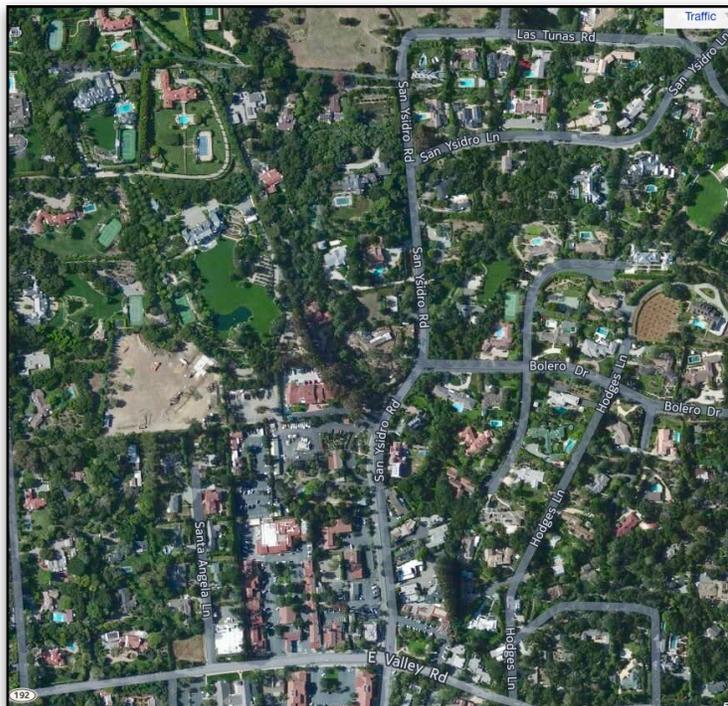
**Drains to Oak Creek Xing at East
Valley**

- 1) Cut water use by millions of dollars.
- 2) Cut electricity use by millions of watts - avoid pumping water from 600 miles away.
- 3) Recharge groundwater basins as part of CA mandated SWP.
- 4) Remediate damage to stream beds by capturing overburden water flows from streets and driveways.
- 5) Improve fish and wildlife habitat by keeping streams flowing year round.
- 6) Pipe this excess water to the desal plant for processing into potable water. Much easier than cleaning up salt water.

The area we are concerned with contains businesses and parking lots, large and smaller estates, roads, culverts, San Ysidro Ranch, Casa Maria and other properties and sources including Oak Creek. The area is 60,000 sq ft or 1,377 acres or 2.15 sq miles. We are using a 20% coverage number, so we assign 20% of this area as impermeable and

this area drains to Oak Creek and the storm drain a hundred yards to the west of Oak Creek. That means 275 acres of usable drainage. With 18" of rain that translates to 412 acre feet of water!!

My design here involves collecting water at Oak Creek where it flows under East Valley Road and the adjacent storm drain at the corner of San Ysidro and East Valley.



At the East Valley crossing, Oak Creek is a rock lined channel some eight feet wide and five feet tall that winds out of the hill area to the North. The plan is to capture part of this relatively clean water, pipe it down to a new cistern at Manning Park and use it for park watering, pipe to other parks and even sell and transport water to other entities.

THE NUMBERS

275 acres of impermeable drainage creates... 275 acre feet of water with one foot of rain. One inch of rain will create 22.9 AF of water flowing past the East Valley crossings or 7.4 million gallons. So when an inch of rain falls in a short period of time, Oak Creek at the East Valley Road crossing receives 22.9 AF of clean rainwater.

Cube Capture Rate

One Foot 12" PVC = .75 Cu Ft

@2ft/second flow= 11.22 GPS

3 Cubes = 33.6 GPS Max

2,016 GPM

120,960 GPH

24 hr output 2,903,040 Gal

1" Rain = 8.9 Acre Feet Stored H2O

In a 24 hour period and a one inch rain, that boils down to...

305,485 gallons per hour (GPH),

5,091 gallons per minute (GPM) and

84.8 Gallons per second (GPS).

For a quick one inch rain, the calculations indicate a 24 hour average flow of 11.34 CFS cubic feet per second between the East Valley crossing and the E. Valley corner drain.

