



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
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STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

August 15, 2012
Honolulu, Oahu

Grace Pacific Corporation
APPLICATION FOR A GROUND WATER USE PERMIT
Upper and Lower Quarry Wells (Well Nos. 2103-06 & 2104-01),
TMK (1) 9-2-003:082 & (1) 9-1-016:004, WUP No. 958
Existing and Future (Dust Control and Renaturalization) Use for 0.601 Mgd
Ewa-Kunia Ground Water Management Area, Oahu

APPLICANT:

Grace Pacific Corporation
P.O. Box 78
Honolulu, HI 96810

LANDOWNER:

Grace Pacific Corporation
P.O. Box 78
Honolulu, HI 96810

SUMMARY OF REQUEST:

Grace Pacific Corporation ("Grace Pacific" or "Applicant") requests approval of a water use permit for 0.601 million gallons per day (mgd) of potable basal ground water to consolidate a) their existing GWUPs 205 and 664 for the Lower Quarry Well (State Well No. 2104-01), and b) a new allocation for the proposed Upper Quarry Well (State Well No. 2103-06) to supply 202 acres of irrigation (renaturalization) and industrial (dust control) uses.

LOCATION MAP: See Exhibit 1

BACKGROUND:

On April 4, 1997, the Commission on Water Resource Management ("Commission") issued a Water Use Permit ("WUP") for 0.124 Mgd (WUP 205) for dust control at the Lower Quarry Well (State Well No. 2104-01).

On October 29, 2003, the Commission issued a separate Water Use Permit for 0.044 mgd (WUP 664) for dust control at the Lower Quarry Well (State Well No. 2104-01). The Applicant requested a separate permit so that a portion of the allocation could be used on an interim basis, subject to the availability of reclaimed water.

On June 6, 2012, Grace Pacific submitted a completed ground water use permit application (GWUPA) to the Commission requesting that the previous two permits (205 and 664) be combined and that an additional allocation be approved for use at the Upper Quarry Well (State Well No. 2103-06). The information regarding the source, use, notification, objections, and field investigation(s) is provided in Attachment A.

ANALYSIS/ISSUES:

The State Water Code, Haw. Rev. Stat. §174C-49(a) establishes seven (7) criteria that must be met to obtain a water use permit. An analysis of the proposed permit follows:

(1) Water availability

Through the Hawaii Water Plan, the Commission established the sustainable yield for the Ewa-Kunia Aquifer System Area as 16 mgd. The current allocation is shown in Exhibit 2. A summary of the current ground water allocation in this aquifer is provided in Table 1:

