

APPENDIX A

MEMO TO KAREN KOSUP

GROUNDWATER USE ON THE MEADOWOOD PROPERTY

MEMORANDUM

648-003

TO: Karen Kosup, P.E., Pardee Homes

FROM: Andrew Oven, P.E., Dexter Wilson Engineering, Inc.

DATE: December 30, 2008

SUBJECT: Groundwater Use on the Meadowood Property

Groundwater has been used on the Meadowood property for a number of years. This memorandum will evaluate the historical groundwater use on the Meadowood property and establish a basis for estimating the annual historical groundwater use.

The Pankey Ranch has been operating fruit tree groves upon and around the Meadowood property since the 1940s. Specifically on the piece of land known as the Meadowood property, the first trees were planted in the 1960s. The current groves on the property were planted between 1973 and 1989. Thus, grove trees have been in production and cultivated on the Meadowood property for over 40 years.¹

Water for irrigating the groves has been pumped from the ground using wells. No imported water is available in the vicinity and thus has not been used to irrigate the groves. Groundwater has been used exclusively to irrigate the groves upon and around the Meadowood property. Furthermore, to the present, records detailing amounts of groundwater use have not been kept. The average annual water use to irrigate the orchards can be estimated by using a rational approach

to determine groundwater usage. Groundwater used on an annual basis can be determined by utilizing the amount of groves under production and applying an irrigation rate based on the type of tree being watered.

The land under production historically upon the Meadowood property includes 45 acres of avocado trees and 135 acres of citrus trees.² Irrigation requirements for crop production for avocado trees was obtained by speaking with Gary S. Bender, Farm Advisor, of the U.C. Cooperative Extension, San Diego County and by referencing an article written by Gary S. Bender titled, "Strategies for Dealing with a 30% Cutback in Water Use for Avocados," undated.³ Gary S. Bender confirmed in a telephone conversation that water use for avocados is around 4 acre-feet/acre/year.⁴

Generally, water use for citrus is less than that required for avocados. Gary S. Bender's comments were consistent with this fact; however, he did not have a ready figure to provide for citrus water use. The citrus water use estimate that we utilized is 3.25 acre-feet/acre/year. This figure was recommended by Mark B. Elliot, PBS&J, to Bill Pankey, Pankey Ranch, as a reasonable average value and confirmed by Bill Pankey in an email to Mark B. Elliot.²

Thus, the annual historical groundwater use on the Meadowood property for irrigation of avocado and citrus groves is estimated to be:

135 acres of citrus x 3.25 acre-feet/acre/year =	438 acre-feet/year
45 acres of avocados x 4 acre-feet/acre/year =	180 acre-feet/year
Total average historical groundwater use =	618 acre-feet/year

Karen Kosup, P.E.
December 30, 2008
Page 3

This amount could vary up or down based upon an excess or deficient year of precipitation but the amount indicated provides a fair representation of groundwater utilized on the Meadowood Property on an annual basis.

Notes:

1. Email from Bill Pankey, Pankey Ranch, to Karen Kosup, Pardee Homes, dated December 13, 2008.
2. Email from Bill Pankey, Pankey Ranch, to Mark B. Elliot, PBS&J, dated June 23, 2008.
3. Source of article is <http://cesandiego.ucdavis.edu/files/45050.doc>
4. Telephone conversation between Gary S. Bender, U.C. Cooperative Extension, San Diego County, telephone number 760-752-4711 and Andrew Oven, Dexter Wilson Engineering, Inc., on December 15, 2008.

AO:ps

Attachments

cc: Thomas F. Steinke, Esq., Seltzer, Caplan, McMahon, Vitek

(1)

Andrew Oven

From: Kosup, Karen [karen.kosup@pardeehomes.com]
Sent: Sunday, December 14, 2008 5:57 PM
To: andrew@dwilsoneng.com
Subject: FW: Pankey Ranch orchards
Attachments: image001.jpg; image002.jpg

fyi

**Karen Kosup, P.E., Senior Land
Development Manager**

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From: Bill Pankey [mailto:bill_pankey@hotmail.com]
Sent: Saturday, December 13, 2008 11:35 AM
To: Kosup, Karen
Subject: RE: Pankey Ranch orchards

Karen,

Thanks for the update on the Palomar schedule.

Most of the orchards on your property were planted from 1973 to 1981. The orange groves along the western boundary about 1989.

About one-half of the above planting were on ground that we had previously planted in the 1960s.

The oldest groves, located on the Tabb property, were planted in the late 1940s, but all of these groves have been removed.

I hope this answers your question.

Bill

From: karen.kosup@pardeehomes.com
To: bill_pankey@hotmail.com
Date: Fri, 12 Dec 2008 14:28:18 -0800
Subject: Pankey Ranch orchards

Bill, how many years have you or your family been farming this area with the current groves??

