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SUPERIOR COURT OF CALIFORNIA

COUNTY OF SANTA CLARA

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COORDINATION PROCEEDING SPECIAL TITLE (Rule 1550(b)) ANTELOPE VALLEY GROUNDWATER CASES INCLUDED ACTIONS: LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40 v. DIAMOND FARMING COMPANY, et al., Los Angeles Superior Court Case No. BC325201 LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40 v. DIAMOND FARMING COMPANY, et al., Kern County Superior Court Case No. S-1500-CV-254348 DIAMOND FARMING COMPANY, and W.M. BOLTHOUSE FARMS, INC., v. CITY OF LANCASTER, et al., Riverside Superior Court Case No. RIC 344436 [c/w case no. RIC 344668 and 353840] ROSAMOND COMMUNITY SERVICES DISTRICT, CROSS-COMPLAINANT,	Judicial Council Coordination Proceeding No. 4408 CASE NO. 1-05-CV-049053 **BOLTHOUSE PROPERTIES, LLC'S AND WM. BOLTHOUSE FARMS, INC.'S** **DECLARATION OF N. THOMAS SHEAHAN RE: SURREBUTTAL TESTIMONY** Phase 3 Trial Date: January 4, 2011

DECLARATION

I, N. Thomas Sheahan, do hereby declare and state as follows:

A. Base Period

1. In Scalmanini Declaration Paragraph 5 (Scal.Dec.Para.5), he incorrectly states that my base period does not reflect long-term average water supply. During my 27-year base period 1971-1997, the average annual precipitation on the surface of the Antelope Valley (AV) groundwater basin was essentially equal to the long-term average annual precipitation in the watershed, as shown in my Exhibit C-9 slides 144 and 145 (Ex.C-9:144&145).

2. In Scal.Dec.Para.6, Mr. Scalmanini states incorrectly that my selection of the 27-year base period 1971-1997 cannot be deemed to be a priority criterion. It is always a priority criterion to select a sufficiently-long base period that minimizes the error in the calculations. As I explained in Ex.C-9:92&96, I have a concern for the overall accuracy of the change in storage calculations made by Mr. Wildermuth. The change in storage values for certain periods (1951-1970 and 1998-2008) show excessively-large values and can result in excessive errors in calculations using these values. I selected 1971-1997 because it has the smallest value for average change in storage, -9,404 acre-feet per year (AFY).

3. In Scal.Dec.Para.7, Mr. Scalmanini incorrectly states that I fail to consider the most applicable data for both long-term runoff and precipitation as indicators of whether those sources reflect long-term average water supply for recharge, and he references Ex.C-9:18. My Ex.C-9:18 correctly states that the source of all water for Mountain Front recharge is precipitation. In my Mountain Front Recharge Analysis, Ex.C-8, I use long-term averages, not any specific base period. The most applicable data, as I stated in Ex.C-9:18, are available from the US Geological Survey (USGS) publication by Blodgett (1995). Similarly, in my calculation of average annual runoff, I used the published streamflow data from the USGS publication by Bloyd (1967), and an established USGS method (Bloyd, 1967) for calculating average annual runoff. These published USGS data are the most applicable data for long-term runoff and precipitation, respectively, and accurately reflect the long-term average water supply from the Mountain Front area producing natural recharge to the AV groundwater basin.

4. In Scal.Dec.Para.8, Mr. Scalmanini incorrectly states that the primary factor in base period selection is that it should reflect long-term mean (average) water supply. The primary factor in any calculation of average annual native recharge is to select a sufficiently-long period that contains the most reliable data and minimizes error. My base period, 1971-1997, meets this primary factor by minimizing error in calculated change in storage. One additional criterion is to test if the average annual precipitation on the surface of the AV groundwater basin is essentially equal to the average annual precipitation for the entire AV watershed for that period. Ex.C-9:145 shows that precipitation stations like Palmdale are most representative of the meteorological conditions directly overlying the AV basin. The average annual precipitation at the Palmdale station is nearly identical to the value for the total watershed. The base period 1971-1997 includes multiple wet and dry cycles. The average annual precipitation on the basin during this period is nearly identical to the average annual precipitation for the total AV watershed.

