

1 **WRITTEN DIRECT TESTIMONY OF TOM NANCE**

2 1. **Please state your name and business address for the record.**

3 Tom Nance

4 Tom Nance Water Resource Engineering

5 560 N. Nimitz Highway, Suite 213

6 Honolulu, Hawaii 96817

7 2. **What is your current occupation?**

8 Civil engineer specializing in groundwater and surface water development, hydraulics and  
9 water system design, flood control and drainage, and coastal engineering.

10 I am the President of Tom Nance Water Resource Engineering ("TNWRE"), which is a  
11 company I started in 1989. Prior to that, from 1972 to 1989, I worked for Belt Collins &  
12 Associates.

13 3. **Is Petitioner's Exhibit 36 a true and correct copy of your resume?**

14 Yes.

15 4. **Please briefly describe your educational background.**

16 B.S. in Economics from Claremont Men's College, 1966

17 B.S. in Mechanical Engineering from Stanford University, 1966

18 M.S. in Civil Engineering from Stanford University, 1970

19 Graduate work in Physical Oceanography at the University of Hawaii, 1970-1972

20 Graduate work on Hydrology at the University of California at Berkeley, 1977-1978

21 5. **Have you even been qualified as an expert witness in hydrology and water resource  
22 engineering before the Land Use Commission?**

23 Yes. I have also been qualified as an expert before the State and Federal Courts in  
24 Hawaii, the State Board of Land and Natural Resources, and the Commission on Water Resource  
25 Management.

26 6. **Are you familiar with the proposed development plans for the Pu'unene Heavy  
27 Industrial Subdivision ("Project") and the Petition Area?**

28

1 Yes. The Petition Area is approximately 86 acres located at TMK 3-8-008: 019. The  
2 Project is proposed as a heavy industrial subdivision that would consist of approximately 28  
3 heavy industrial lots that would range in size from 0.5 to 20 acres. The developable lots within  
4 the Project will encompass approximately 66 acres and the interior roadways and drainage  
5 retention area will encompass the remaining 20 acres.

6 7. **How did you familiarize yourself with the Project?**

7 I was originally retained by CMBY 2011 Investment LLC to develop the water system  
8 concept of onsite supply wells, RO treatment for drinking water supply, and disposal wells to  
9 handle the RO concentrate. I also prepared the report titled "Groundwater Resource and Water  
10 System Assessment for the Proposed Puunene Industrial Subdivision in Kahului, Maui" dated  
11 September 2011 ("**Water Study**"), a copy of which was included as Appendix O of Petitioner's  
12 Exhibit 1 (the Environmental Assessment prepared by Chris Hart & Partners for the Project).

13 8. **Please describe the scope of the Water Study.**

14 The Water Study provides estimates of the Project's potable and non-potable water supply  
15 requirements, identifies the water system infrastructure necessary to meet these requirements, and  
16 provides an evaluation of the probable impacts to groundwater due to the development of the  
17 Project.

18 9. **Is the Petition Area currently served by a water source?**

19 No. The County of Maui Department of Water Supply ("**DWS**") system does not serve  
20 the Petition Area. Petitioner intends to develop a private water system for the Project using  
21 groundwater supplied from on-site wells. It is my understanding that the Project water system  
22 will be owned, operated, and maintained by the Pu'unene Owners' Association.

23 10. **What is the estimated potable water demand for the Project?**

24 The Project will be served by a dual water system with RO treated groundwater for  
25 potable use and untreated groundwater for non-potable use. My estimate for the potable use at  
26 full build out is 118,800 gallons per day ("**GPD**").

27 11. **What is the estimated non-potable water demand for the Project?**

28

1 My estimate of the non-potable water use is 305,200 GPD. This includes use within the  
2 lots and for the irrigation of the drainage retention areas and the roadways.

3 12. **Please describe the water system infrastructure proposed to meet these**  
4 **requirements.**

5 The water system will consist of two, or possibly three, supply wells located toward the  
6 north end of the Project site. Each well will have a 300 GPM pump. In addition to the supply  
7 wells, there will be two, or possibly three, 75 GPM reverse osmosis ("RO") treatment trains, one  
8 0.4 MG non-potable water storage tank, one 0.25 MG potable water storage tank, and booster  
9 pumps to pressurize the distribution systems.

10 13. **Why is RO treatment proposed?**

11 The supply wells will produce slightly brackish water. RO treatment is necessary to  
12 create the potable supply.

13 14. **What will be done with the concentrate water from the RO treatment?**

14 Conservatively, I have assumed that the product recovery from the RO process will be  
15 about 60 percent of the feedwater supply. That means that the production of 118,800 GPD of  
16 potable water will require a feedwater supply of 198,000. It will also produce a concentrate flow  
17 of 79,200 GPD. This brackish concentrate will be disposed of in disposal wells that will be  
18 located at the south end of the Petition Area, as shown on Petitioner's Exhibit 42. As required by  
19 Department of Health (DOH) regulations, the RO disposal wells will be located more than 1,500  
20 feet from the source wells.