(1)

<p>Karen Kosup, P.E., Senior Land Development Manager 12626 High Bluff Drive, Suite 100 San Diego, CA 92130 ☎ (858) 794-2512 ☎ (858) 794-2599 - Fax ✉ karen.kosup@pardeehomes.com 🌐 www.pardeehomes.com</p>	
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(2)

Andrew Oven

From: Steinke, Thomas [steinke@scmv.com]
Sent: Friday, December 12, 2008 11:26 AM
To: andrew@dwilsoneng.com
Cc: Locher, Cat; Kosup, Karen
Subject: FW: Pardee Property - Ag Use

From: Elliott, Mark B [mailto:MBElliott@pbsj.com]
Sent: Tuesday, June 24, 2008 2:54 PM
To: Steinke, Thomas
Subject: RE: Pardee Property - Ag Use

yes, assuming Bill is on target with water use (I've seen 2.5 -4.5 afy/ac ranges in the past). It's a significant quantity of irrigation supply from groundwater.

From: Steinke, Thomas [mailto:steinke@scmv.com]
Sent: Tuesday, June 24, 2008 8:16 AM
To: Elliott, Mark B; Alan Ziegau; Ayala, Jimmy
Cc: Gillingham, Douglas
Subject: RE: Pardee Property - Ag Use

this is good news in support of pardees zero water footprint goal for meadowood.
according to my calculations pardee would need either 151 AF/yr or 238 AF/yr of groundwater
depending on whether recycled water can be used to irrigate residential landscaping
see table 8b and table 9
mark....am i correct?

From: Elliott, Mark B [mailto:MBElliott@pbsj.com]
Sent: Tuesday, June 24, 2008 8:03 AM
To: Steinke, Thomas; Alan Ziegau
Cc: Gillingham, Douglas; Elliott, Mark B
Subject: FW: Pardee Property - Ag Use

Update from Bill Pankey. Based on Bill's estimate current irrigation on the Pardee Property is estimated to be:

135 citrus x 3.25 afy/ac = 440 afy
45 avocados x 4 afy/ac = 180 afy

Total about 600 afy of irrigation within Meadowood. The avocado irrigation will remain. Again, it appears there is sufficient groundwater irrigation supply to meet onsite needs for any supplemental water requirements.

Mark

From: Bill Pankey [mailto:bill_pankey@hotmail.com]
Sent: Monday, June 23, 2008 8:58 PM
To: Elliott, Mark B
Subject: RE: Pardee Property - Ag Use

Mark,

The acreage is:
135 citrus

45 avocados

(2)

Water use per acre depends on the amount of rain and weather conditions. Your estimates are reasonable averages.

Bill

Subject: FW: Pardee Property - Ag Use
Date: Fri, 20 Jun 2008 18:52:17 -0400
From: MBElliott@pbsj.com
To: bill_pankey@hotmail.com

Bill,

Here is my contact information, please feel free to call or email the area information:

1. Citrus Acreage within Pardee Ownership
2. Avocado Acreage within Pardee Ownership

Also wanted to confirm that Citrus uses about 3.25 afy per acre and Avocado's about 4 afy per acre.

Thanks,

Mark B. Elliott
Senior Engineer
PBS&J
9275 Sky Park Court, Suite 200
San Diego, California 92123

Cell 715.347.4635
Office 715.544.0042
mbelliott@pbsj.com

The i'm Talkathon starts 6/24/08. For now, give amongst yourselves. [Learn More](#)

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Confidential - June 24, 2008

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Strategies for Dealing with a 30% Cutback in Water Use for Avocados

Gary S. Bender
Farm Advisor – Subtropical Horticulture
UCCE San Diego County
gsbender@ucdavis.edu

On August 31, 2007, in a Sacramento court, a federal judge ruled that an endangered fish (the Delta smelt) deserved a chance to survive extinction. This decision will directly affect most of the avocado growers in Southern California because, in order to save the fish, the pumping of water from the Sacramento-San Joaquin Delta into the State Water Project canal for transport to Southern California must be drastically reduced. Combine this with an eight-year drought in the Colorado River Basin, increased water use in the Southern California/Las Vegas region due to housing construction, and a reduced Sierra snowpack (due to global warming?)...the writing is on the wall. It appears that avocado growers who receive district water and who signed up for the Interim Agricultural Water Program (the interruptible water plan that reduced the cost of ag water by 30%) will face a 30 to 40 % cutback in water deliveries to their farms starting in January, 2008.

The base year for calculating water reductions will be chosen by the local district. For instance, Fallbrook Public Utility District will be using fiscal year 2006-2007 as the base year. Only the growers that entered into the Interim Agricultural Water Program will be affected right now, growers that have been paying full price for their water will not be affected unless the water situation becomes worse. The Metropolitan Water District informed their member agencies that if they go over their allotment, there will be financial penalties of \$818 per acre foot. This penalty would be presumably passed on to the growers.

Avocado is a water-loving high value crop. Average water use per acre is around 3.5 to 4.0 acre ft/acre, with some growers having to water more if they are in wind-prone locations. Simply cutting back the water to the entire grove is not a good strategy. In one of our trials we cut the water back 10% and the yield went down 50%! In this particular grove water use was rather low at the beginning, about 2.75 af/acre, but the idea that a 30% reduction in water use will only reduce yield 30% is probably not true.