This water in draining out of rock lined and concrete lined channels and thus is not deemed available for fish spawning. This water now runs off creating over burdens and mud on the lower Oak Creek. The goal here is to save this peak water for later, thus enhancing creek flows in drier times. By slowing water flows and evening out the rates, we can enhance

riparian habitat downstream and irrigate county parks.

THE DESIGN

Here's an overview of the design... We gather water at the two locations mentioned. The corner storm channel at East Valley and San Ysidro, and at the East Valley crossing of Oak Creek. From there we pipe this water along the creek banks in a 12" PVC pipe, 680" long, down to Manning Park. On both sides of this park build underground storage cisterns to store a total of 6 Acre feet of water. The East side of the park is where collected water will rush down as the Park is 160 feet below the corner. Pump half of this water under the road to fill the West side park reservoir.

Simply put the County now has 8.9 Acre feet of stored water from a one inch rain.

- 1) Cube 16" x16" x 7'
- 2) 12" exit pipe
- 3) Rock grate entrance
- 4) Exit valve

THE CUBE

This is my *patented device* that safely and efficiently collects water from a rushing channel. These cubes are six feet long and 16" square tubes that allows rushing water to pass straight through when open. When they are closed via a steel cable from above on a

- 5) Side exit plates
- 6) Pivot for exit plate
- 7) Side valve cable pull
- 8) Exit valve cable pull
- 9) Side valve hinges
- 10) Side exit weld to exit pipe