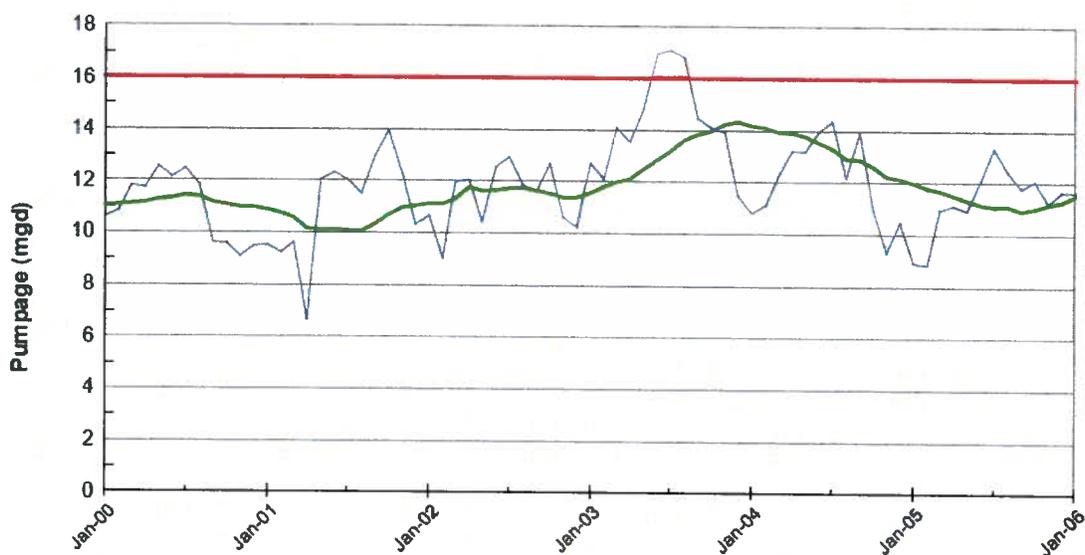
Table 1. Ewa-Kunia Aquifer System Area

<u>ITEM</u>	Ewa-Kunia Aquifer System Area (Mgd)
Sustainable Yield	16
Less: Other Existing Water Use Permits (shown in Exhibit 2) (excludes WUP 205 & 664)	15.289
Reservation to DHHL	0
Subtotal (Current Available Allocation)	0.711
Less: Other Completed Applications	0
Less: This Application	0.601
Subtotal (Potential Available Allocation/Allocation Deficit)	0.110

Though not all users in the Ewa-Kunia Aquifer System Area report monthly water usage, in 2006, monthly pumping totaled 11 mgd on a 12-mav. Pumping was as high as 14 mgd in 2004 (see chart below).



**Monthly Pumpage Chart
12 Month Moving Average**



There is adequate water available to accommodate this application request.

(2) Reasonable-beneficial

Haw. Rev. Stat. , §174C-3 defines "reasonable-beneficial use" as

"...the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and the public interest".

I. Purpose of Use

The applicant requests fresh, potable ground water to re-naturalization of groundwater and control dust. These uses are considered irrigation and industrial uses. The Declaration of Policy, Haw. Rev. Stat. §174C-2(c) provides that the Water Code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for various purposes including irrigation and industrial uses.

II. Quantity Justification

The applicant requests 0.601 mgd to re-naturalization of groundwater and dust control. This is the maximum requirement based on their plans until the year 2035 (refer to Exhibit 3).

Since April 2008, the Commission staff has used an ArcGIS based numerical simulation model, created in conjunction with the University of Hawaii College of Tropical Agriculture and Human Resources (CTAHR) as a *guideline* to help review irrigation requirements for proposed water use permit applications. Most applications do not have the level of irrigation analysis as provided by this application. Nevertheless, it is useful to use the Irrigation Water Requirement Estimation Decision Support System (IWREDSS) model for comparative purposes.

Because the applicant's use is very specific there is no comparable vegetation type in the IWREDSS model to the applicant's request for renaturalization. However, running the IWREDSS using grass as the parameter indicates that for the soil type and rainfall data provided at the subject parcel, irrigation needs may be as high as 4,300 gallons per day per acre (see Exhibit 4). This value is based on an 80% rainfall event, or a 1 in 5 drought condition. The applicant requests approximately 3,425 gallons per day per acre in 2014. For 2014, the requested amount appears to be reasonable for re-naturalization. See below.

For dust control, the applicant requests 1,000 gallons per day per acre. The allocation for the Lower Quarry Well under WUP no. 664 was based on a duty of 1,000 gallons per day per acre. The Commission uses this standard duty for dust control in the Ewa area.

III. Efficiency of Use

The applicant states that its operations are as water efficient as possible because they are using drought tolerant species and grow-in procedures designed to acclimate plants to dry conditions.

IV. Analysis of Practical Alternatives

The applicant has alternatives to using potable groundwater and has concluded the following:

1. The applicant has investigated the feasibility of using **R-1 reclaimed water** from the Honouliuli Wastewater Reclamation Facility. This option is not feasible for the applicant because of the limited hours of water availability, as well as the distance to the R-1 supply.
2. The applicant is actively investigating the feasibility of purchasing and installing a filter press to **reuse industrial wastewater** from the wash plant. However, the equipment is not currently installed and is not locally available to lease.

3. The applicant had submitted a GWUPA for the **Waiahole Ditch System**. However, the Intermediate Court of Appeals of the State of Hawaii vacated this permit through the Waiahole Contested Case Hearing on October 13, 2010.
4. **Desalinization** and **surface water** are not feasible because of proximity of site to potential sources.
5. To minimize the long-term use of water in the renaturalized areas, the applicant has chosen drought-tolerant species and grow-in procedures designed to acclimate plants to dry conditions.
6. The applicant is currently designing a **storm water retention system** that will supplement well water usage.