5. In Scal.Dec.Para.9, Mr. Scalmanini incorrectly states that examination of all appropriate indicators for assessment of my base period show it to have an inherent bias that will produce higher estimates of natural recharge and a higher value for safe yield. I calculated natural recharge using two separate methods. In my Mountain Front Recharge analysis, I appropriately used long-term averages. No base period was needed. I used published USGS precipitation data and published USGS streamflow data. I used published data for reference evapotranspiration, ETo, from the California Department of Water Resources (DWR) and the coefficient of native vegetation, Knv, derived by DWR from Chapter 2 of the published document entitled "A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California, The Landscape Coefficient Method and WUCOLS III, August 2000, published by the University of California Cooperative Extension and the California Department of Water Resources (hereinafter referred to as the "**UC Coop. Extension Method**"). There are no more-appropriate data than these for calculating natural recharge in the AV watershed with this method of analysis. For the Water Balance method, I used the Purveyors' data. The value of natural recharge of about 105,000 AFY that I calculated using the Water Balance method is

consistent with the natural recharge value of about 106,000 AFY that I calculated using the separate, Mountain Front Recharge analysis. Thus, there is no bias in my calculations.

B. Evapotranspiration

6. In Scal.Dec.Para.10, Mr. Scalmanini incorrectly states that the use of a coefficient developed for irrigated landscaping is invalid for purposes of estimating consumptive use by native vegetation, and that the use of this coefficient underestimates the amount of water used by native vegetation. In Scal.Dec.Para.13, he incorrectly states that use of the UC Coop. Extension Method by DWR to determine a coefficient for native vegetation (Knv) is a misrepresentation of the UC Coop. Extension Method document. In Scal.Dec.Para.15, he incorrectly characterizes as a "fundamental flaw" in my analysis his own incorrect assumption that there is no comparison between native vegetation and irrigated landscaping. The value I used as the coefficient for native vegetation (Knv) is the value derived by Mr. Robert G. Fastenau, State of California, Department of Water Resources, as shown in Exhibit Scalmanini 158 (Ex.Scal.158). That coefficient was developed by the Department of Water Resources (DWR) using the UC Coop. Extension Method as the basis (See Ex.Scal.158). The UC Coop. Extension Method explains that landscaped plantings differ from crops and turfgrass due to three distinct factors: species; density; and microclimate. These three factors also apply to native vegetation. Species factor: landscape plantings (and native vegetation) are typically composed of more than one species. Density factor: the density of landscape plantings (and native vegetation) may have sparse areas that would be expected to evapotranspirate a smaller amount of water than dense plantings. Microclimate factor: many landscapes (and native vegetation areas) include a range of microclimates, from cool, shaded, protected areas to hot, sunny, windy areas. These similarities show that the coefficient for landscape plantings, K_L, and the coefficient for native vegetation, Knv, are based on the same three factors, and therefore, K_L and Knv are essentially the same coefficient.

7. In Scal.Dec.Para.13, Mr. Scalmanini presented his Ex.Scal.159 which he claims includes the "pertinent pages" of Chapter 2 of the UC Coop. Extension Method document; however, he included just the cover and only 2 pages, pages 9 and 10, of Chapter 2. He did not