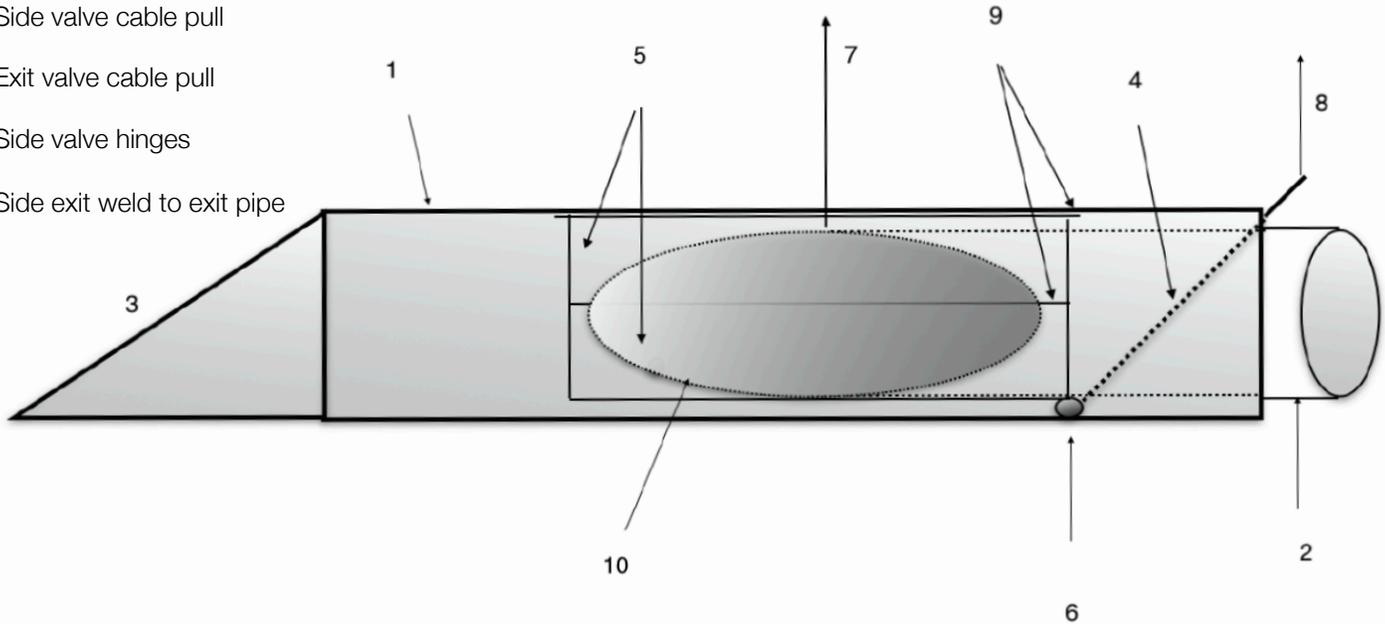
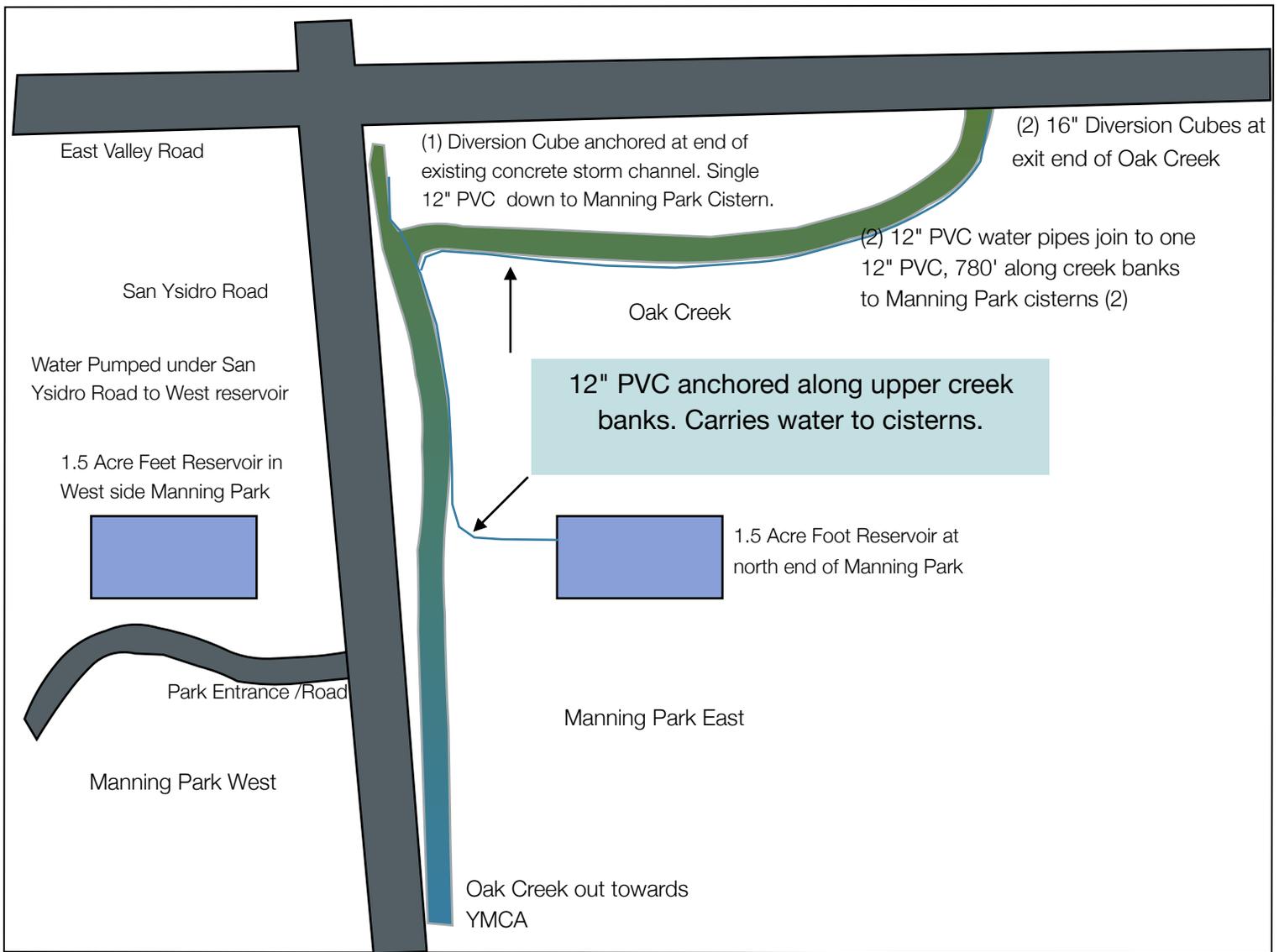


Fig 2

bridge or abutment, water entering the cube is redirected to a steel pipe exiting out the side of the cube, where water is carried away out of the channel and into pipes installed on the banks and down to storage in the park.

The cube thus pulls and extracts water out of the channel on command and sends water to storage.