(3) Interference with other existing legal uses

There are 5 other wells currently in use within 1 mile of both of these wells (refer to Exhibits 1 & 5). Four of these wells are observation wells. Barbers Point Shaft (State Well No. 2103-03 completed in 1943) is a production well used by the Navy. The Lower Quarry Well (State Well No. 2104-01 completed in 1976) does not have pump test data. No pump test will be required of the Lower Quarry Well unless the pump capacity is increased. However, the new construction of the Upper Quarry Well (State Well No. 2103-06) will require a long-term pump test. Pump test data will be analyzed to determine if there is any interference with the Barbers Point Shaft.

(4) Public interest

The Water Code Haw. Rev. Stat. §174C-2 - Declaration of policy, defines “public interest” as follows:

- (c) *The state water code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic uses, aquaculture uses, irrigation and other agricultural uses, power development, and commercial and industrial uses. However, adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture, and navigation. Such objectives are declared to be in the public interest.*

The use of water for irrigation and industrial purposes is deemed to be in the public interest.

(5) State & county general plans and land use designations

The proposed uses are in the State Agricultural District, and the county zoning is AG-1/AG-2. The proposed use is consistent with these land use designations.

Normal agency review includes:

- 1) The State's Department of Land and Natural Resources (DLNR) and its State Parks, Aquatic Resources, Historic Preservation, and Land Divisions; the Department of Health (DOH) with its Clean Water, Safe Drinking Water, and Wastewater Branches; the Department of Hawaiian Home Lands (DDHL), and Land Use Commission (LUC); and the Office of Hawaiian Affairs (OHA).
- 2) the Office of the Mayor, Department of Planning and Permitting, and the Board of Water Supply.

The proposed uses are consistent with the state and county general plans and land use designations.

The Honolulu Board of Water Supply (BWS) has submitted extensive comments (attached as Exhibit 6). In summary, BWS requests as follows (with staff commentary in italics):

- The Commission impose a monitoring plan to assess the impact of the proposed Upper Quarry Well upon existing adjacent ground water resources. *The construction of the well will require a long term aquifer pump test that can be assessed to determine the potential for adverse effects.*
- The Commission defer the additional 0.433 Mgd until Grace Pacific sends in Water Use Reports from 2006 onwards. *Water Use Report data for Grace Pacific is current to 2011.*
- That consideration be given to phasing the permitted use in incremental periods of 4 years with approval to be contingent upon monitoring results *To be considered*
- That Grace Pacific provide a report on the feasibility of using recycled water for the renaturalization project. *The applicant has stated that recycled water is not feasible, and there is no projected date for the extension of the reclaimed water line to a closer location along Farrington Highway. Further, through standard special condition 1, the Commission reserves the right to revoke this permit after a hearing should alternative sources become available.*

(6) County land use plans and policies

Again normal County review includes Office of the Mayor, Department of Planning and Permitting, and the Board of Water Supply. The Honolulu BWS comments are summarized above.

(7) Interference with Hawaiian home lands rights

All permits are subject to the prior rights of Hawaiian home lands. The Department of Hawaiian Home Lands (DHHL) and the Office of Hawaiian Affairs have reviewed this application and made no comments or objections. Further, standard water use permit conditions 3.g., 6, and 9.f. notify all water use permittees that their permits are subject to and cannot interfere with Hawaiian home land rights.

Therefore, this application will not interfere with Hawaiian home lands rights.

(8) Other issues

I. Chapter 343 – Environmental Assessment (EA) Compliance

Environmental Assessment

Pursuant to Haw. Rev. Stat. §343-5(a), the applicant's proposed action does not trigger the need for an EA.

II. The projected demand year

The applicant requests 0.601 Mgd based upon the maximum use as of the year 2034 (projections are made until 2035, but the maximum demand will be in 2034). The Commission has a provision for revocation of unused allocation for any 4-year period. Therefore, in the year 2016, any unused allocation issued through this permit may be revoked for non-use.