include pages 11 through 22 of Chapter 2, which present the descriptions and application of the three factors, species (Ks), Density (Kd), and microclimate (Kmc), that demonstrate that the coefficient K_L, as used in that document is equivalent to the coefficient Knv. Attached as Exhibit C-10 is the cover page and all of Chapter 2 (pages 9 through 22) of the UC Coop. Extension Method document. Mr. Scalmanini also incorrectly quoted my reference to a document on Ex.C-9:40 by placing his own emphasis (**bolding**) on the wrong portion of the text. In Ex.C-9:40, I described the three factors that Mr. Fastenau of the DWR determined from the UC Coop. Extension Method document in the following quoted statement: "**Factors** determined by **DWR** (Fastenau, 2007) from **UC Coop. Extension Method** for Mountain Front Native Vegetation (WUCOLS III)." The emphasis shown here is the same emphasis that I showed in Ex.C-9:40. It is patently obvious to even the most casual observer reviewing my Ex.C-9:40 that the name of the document I am referencing is "**UC Coop. Extension Method.**" In Scal.Dec.Para.13 (Page 5, Lines 12-14), Mr. Scalmanini, again, using improper emphasis, incorrectly states: "On his slide 40, Mr. Sheahan claims that factors were determined by DWR (Fastenau, 2007) from a 'UC Coop. Extension Method **for Mountain Front Vegetation (WUCOLLS III)**' (emphasis added), and claims that "[t]his is a misrepresentation of the referenced document." In fact, Mr. Scalmanini, once again, misrepresents my Exhibit by placing emphasis on the wrong phrase -- the phrase "for Mountain Front Vegetation (WUCOLLS III)" -- instead of showing the correct emphasis on the document name "**UC Coop. Extension Method**" as I had done in both Ex.C-9:40 and Ex.C-9:41.

8. In Scal.Dec.Para.12, Mr. Scalmanini incorrectly states that "[i]t is contrary to all proper understanding of reference evapotranspiration" to think that there is a difference between the value for reference evapotranspiration (ETo) on the valley floor and the value for evapotranspiration in the Mountain Front. In my Ex.C-9:250-254 I explain that each of the six factors affecting evapotranspiration produces relatively high evapotranspiration in the flatland areas and correspondingly relatively low evapotranspiration in the mountain front areas. I showed that ETo data from four DWR CIMIS stations that are representative of flatland areas (Palmdale, Victorville, Barstow, and Palm Desert) have similar values for ETo, while altitudes

at these stations varied nearly 2700 feet Similarly, I showed that the ETo values from Mountain Front DWR CIMIS stations (Lake arrowhead and Big Bear Lake), which were deemed by DWR to be representative of the Mountain Front area (See Ex.Scal.158), had similar values for reference evapotranspiration, while altitudes at these stations varied nearly 1800 feet. Based on these data, I concluded that it is appropriate to assign a uniform average value for ETo representing the Mountain Front area, just as Mr. Fastenau of the DWR had done in August 2007 (Scal.Ex.158).

9. In Scal.Dec.Para.17 & 18, Mr. Scalmanini incorrectly states that his unitless value of 0.4 that he arrived at by "adjusting" the values in Ex.Scal.160, taken from a 37-year-old reference known only as "Wymore, 1974," the "proper" thing to use for Knv, instead of the value calculated by DWR, and that, if his value is used, "approximately three times as much precipitation would be consumed by native vegetation than reported by Mr. Sheahan." The unreasonableness of this assertion can be seen by comparing three times my evapotranspiration to precipitation. My calculated value for average annual evapotranspiration from native vegetation is 172,000 AFY (Ex.C-9:42). Three times this amount is 516,000 AFY. The average annual precipitation in the Mountain Front area is only 279,000 AFY (Ex.C-9:23). It is impossible to evapotranspirate 516,000 AFY of water from only 279,000 AFY of precipitation.

