MANCINI, WELCH & GEIGER LLP

PAUL R. MANCINI 1198-0
JAMES W. GEIGER 4684-0
305 East Wakea Avenue, Suite 200
Kahului, Hawaii 96732
Telephone: (808) 871-8351
Facsimile: (808) 871-0732

Attorneys for Petitioners

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

In the Matter of the Petition of:	) DOCKET NO. A15-798
	) DIRECT TESTIMONY OF DANIEL LUM
WAIKAPU PROPERTIES, LLC; MTP LAND PARTNERS, LLC; WILLIAM S. FILIOS, Trustee of the William S. Filios Separate Property Trust dated APRIL 3, 2000; and WAIALE 905 PARTNERS, LLC,	)
To Amend the Agricultural Land Use District Boundaries into the Rural Land Use District for certain lands situate at Waikapu, District of Wailuku, Island and County of Maui, State of Hawaii, consisting of 92.394 acres and 57.454 acres, bearing Tax Map Key No. (2) 3-6-004:003 (por) and to Amend the Agricultural Land Use District Boundaries into the Urban Land Use District for certain lands situate at Waikapu, District of Wailuku, Island and County of Maui, State of Hawaii, consisting of 236.326 acres, 53.775 acres, and 45.054 acres, bearing Tax Map Key No. (2) 3-6-002:003 (por), (2) 3-6-004:006 and (2) 3-6-005:007 (por).	)

DIRECT TESTIMONY OF DANIEL LUM

My name is Daniel Lum.

I am principal and owner of Water Resource Associates, a hydrogeology consulting firm that I formed in 1989. Prior to establishing my consulting firm, I was employed by the Department of Land and Natural Resources, retiring as Senior Hydrologist-Geologist in 1989 after 29 years of service.

I graduated from Rice University in 1956 with a Bachelor's of Arts Degree in Geology. I received my Master's of Science Degree in Geophysics from the University of Utah in 1957.

I authored over 100 scientific papers concerning hydrology, many of which concerned the availability and sustainability of groundwater resources in Hawaii.

I testified as an expert in the field of hydrology before courts, boards and commissions in Hawaii over a half dozen times.

My firm was contacted by the developers of the Waikapu Country Town project to provide hydrogeology consulting services with regard to wells that had been drilled in the Waikapu area of Maui. Specifically, my firm was asked to assess the sustainable capacities of three wells, to assess the sustainable yields of the aquifer in which the wells were

located and to assess the quality of the groundwater that would be pumped from the wells.

To perform the work, I reviewed available reports and studies on the Waikapu Aquifer, information provided by the developer concerning the drilling and testing of the wells, and designed, oversaw and obtained data from pumping tests of the wells.

I prepared the report, "Results of 10-day Pumping Test of WCT Wells 1, 2, and 3 in the Waikapu Aquifer System" as the proposed potable water source for the Waikapu Country Town development. A copy of my report is attached as Appendix "I" to Exhibit "25." In my report, I addressed the individual and aggregate sustainable capacities of the three wells, the water availability with respect to aquifer sustainable yield, and groundwater water quality.

I will briefly summarize the findings of my report.

The project is located within the Wailuku Aquifer System, which comprises the southernmost hydrologic unit of the much larger Iao Hydrologic Area. Two types of aquifers occur within the Wailuku Aquifer System: a basaltic aquifer which readily yields water to wells located at the foot of a rugged basaltic terrain and an alluvial aquifer that moderately yields water to wells located on the lower gentle slopes of alluvium that comprise the Waikapu Country Town

development. The geologic occurrence of permeable basalts overlain by thick deposits of poorly permeable alluvium plays an important role in WCT Wells 1 and 2 having high yields and WCT Well 3 having a more moderate yield.

Waikapu Country Town Wells 1, 2, and 3 were pumped simultaneously and continuously for 10 days, during April 25 to May 13, 2016, at rates of 1.39 MGD (million gallons per day), 1.03 MGD, and 1.07 MGD, respectively, for a total pumping rate of 3.49 MGD, which compares with the 3.0 MGD sustainable yield established for the Waikapu Aquifer by the State Commission on Water Resources Management. Three additional wells, WCT Wells 4, 5, and 6, located at lower elevations in alluvial deposits without pumps installed, were used as observation wells to record water levels.

Data loggers were installed down-hole to record groundwater levels at two-minute intervals in all six wells days before, during, and after the 10-day pumping test. Additional data were manually collected including pumping rates, chlorides, and electrical conductivities. Besides intermittent sampling for chlorides and electrical conductivity, representative water samples were carefully collected for comprehensive water quality analyses meeting the requirements of the State Department of Health for new potable water sources. Analyses of the representative samples were

performed by Eurofins Analytical, a laboratory approved by the State Department of Health.

Summary of Test Results

WCT Well 1 taps a basal aquifer with a water level of 8.5 ft. above mean sea level in permeable basalts and is capable of yielding 1.4 MGD (million gallons per day) of potable water, based on 10 days of pumping at an average rate of 1.39 million gallons per day (MGD) or 972 gallons per minute (GPM), a relative small drawdown ranging from an initial 1.0 ft. to 4.4 ft., a rapid recovery, and a remarkably stable chloride content that ranged from 41 to 47 mg/L).

WCT Well 2 taps a basal aquifer with a water level of 15.0 ft. above mean sea level in permeable basalts and is capable of yielding 1.0 MGD of potable water, based on 10 days of pumping at an average rate of 1.03 MGD (720 GPM) and a modest drawdown ranging from an initial 2.7 to 4.4 ft., a rapid recovery, and a decreasing chloride content that ranged from 132 mg/L downward to 100 mg/L.

WCT Well 3 taps a basal aquifer with a water level of 8.5 ft. above mean sea level in moderately permeable alluvial formations and is capable of yielding less than 1.0 MGD of potable water, based on 10 days of pumping at an average rate of 1.1 MGD (747 GPM) and a high, but steady drawdown ranging from10.3 ft. to 12.2 ft., a rapid recovery, and a low chloride

content that ranged from 25 to 109 mg/L.

Water Availability

The total average daily demand for potable water use for the Waikapu Country Town development has been estimated by Otomo Engineering, Inc. to be 0.683 MGD (0.348 MGD for Phase I and 0.335 MGD for Phase II). This average amount represents only 22.8 % of the 3.0 MGD sustainable yield that has been established for the Waikapu Aquifer System. The 10-day pumping test has demonstrated that existing basal water wells, WCT Wells 1 and 2, with their combined sustainable pumping capacity of 2.4 MGD, can easily meet the estimated potable water requirements of the Waikapu Country Town development.

Water Quality

The water quality parameter which is of most concern in basal water wells is chloride content during a pumping test because it is an easily determined indicator of salt water intrusion. The potable water limit for chloride content is 250 mg/L, which indicates that basalt WCT Well 1 produces the freshest groundwater at approximately 40 mg/L, followed by basalt WCT Well 2 at approximately 100 mg/L and alluvial WCT Well 3 with increasing chloride trend ranging from a very low 25 mg/L to a low of 109 mg/L.

In addition to frequent tests for chlorides, special water samples were carefully collected for a variety of

analyses of inorganic constituents and potential contaminants, such as pesticides.

Test results indicate that WCT Wells 1, 2, and 3 meet all water quality requirements of the State Department of Health for new potable water sources. All tests for volatile and non-volatile organic contaminants and pesticides were found to be non-detectable.

Thank you for the opportunity to speak to you.

DATED: Kailua-Kona, Hawaii, October 30, 2017.

DANIEL LUM