Market demands and other environmental factors may change the demand beyond 2016. Therefore, staff is proposing to issue an allocation based on the year 2016 instead of 2034. The applicant can always submit new GWUPAs to increase the allocation to meet projected demands.

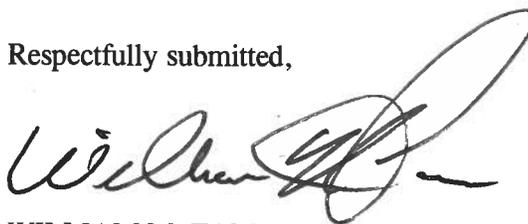
As referenced in Section (2) (II) above, the requested allocation duties appear to be reasonable. For the year 2016, the applicant requests 255,862 gallon per day, or 0.256 Mgd (refer to Exhibit 3). Therefore, staff recommends approval of an allocation of 0.256 Mgd.

RECOMMENDATION:

Staff recommends that the Commission approve the issuance of ground water use permit no. 958 to Grace Pacific Corporation for the reasonable and beneficial use of 0.256 million gallons per day of potable water for industrial and irrigation uses from the Upper and Lower Quarry Wells (State Well Nos 2103-06 and 2104-01), subject to the standard water use permit conditions listed in Attachment B and the following special conditions:

1. Should an alternate permanent source of water be found for this use, then the Commission reserves the right to revoke this permit, after a hearing.
2. In the event that the tax map key at the location of the water use is changed, the permittee shall notify the Commission in writing of the tax map key change within thirty (30) days after the permittee receives notice of the tax map key change.
3. This permit supercedes and consolidates Water Use Permits 205 and 664.

Respectfully submitted,



WILLIAM M. TAM
Deputy Director

Attachment(s): A (Water Use Permit Detailed Information)
 B (Water Use Permit Standard Conditions)

Exhibit(s): 1 (Location Map)
 2 (Existing Water Use Permits and 12-Month Moving Average Withdrawal)
 3 (Applicant's Projecting Quantity Requests)
 4 (IWREDSS Summary and Rainfall Atlas Printout)
 5 (Data for Surrounding Wells)
 6 (Board of Water Supply Comments)

APPROVED FOR SUBMITTAL:



WILLIAM J. AILA, JR.
Chairperson

WATER USE PERMIT DETAILED INFORMATION**Source Information**

AQUIFER:	Ewa-Kunia System, Pearl Harbor Sector, Oahu
Sustainable Yield:	16 Mgd
Existing Water Use Permits:	15.289 Mgd
Available Allocation:	0.711 Mgd
Total other pending applications:	0 Mgd
This application:	0.601 Mgd

WELL (Proposed):	Upper Quarry Well (Well No. 2103-06)
Location:	TMK: (1) 9-2-003:082
Year Drilled:	n/a
Casing Diameter:	12 in.
<u>Elevations</u> (msl = 0 ft.)	
Water Level (estimated):	14 ft.
Ground:	255 ft.
Bottom of Solid Casing:	-5 ft.
Bottom of Perforated:	-55 ft.
Bottom of Open Hole:	n/a ft.

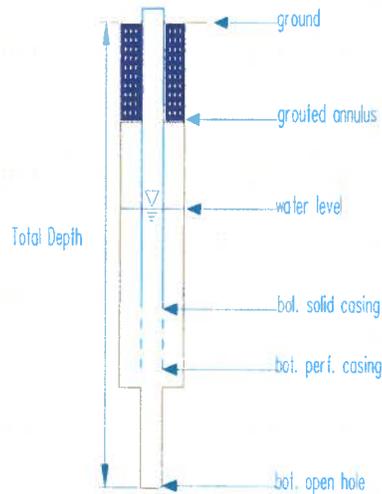
Total Depth:	310 ft.
Grouted Annulus Depth:	unknown

Pump Capacity	500 gpm
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WELL (Existing):	Lower Quarry Well (Well No. 2104-01)
Location:	TMK: (1) 9-1-016:004
Year Drilled:	1976
Casing Diameter:	12 in.
<u>Elevations</u> (msl = 0 ft.)	
Water Level (estimated):	f ft.
Ground:	125 ft.
Bottom of Solid Casing:	-15 ft.
Bottom of Perforated:	-35 ft.
Bottom of Open Hole:	-51 ft.