C. Bedrock Infiltration

10. In Scal.Dec.Para.14, Mr. Scalmanini characterizes as "relatively large" my calculated value for bedrock infiltration, 62,200 AFY. I had reliable data from USGS and DWR sources that allowed me to determine average annual precipitation, P, average annual runoff, RO, and average annual evapotranspiration, ETnv. My value for bedrock infiltration, BI, that I calculated using the simple equation BI = P – RO – ETnv, was also reliable (See Ex.C-9:45). I also performed two tests of reasonableness for the calculated value of BI. In the first test, I compared my calculated value of BI, as a percent of total P, to the range of similarly-calculated percentages from other mountain front recharge studies. I found that the values of BI (shown as MBR2 in the source document) as a percent of total P ranged from 14% to 38% in those studies, (See Ex.C-9:60&61). My value of 22% for BI, as a percent of total P,

is comfortably within the middle portion of that 14%-38% range, and, in fact, on the lower side of that range. In the second test, I used Darcy's law, Q = K * I * A, to calculate the groundwater flow capacity, Q, that could come from the fractured bedrock in the Mountain Front area to the AV basin. This second test indicated that the capacity of the bedrock, Q, was 136,000 AFY, which is more than twice the value of 62,200 AFY that I calculated for BI. These two tests confirmed the reasonableness of the calculated value of 62,200 AFY for bedrock infiltration, BI.

11. In Scal.Dec.Para.19, Mr. Scalmanini incorrectly states "Mr. Sheahan changes his own definition of mountain front recharge" for purposes of comparing his results to the range of published data, as shown in Ex.C-9:61, and Mr. Scalmanini incorrectly assumes that the range of published data shown in Ex.C-9:61 represent percentages for "mountain front recharge" as I had defined. In my two exhibits, Ex.C-9:60&6, I referred to bedrock infiltration, not mountain front recharge. I defined available mountain front recharge on Ex.C-9:26 as runoff (RO) plus bedrock infiltration (BI). In my test of reasonableness for my calculated value of 62,200 AFY for bedrock infiltration, BI, I did not change any definitions. Attached to this declaration as Exhibit C-11 are pages 1 through 7 of the document (Wilson & Guan, 2004) from which the table shown on Ex.C-9:60 was taken. The term "MBR2" used by Wilson & Guan is the same as my bedrock infiltration, BI, as shown in the table in Ex.C-9:60. The Wilson & Guan (2004) term "MBR2" is defined in Equation (9) on page 6 of Exhibit C-11, which states "MBR2 = P – ETb – RO." In Ex.C-9:43, I defined bedrock infiltration as "BI = P – RO – ET." Clearly, the term "BI" that I used means the same as the term "MBR2" used by Wilson & Guan in table 2 of the document (Wilson & Guan, 2004). My value of BI, as 22% of precipitation, P, is clearly within the 14% - 38% range of values for BI, (or MBR2) as a percent of P, which I showed in the table in Ex.C-9:60.

D. <u>Lag Time</u>

12. In Scal.Dec.Para.20, Mr. Scalmanini incorrectly states that using a shorter lag time in a "proper base period" results in "insignificant differences, which have no material impact on estimates of natural recharge or safe yield." Mr. Scalmanini refers to Ex.Scal.161

which appears to be a revised copy of Table 4.8-1 of the Summary Expert Report. In Ex.Scal.161, he presents a revised version of Table 4.8-1 to reflect a lag time of 3 years. Mr. Scalmanini's natural recharge calculations using a 3-year lag time are shown in the small table at the bottom of Ex.Scal.161. For the first period, 1951-1962, Mr. Scalmanini's calculations indicate that, not only was there absolutely no natural recharge into the groundwater basin, but that there was, in fact, a negative natural recharge, amounting to about -23,431 AFY for each year of this period, and over the 12-year period 1951-1962, Mr. Scalmanini's calculation would mean that the total natural recharge over 12 years was a negative value of -278,874 AF. While it is difficult to believe that there was no natural recharge, at all, to the basin during the 12-year period 1951-1962, it is beyond all reason to believe that there was a negative natural recharge of almost -280,000 AF during this entire 12-year period. Clearly, the data being used by Mr. Scalmanini for this period (change in storage and agricultural water requirements) are incorrect.