Therefore, a strategy must be developed by the grower. Here are some suggestions:

1. **Root rot infected trees.** A lot of trees in our groves are infected with the avocado root rot fungus *Phytophthora cinnamomi*. Many of these trees are undergoing chemical treatments and many are recovering, but some are not. A critical look at these trees is necessary to determine if they are producing an economical crop. If not, the sprinklers on these trees should be capped and the trees taken out of production.
2. **Sunblotch infected trees.** These trees will often show a deep yellow grooving in the fruit and a rough bark on the lower trunk. A side effect of this viroid-caused

disease is simply a lack of fruit production. These trees should be removed and the sprinklers capped.

3. **Trees in wind-prone areas.** Some groves have east-facing slopes, some of which are exposed to strong Santa Ana winds every year. One grower told me that he has forty acres of trees in which the wind blows most of the fruit on the ground every year, but he was "Ok with that because they serve as a wind-break for the rest of the grove". Time to take these trees out of production!
4. **Tall trees.** Many (if not most) of our groves are really too tall and picking costs are high, as much as \$0.25 per pound to pick. Stumping these trees is probably necessary anyway. These trees should be stumped back to 4-5 ft in height, painted white to protect the bark from the sun, and allowed to re-grow. In our experience, you can cap the sprinklers for about two months, then begin to apply water again; gradually increasing the amount of water as the trees grow. On an acre basis, this should achieve at least a 30% cutback in applied water. However, these trees will be completely out of production for two years.
5. **Thinning the grove.** Another way to reduce water use, and usually beneficial to long-term fruit production, is to thin the grove (remove every other tree). The trees that have been removed can have their sprinklers capped. But be careful! Almost all trees have roots growing into their neighbor trees' rootzone. These roots will now be under stress when the sprinkler is capped. This can be compensated for by giving extra water to the remaining trees and by changing to sprinklers with a wider wetting patterns.
6. **Pruning the trees.** Many people think that if you remove half of the foliage from a tree, you might reduce water use by half. It doesn't quite work like that because by reducing the foliage, more wind blows through the canopy and more sunlight shines on leaves previously in shade, and could increase the transpiration of the remaining leaves. In fact, research on other tree crops has shown that if trees shade at least 65% of the orchard floor, there should be no difference on per area water use than one that has 100% ground cover. Our best guess is that by reducing the foliage by half, you might decrease water use by 20-30%. However, this has not been tested by research trials in avocados.
7. **Analyze your grove.** In some groves, fruit production may be chronically low. Often we don't know the reason, but it could be related to cold temperatures in the spring during fruit set, excessive salinity in the soil (especially if the grove is being irrigated by well water), low soil pH or low bee visitation to the flowers during the spring. If you have a section of the grove that has chronically poor fruit production, you may want to cap off these sprinklers in 2008.
8. **Learn to schedule irrigations properly.** It is critical that you learn how to schedule irrigations so that trees get enough water, but not too much. Refer to the UCCE publication "Proper Scheduling of Irrigations in Avocado Production".
9. **Clean up and repair your irrigation system.** Some grove irrigation systems are reaching the end of their life expectancy. Buried PVC irrigation lines are probably OK, but many of the poly-hose systems are beginning to break down and are leaking, especially if they have been lying on the ground exposed to the sun for several years. These systems are also susceptible to chewing by coyotes

and other animals. Lateral lines should be flushed once a year, sprinklers should be repaired and filters should be cleaned.

- 10. Distribution uniformity (DU).** A perfect distribution uniformity (100%) means that every sprinkler is putting out the exact same amount of water. In the real world, this never happens. A good distribution uniformity for avocado groves in San Diego is about 85%. This means that 15% extra water must be applied to the entire grove to make sure that all trees get the required amount of water.

Unfortunately, some groves have very poor distribution uniformity, some as poor as 50%. This can be due to clogged sprinklers and lines, breaks and leaks and poor pressure regulation. In order for these trees to all get the minimum amount of water necessary for good fruit production, the entire grove has to be over-irrigated by a considerable amount. The Mission Resource Conservation District in Fallbrook (760) 728-1332 will do an irrigation system analysis for free (funded by the San Diego County Water Authority); they will calculate your DU and help you with a good irrigation schedule.

- 11. Distribution uniformity...things to do now.** If you know that your grove has a poor distribution uniformity, rather than wait for an analysis, you may want to go ahead and start adding pressure regulators (pre-set for 30 psi) on every lateral line. If your lines are clean and free of leaks, the pressure regulators insure that all the lines will be running at the same pressure when the water is turned on. An additional method of insuring a good distribution uniformity is to change the mini-sprinklers to pressure-compensating mini-sprinklers.

Prepared by Gary S. Bender, Farm Advisor, U.C. Cooperative Extension, San Diego County (gsbender@ucdavis.edu)