Total Depth:	176 ft.
Grouted Annulus Depth:	unknown

Pump Capacity	750 gpm
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Use Information

Quantity Requested:	0.601 gallons per day
Existing/Future Type of Water Use:	Irrigation / Industrial
Place of Water Use:	TMK: (1) 9-2-003: 074 & 082

Ewa-Kunia Aquifer System	
Current 12-Month Moving Average Withdrawal (See Exhibit 2):	10.254 Mgd

Nearby Surrounding Wells and Other Registered Ground Water Use

There are 5 other wells within a mile of the well (see Exhibit 1). Of these, one well (State Well No. 2103-03 - Barbers Point Shaft) is being used.

Public Notice

In accordance with HAR §13-171-17, a public notice was published in the Honolulu Star Advertiser on June 29 and July 6, 2012 and a copy of the notice was sent to the Office of the Mayor. Copies of the completed application were sent to the Board of Water Supply, Department of Planning and Permitting, Department of Health, Department of Hawaiian Home Lands, Office of Hawaiian Affairs, the various divisions within the Department of Land and Natural Resources, and other interested parties for comments. Written comments and objections to the proposed permit were to be submitted to the Commission by July 20, 2012.

Objections

The public notice specifies that an objector meet the following requirements: (1) state property or other interest in the matter; (2) set forth questions of procedure, fact, law, or policy, to which objections are taken; (3) state all grounds for objections to the proposed permits, (4) provide a copy of the objection letter(s) to the applicant, and (5) submit objections meeting the previous requirements to the Commission by July 20, 2012.

To the best of staff's knowledge there are no objectors who have property interest within the Ewa-Kunia Aquifer System or who will be directly and immediately affected by the proposed water use, but the Board of Water Supply has submitted substantial comments, attached as Exhibit 6.

Briefs in Support

Responses to objections, or briefs in support, regarding the application are required to be filed with the Commission ten (10) days after an objection is filed and, presumably, copies are served to the applicant. No briefs in support were filed with the Commission.

STANDARD WATER USE PERMIT CONDITIONS

1. The water described in this water use permit may only be taken from the location described and used for the reasonable beneficial use described at the location described above. Reasonable beneficial uses means "the use of water in such a quantity as is necessary for economic and efficient utilization which is both reasonable and consistent with State and County land use plans and the public interest." (HRS § 174C-3)
2. The right to use ground water is a shared use right.
3. The water use must at all times meet the requirements set forth in HRS § 174C-49(a), which means that it:
 - a. Can be accommodated with the available water source;
 - b. Is a reasonable-beneficial use as defined in HRS § 174C-3;
 - c. Will not interfere with any existing legal use of water;
 - d. Is consistent with the public interest;
 - e. Is consistent with State and County general plans and land use designations;
 - f. Is consistent with County land use plans and policies; and
 - g. Will not interfere with the rights of the Department of Hawaiian Home Lands as provided in section 221 of the Hawaiian Homes Commission Act and HRS § 174C-101(a).
4. The ground water use here must not interfere with surface or other ground water rights or reservations.
5. The ground water use here must not interfere with interim or permanent instream flow standards. If it does, then:
 - a. A separate water use permit for surface water must be obtained in the case an area is also designated as a surface water management area;
 - b. The interim or permanent instream flow standard, as applicable, must be amended.
6. The water use authorized here is subject to the requirements of the Hawaiian Homes Commission Act, as amended, if applicable.
7. The water use permit application and submittal, as amended, approved by the Commission at its August 15, 2012 meeting are incorporated into this permit by reference.
8. Any modification of the permit terms, conditions, or uses may only be made with the express written consent of the Commission.
9. This permit may be modified by the Commission and the amount of water initially granted to the permittee may be reduced if the Commission determines it is necessary to:
 - a. protect the water sources (quantity or quality);
 - b. meet other legal obligations including other correlative rights;
 - c. insure adequate conservation measures;

- d. require efficiency of water uses;
- e. reserve water for future uses, provided that all legal existing uses of water as of June, 1987 shall be protected;
- f. meet legal obligations to the Department of Hawaiian Home Lands, if applicable; or
- g. carry out such other necessary and proper exercise of the State's and the Commission's police powers under law as may be required.