E. <u>Natural Recharge, Temporary Surplus, Safe Yield, and Overdraft</u>

13. In Scal.Dec.Para.21, Mr. Scalmanini incorrectly states that I defined the term "TI" "total inflow" and that the equation NR = TO – TI + CS shown on Ex.C-9:176 fails to satisfy the fundamental conservation of mass. In Scal.Dec.Para.22, Mr. Scalmanini, incorrectly states, again, based on his incomplete reading and incorrect understanding of the definition of "TI," that my calculation of natural recharge resulted in a double counting of natural recharge in the calculations shown in Ex.C-9:176-182 Mr. Scalmanini simply misread Ex.C-9:176. I defined the term "TI" as "Total Inflow **<u>Other Than Natural Recharge</u>**" (emphasis added) on Ex.C-9:176. Additionally, I showed this same definition on Ex.C-9:177 and on Ex.C-9:181. I consistently used this same definition of the term, "TI" in all calculations of natural recharge in Ex.C-9:176-182. Clearly, I did not double count natural recharge.

14. In Scal.Dec.Para.23, Mr. Scalmanini goes further to incorrectly state that my expression for safe yield, shown on Ex.C-9:189 is "independent of natural recharge." My expression for long-term safe yield, shown on Ex.C-9:189, is the equation "Safe $\text{Yield}_N = RF_N + AR_N + NR_{LT}$." where NR_{LT} is the long-term (27-year) natural recharge to the groundwater basin. Clearly, my expression for long-term safe yield is not "independent of natural recharge."

15. In Scal.Dec.Para.24, Mr. Scalmanini incorrectly states that my treatment of temporary surplus is "fundamentally flawed," and he incorrectly suggests that overdraft has occurred. Mr. Scalmanini also incorrectly states the definition of the term "overdraft" and does not give a definition of "temporary surplus," but agrees that "in order for a groundwater basin to be operated in a safe state, there needs to be some water removed from native storage to allow groundwater recharged (sic) to occur." (Scalmanini Declaration Page 9, Lines 7-9) I have defined the term "temporary surplus" in my Exhibits, Ex.C-9:149,158,&192. I reviewed the Purveyors' historical data on water use for the period 1971-2008, as shown on Ex.C-9:193, and concluded that there was additional water withdrawn from the AV groundwater supply basin in excess of the safe yield during the years prior to 1982. Withdrawal of this additional water created additional groundwater storage capacity, avoided waste of some water, did not adversely affect the safe yield, did not result in depletion of the supply (less than 8% of storage removed), and met the definition of "temporary surplus" (Ex.C-9:194-200).

16. In Scal.Dec.Para.25&26, Mr. Scalmanini, again, incorrectly states the definition of overdraft. The correct definition of the term "overdraft," which is consistent with the definition of "overdraft" by the California Supreme Court, is: "Overdraft is the amount of water that is withdrawn annually over a long period of time from a groundwater basin in excess of the total of the basin's Safe Yield plus Temporary Surplus, which produces the undesirable result of causing a gradual lowering of the ground water levels resulting eventually in depletion of the supply." Mr. Scalmanini also incorrectly states that my Ex.C-9:197 means that it takes "**ongoing** removal of groundwater from storage" to allow collection of natural recharge and storage of water by current and future artificial recharge. (emphasis added) In my Ex.C-9:197, I state just the opposite; "Temporary Surplus Pumped Prior To [the] Early 1980s has created sufficient groundwater storage capacity in the groundwater basin to allow collection of Natural Recharge and storage of water by current and future artificial recharge." There has been no "ongoing" removal of water from storage beyond temporary surplus in the AV basin, which ended in 1981. Pumping of water from the basin since 1981 has been within the long-term safe yield, as demonstrated by my Ex.C-9:212 and Ex.C-9:223.