Sale of Stored Water From Park

Assume 6 Acre Feet of Storage
or 11.7 Million Gallons

One Tanker Truck 50,000 Gals Sold
at 3 cents/gal delivered...

$50K \times .03 = \$1500.00$ per load

$11.7M / 50k = 234$ Tanker loads

$234 \times \$1500.00 = \$315,000$

From one inch of rain...

The capture rates are shown here. When securely installed in the water channel, the cube gathers 11.2 gallons per second as an average at 2-3 feet per second flow rate. With three cubes installed, two at Oak Creek and one at the corner channel, the water gathered total is 33.6 gallons per second... Or...2,016 Gallons Per Minute GPM

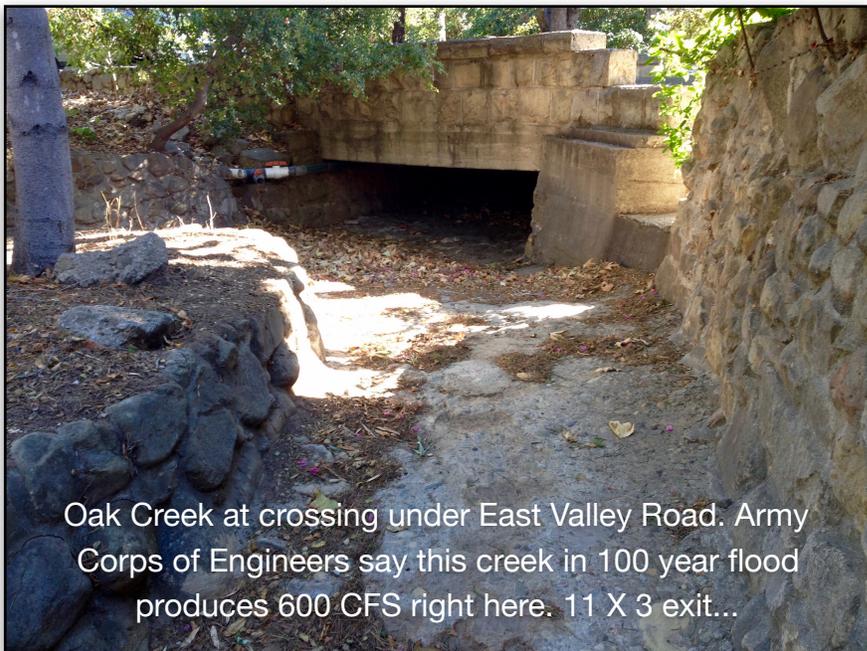
120,960 Gallons Per Hour GPH

2,903,040 Gallons Per Day (GPD) 24 Hour Rate

So using this system, a one inch rain produces 8.9 Acre Feet of storable water delivered to Manning Park with zero electrical costs. Zero because the whole system operates on gravity flow. Maybe some electricity to move water from various siltration tanks to storage tanks.