Prior to any reduction, the Commission shall give notice of its proposed action to the permittee and provide the permittee an opportunity to be heard.

- 10. An approved flowmeter(s) must be installed to measure monthly withdrawals and a monthly record of withdrawals, salinity, temperature, and pumping times must be kept and reported to the Commission on Water Resource Management on forms provided by the Commission on a monthly basis (attached).
- 11. This permit shall be subject to the Commission's periodic review of the **Ewa-Kunia** Aquifer System's sustainable yield. The amount of water authorized by this permit may be reduced by the Commission if the sustainable yield of the **Ewa-Kunia** Aquifer System, or relevant modified aquifer(s), is reduced.
- 12. A permit may be transferred, in whole or in part, from the permittee to another, if:
 - a. The conditions of use of the permit, including, but not limited to, place, quantity, and purpose of the use, remain the same; and
 - b. The Commission is informed of the transfer within ninety days.

Failure to inform the department of the transfer invalidates the transfer and constitutes a ground for revocation of the permit. A transfer which involves a change in any condition of the permit, including a change in use covered in HRS § 174C-57, is also invalid and constitutes a ground for revocation.

- 13. The use(s) authorized by law and by this permit do not constitute ownership rights.
- 14. The permittee shall request modification of the permit as necessary to comply with all applicable laws, rules, and ordinances which will affect the permittee's water use.
- 15. The permittee understands that under HRS § 174C-58(4), that partial or total nonuse, for reasons other than conservation, of the water allowed by this permit for a period of four (4) continuous years or more may result in a permanent revocation as to the amount of water not in use. The Commission and the permittee may enter into a written agreement that, for reasons satisfactory to the Commission, any period of nonuse may not apply towards the four-year period. Any period of nonuse which is caused by a declaration of water shortage pursuant to section HRS § 174C-62 shall not apply towards the four-year period of forfeiture.

16. The permittee shall prepare and submit a water shortage plan within 30 days of the issuance of this permit as required by HAR § 13-171-42(c). The permittee's water shortage plan shall identify what the permittee is willing to do should the Commission declare a water shortage in the **Ewa-Kunia** Ground Water Management Area.
17. The water use permit shall be subject to the Commission's establishment of instream standards and policies relating to the Stream Protection and Management (SPAM) program, as well as legislative mandates to protect stream resources.
18. Special conditions in the attached cover transmittal letter are incorporated herein by reference.
19. The permittee understands that any willful violation of any of the above conditions or any provisions of HRS § 174C or HAR § 13-171 may result in the suspension or revocation of this permit.