17. In Scal.Dec.Para.26, Mr. Scalmanini incorrectly states that "[u]ndesirable results have been delineated for purposes of defining safe yield and overdraft;" however, Mr. Scalmanini is not specific as to which undesirable result(s) he is referring. As Mr. Scalmanini previously agreed in Scal.Dec.Para.24, "in order for a groundwater basin to be operated in a safe state, there needs to be some water removed from native storage to allow groundwater recharged (sic) to occur." Among other impacts, removal of some water from the groundwater basin results in lowering of the water table, which in turn: (a) increases the depth, and therefore the cost, of wells; (b) increases the cost of pumping; (c) eliminates the vegetation in some areas; (d) results in the loss of wildlife supported by that vegetation; and (e) causes land subsidence to occur if there are fine-grained, compressible sediments in the subsurface. Each of these results of lowering the water table may be considered undesirable by some persons or organizations. However, these results may be acceptable to those persons and organizations when they are balanced against the benefits of developing the basin's groundwater supply. They are not indications of "overdraft." The only "undesirable result" that causes "overdraft" is the "gradual lowering of the ground water levels resulting eventually in depletion of the supply," as stated in the definition of "undesirable result" as used by the California Supreme Court. As I showed in Ex.C-9:223, pumping of the temporary surplus prior to 1982 has not caused the "gradual lowering of the ground water levels resulting eventually in depletion of the supply," and therefore that pumping did not cause overdraft.

18. In Scal.Dec.Para.27, Mr. Scalmanini incorrectly states that the definition of "safe yield" presented in a 1914 article by Lee, as shown in Ex.Scal.7, is the same concept that has been perpetuated for nearly a century by both technical and legal definitions. The growth of the field of hydrogeology over the last century, or so, coupled with the concurrent development of the laws pertaining to water rights in California, have all combined to cause the definition of safe yield to develop and change significantly from the simple concept presented by Lee nearly 100 years ago. To address today's groundwater issues, it is necessary to apply the current technical and legal definitions of terms (See Ex.C-9:147-163, with footnotes showing consistency with the definitions by California Supreme Court).

19. In Scal.Dec.Para.30, Mr. Scalmanini incorrectly states that my safe yield of 171,000 AFY "produces an overly optimistic estimate of safe yield that fails the fundamental test of producing a change in groundwater storage that is consistent with what is actually happening in the basin subsequent to his base period, i.e. from 1998 to the present." To consider "what has actually been happening in the basin from 1998 to the present," it is necessary to look at the meteorological conditions that are representative of the basin during the period since 1998, and the corresponding water levels. My Ex.C-9:223 shows that, for approximately the last 30 years, the water levels in most of the AV groundwater basin have been stable or rising. For the past 10 years, or so, the water levels in several of the wells have shown a slight downward fluctuation. The AV watershed has been experiencing a drought since 1998, (See Ex.C-9:299 showing the drought period 1998-2008). The average annual precipitation has been less than the mean annual precipitation for 9 of the 11 years shown. The year 2003 was just slightly above the mean. The only year in which the precipitation was substantially above the mean was 2005. Considering that the lag time for infiltrated water is about 3-5 years, the recharge from the 2005 precipitation would likely not be reflected in the water level data plotted on Purveyors' Figure 4.3-10, depicted in my Ex.C-9:223. Based on these precipitation data, even though the extractions from the basin have been lower than the long-term safe yield during this drought period, it would be expected to see the water levels in some of the wells fluctuate in response to the drought conditions of the last 11 years, just as they have shown, as depicted in Ex.C-9:223. Fluctuating water levels due to changes in meteorological conditions are expected in a groundwater basin.

20. Nothing in Mr. Scalmanini's rebuttal testimony has caused me to change any of my opinions. I am still of the opinion that he long-term natural recharge to the AV groundwater basin is about 105,000 AFY and the long-term safe yield is about 171,000 AFY. Temporary surplus was pumped prior to 1982, but the average extractions from the basin since that time have been less than the long-term average safe yield. There has been surplus water available in the basin for each of the 24 5-year periods ending in 1985 through 2008, which indicates that the basin has never been, and is not currently in, a state of overdraft.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my ability. Executed on April 9, 2011, at Murrieta, California.

N. THOMAS SHEAHAN