STORAGE

To store 6 Acre feet build two cisterns in the park. 6 AF is nearly 2 million

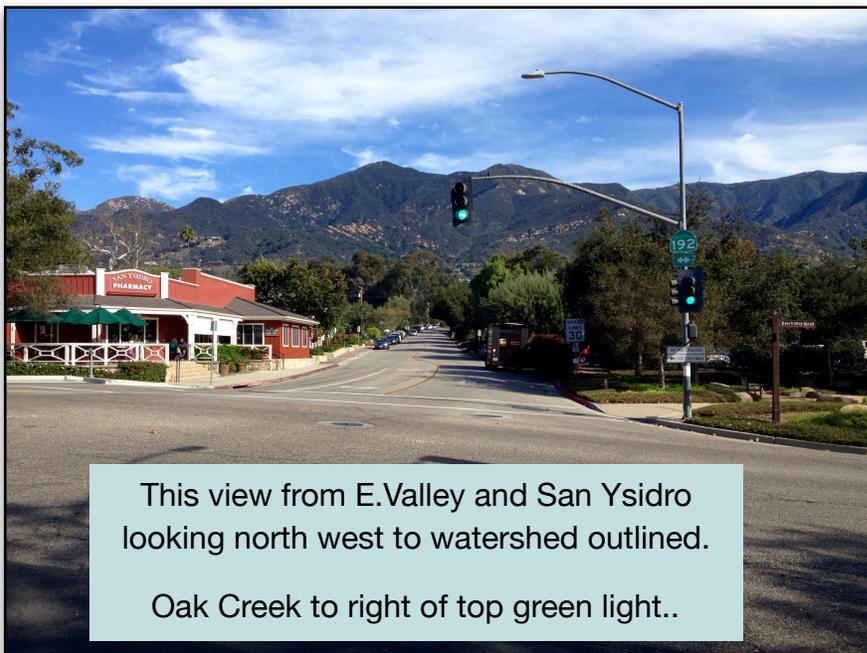


Oak Creek at crossing under East Valley Road. Army Corps of Engineers say this creek in 100 year flood produces 600 CFS right here. 11 X 3 exit...

gallons. A simple storage method is block walled cisterns placed mostly underground, with a cover. Easy to build and maintain. Place both cisterns at the north side of the park on land nobody uses, or on the west park, Northern boundary. This will provide water for the park nearly year round. When the next one inch rains fall, gather another 6 AF of water...The County is now a water machine, able to irrigate numerous county properties, programs, parks.

Now Manning park is able to save \$43,000 a year watering Manning Park. Instead county can irrigate its own parks with its own local water, stored on site or... irrigate other parks nearby or at distance. Water can be shipped via pipes up and down the stream corridor, pumped onto tanker trucks on the street just above Manning (San Ysidro) or as my son suggested... send it back over the hill to Jamison Reservoir for storage and processing.

So how much is this water worth? It's not purified but its also arguably cleaner and more useful than recycled sewer water, or saltwater. This water can be put directly on landscapes ***without any Title 22 regulations***, as long as a ***dedicated pipe system is used***. Or it can be purified at the desal plant and used as drinking water. It is after all, rainwater with a few leaves.



This view from E.Valley and San Ysidro looking north west to watershed outlined.

Oak Creek to right of top green light..

RETAIL WATER

What can the county get from 6 Acre Feet of stored water or two million gallons?

Delivered off site to the Warner properties or other high end water users for irrigation, this water could bring .03 cents gallon/or 50K gallon truck load for \$1500.00.

At that rate 6 AF is worth \$58,653.



Storm drain at San Ysidro and E. Valley...
instal cube at south end of this drain
culvert...

That's from one inch of water. If 12 inches of rain falls and is captured in one inch increments, that would bring the value of harvested rainwater at Manning Park to \$703,838. If not sold, this water could be piped or shipped to other county parks to replace municipal water, thus saving \$703,838 a year in water costs. Either way the county is making or saving \$700K/year, every year.

The (continuing drought) and just the ability to grow as a county really calls out for solutions. Imagine every county park with some kind of rain/creek catchment system and/or onsite storage. Water in drainage channels is wasted as mud out to the ocean. It causes great erosion in overburdened creek beds and fish can't use mud...fish need slow, non muddy release of water that will be provided by saving and slowly releasing storm waters. So this is also a fish program. Rather than all that runoff water rushing out to the ocean, now we can save a small part of it. That adds up to 80+ acre feet every year at this one location.

COSTS

This full option as outlined because it is the most efficient. Note: Not all parks are as productive as Manning, but this

is local and has great features and conditions for water capture. As a second option, instal one cube in Oak Creek, one pipe and dig a 100' X 50' hole in Manning and line it with plastic.

Test it out for very little money. That could be done in a month for \$110,000, probably. The full project with three cubes and two (6) Acre Foot storage basins... Probably \$650,000. Add in government costs and probably double this. But Manning is still creating \$703,838 from water sales/savings each year out of a 12" rain year, which may be the new normal.

In a 12" year with one inch rain increments that system could gather and store and disperse 72 acre feet. 23.5 Million gallons...with practically zero electricity costs.

CONCLUSIONS

There are many lots, roads surfaces, and drain creeks throughout the Montecito and the entire Santa Barbara County coast that would provide large amounts of water during the rain season. Initial views around Montecito, *there are some 20K acre feet* traveling down drains and creeks. The Army Corps of Engineers did a 1974 survey



Oak Creek outlet at E.Valley Road - One inch rain produces 11.5 CFS at this point...



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