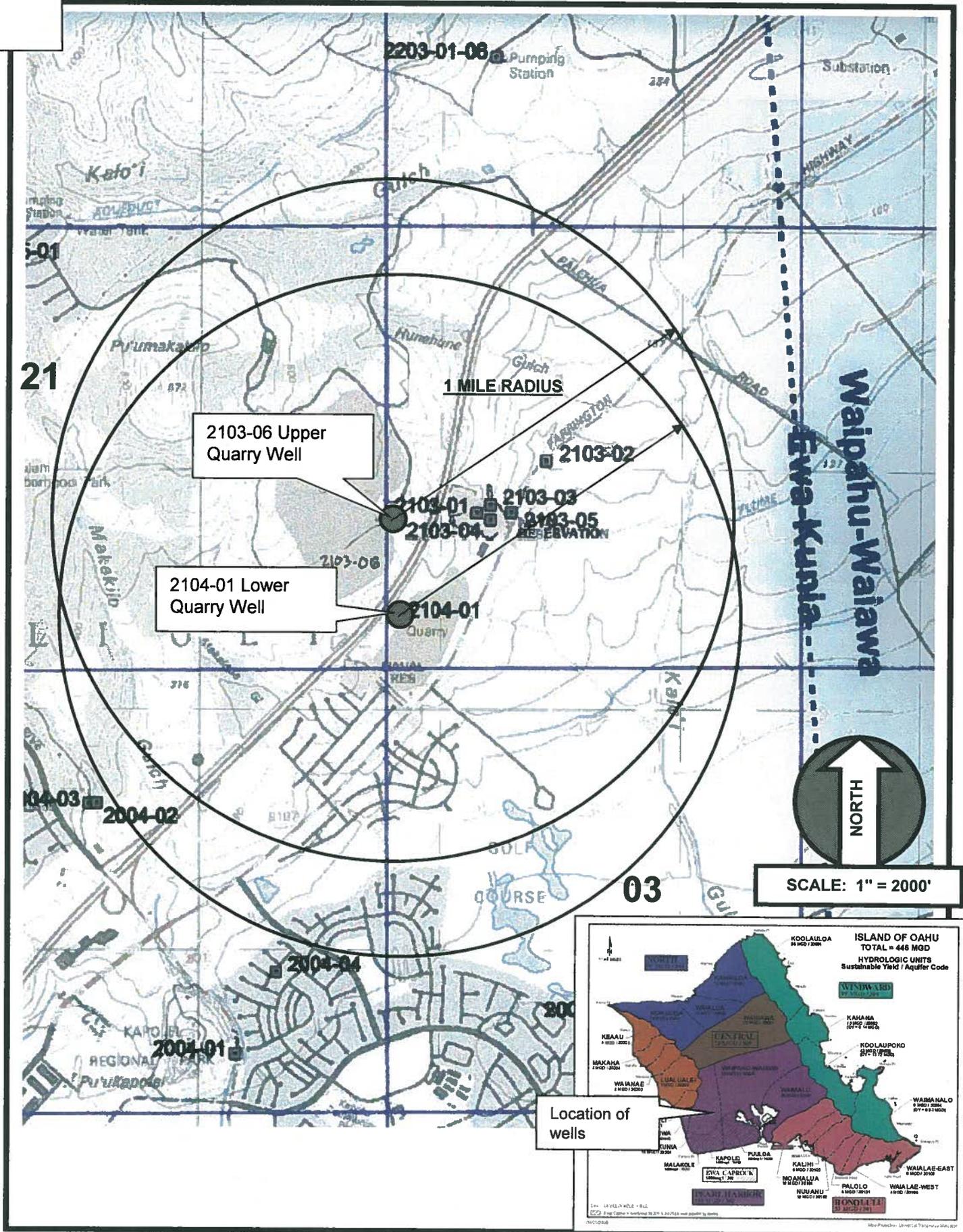


EXHIBIT 1



Report Parameters

Island: Oahu
 Applicant: All
 Well # Prefix: All
 Date: All
 Aquifer: 30204 EWA-KUNIA
 TMK: All
 Aquifer Type: All

WUP = Water Use Permit, 12-MAV = 12 month moving average, Diff = WUP-12-MAV, mgd = million gallons per day

Island of OAHU

Aquifer System Ground Water Management Area: 30204 EWA-KUNIA
Sustainable Yield (mgd): 16