21 15. **What regulatory approvals, if any, are needed in order to develop the proposed**  
22 **water system?**

23 The supply wells will require Well Construction and Pump Installation permits from the  
24 State Commission on Water Resource Management. The disposal wells will require  
25 Underground Injection Control (UIC) permits from the Safe Drinking Water Branch (SDWB) of  
26 DOH. The DOH-SDWB will also approve all aspects of the construction and operation of the  
27 potable system. For its approval, the following will be required: an engineering report to certify  
28 the supply wells for drinking water use; a capacity report to certify the water system

1 owner/operator as having the appropriate managerial, technical, and financial capability to  
2 operate the system; and submission of the construction plans for DOH-SDWB's review and  
3 approval.

4 16. **What impacts, if any, will the water system have on groundwater?**

5 I estimate that the groundwater flowrate beneath the Petition Area is about 4.0 MGD. The  
6 total groundwater pumpage by the Project's wells for potable and non-potable uses is estimated at  
7 0.503 MGD; 0.198 MGD would be for RO feedwater and 0.305 MGD would be for direct non-  
8 potable use.

9 About 55 percent of the 0.503 MGD of groundwater withdrawal will be returned to the  
10 groundwater in the following ways: (i) disposal of the RO concentrate in on-site disposal wells  
11 (0.0792 MGD); (ii) disposal of treated domestic wastewater in leach fields (0.107 MGD); (iii)  
12 percolation of excess landscape irrigation water (0.012 MGD); and (iv) return to groundwater by  
13 other non-potable uses (0.075 MGD). The net consumptive use of groundwater is estimated at  
14 0.23 MGD. This represents a reduction of less than six (6) percent of the 4.0 MGD of  
15 groundwater flow beneath the Project site.

16 17. **What effects, if any, will the RO concentrate have on the groundwater?**

17 The RO concentrate will be delivered to the groundwater directly via the disposal wells.  
18 The concentrate will be delivered into strata of similar or greater salinity than the RO discharge  
19 (which is estimated to be on the order of 2 PPT or less than 6 percent of seawater salinity). The  
20 discharge will be into the transition zone below the basal lens. Changes in the salinity and  
21 nutrient (nitrogen and phosphorus) levels of the groundwater as a result of the RO concentrate  
22 disposal will not be significant.

23 18. **What other impacts to groundwater quality will water returned to the groundwater**  
24 **have?**

25 Disposal of treated domestic wastewater in individual leachfields, percolation of excess  
26 landscape irrigation, runoff disposal in drainage systems, and on-site rainfall will all have some  
27 impact on groundwater quality. These returns to the groundwater will travel vertically through  
28 sand soil, alluvium, and unweathered lava before reaching the groundwater. Processes along this

1 vertical travel path are likely to remove more than 80% of the nitrogen and more than 95% of the  
2 phosphorus. To be conservative, I used lower removal rates of 50% for nitrogen and 90% for  
3 phosphorus to calculate potential water quality impacts. The net results as changes to the 4.0  
4 MGD of groundwater flowing beneath the Project site are: 3.8% increase in salinity; 1.3%  
5 increase in nitrogen; and 7.1% percent increase in phosphorus.

6 19. **What effect will the anticipated changes in the groundwater flow have on other users**  
7 **of groundwater in the area?**

8 The estimated changes are not likely to be detectable in any other uses of the groundwater  
9 body as the changes described above are modest and essentially insignificant from an aquifer-  
10 wide perspective.

11 20. **Have you read the Office of Planning's Statement of Position, filed July 18, 2013?**

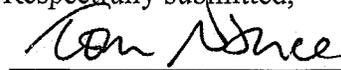
12 It is understandable that the Office of Planning would express the concerns it has in its  
13 Statement of Position, but these concerns are not well founded. The changes to groundwater  
14 computed for the Project are very modest and restricted to the groundwater flow directly beneath  
15 the Project. Changes to the quantity or quality of water pumped by the wells at the Kealia  
16 Wildlife Refuge a substantial distance downgradient would be too small to be detected. The  
17 discharge of groundwater into the marine environment is forced further offshore by the alluvial  
18 "caprock" where mixing to background levels takes place.

19 21. **In your professional opinion, will the development of the Project have an adverse**  
20 **impact on natural water resources?**

21 No. I do not believe development of the Project will have a significant impact on  
22 groundwater, surface water, or the nearshore ocean water.

23  
24 DATED: Honolulu, Hawaii, August 15, 2013.

25 Respectfully submitted,

26 

27 TOM NANCE

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