WUP No	Approved	Permittee	Well No	Well Name	WUP (mgd)	12-MAV (mgd)	Diff (mgd)	Date Last Reported
64	08/22/1986	U.S. Navy 1	3-2103-003	Barbers Pt Shaft	2.337	1.699	0.638	07/31/2009
75	06/12/1987	DLNR, Land Division 1	3-1905-004	Ewa Desalt Basal	0.500	0.000	0.500	06/30/1997
81	05/17/1989	Honolulu Board of Water Supply, BWS	3-2004-004	Makakilo	1.500	0.878	0.622	01/31/2007
82	05/17/1989	Honolulu Board of Water Supply, BWS	3-2006-014	BP Non-Potable 1	1.000	0.890	0.110	01/31/2007
			3-2006-015	BP Non-Potable 2		0.994	0.006	10/31/2000
158	09/13/1989	Honolulu Board of Water Supply, BWS	3-2303-001	Honouliuli I-1	2.240	0.691	1.549	01/31/2007
			3-2303-002	Honouliuli I-2				
165	02/13/1991	Honolulu Board of Water Supply, BWS	3-1905-004	Ewa Desalt Basal	0.500	0.000	0.500	06/30/1997
205	07/28/1993	GRACE PACIFIC, INC.	3-2104-001	Makakilo LowerQuarry	0.124	0.000	0.124	02/29/2012
655	10/25/1985	KO OLINA CO.	3-2006-013	Ko Olina	0.700	0.016	0.684	02/29/2012
664	10/29/2003	Grace Pacific Corp.	3-2104-001	Makakilo LowerQuarry	0.044	0.000	0.044	02/29/2012
670	01/26/2000	AINA NUI CORPORATION	3-2006-001	EP 10 A	0.957	0.141	0.816	02/06/2012
			3-2006-002	EP 10 C		0.000	0.957	06/30/1996
			3-2006-003	EP 10 D				
			3-2006-004	EP 10 E				
			3-2006-005	EP 10 F				
			3-2006-006	EP 10 G		0.189	0.768	02/01/2012
			3-2006-007	EP 10 H				
			3-2006-008	EP 10 J				
			3-2006-009	EP 10 K				
			3-2006-010	EP 10 B				
			3-2006-011	EP 10 I				
811	08/22/2007	Honolulu BWS	3-2303-003	Honouliuli II-1	4.480	5.273	-0.793	01/31/2007
			3-2303-004	Honouliuli II-2				
			3-2303-005	Honouliuli II-3				
			3-2303-006	Honouliuli II-4				
928	06/20/2001	Del Monte Fresh Produce, Inc.	3-2703-001	Kunia 1	1.075	0.667	0.408	05/02/2011
			3-2703-002	Kunia Basal Monitor				

Summary for EWA-KUNIA (28 detail records)

Total: 15.457 10.254 5.203
Available: 0.543

Land Use Category	2009	2010	2011	2012	2013	2014	2015	2016	2017
DUST CONTROL (gpd)	105,044	110,988	116,931	105,044	104,683	104,683	104,683	104,683	104,683
RENATURALIZATION (gpd)	0	0	0	26,489	42,079	50,445	58,812	67,179	75,545
PROCESSING (gpd)	50,000	50,000	50,000	84,000	84,000	84,000	84,000	84,000	84,000
TOTAL WATER USAGE (gpd)	155,044	160,988	166,931	215,533	230,762	239,128	247,495	255,862	264,228
TOTAL ACTIVE LAND AREA (acres)	105	111	117	110	115	119	124	129	134
Water Usage (gpd/acre)	1,476	1,451	1,428	1,960	2,015	2,003	1,991	1,980	1,970
Land Use Category	2018	2019	2020	2021	2022	2023	2024	2025	2026
DUST CONTROL (gpd)	103,497	103,497	103,497	103,497	103,497	101,942	101,942	101,942	101,942
RENATURALIZATION (gpd)	83,912	92,279	100,645	109,012	117,378	125,745	134,112	142,478	150,845
PROCESSING (gpd)	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000
TOTAL WATER USAGE (gpd)	271,409	279,776	288,142	296,509	304,875	311,687	320,054	328,420	336,787
TOTAL ACTIVE LAND AREA (acre)	138	143	148	153	158	161	166	171	176
Water Usage (gpd/acre)	1,969	1,960	1,951	1,943	1,936	1,938	1,931	1,924	1,918
Land Use Category	2027	2028	2029	2030	2031	2032	2033	2034	2035
DUST CONTROL	101,942	102,143	102,143	102,143	102,143	102,143	0	0	0
RENATURALIZATION	159,212	167,578	175,945	184,312	192,678	201,045	450,244	600,343	417,454
PROCESSING	84,000	84,000	84,000	84,000	84,000	84,000	0	0	0
TOTAL WATER USAGE (gpd)	345,153	353,722	362,088	370,455	378,821	387,188	450,244	600,343	417,454
TOTAL ACTIVE LAND AREA (acre)	181	186	191	195	200	205	153	202	202
Water Usage (gpd/acre)	1,912	1,906	1,900	1,896	1,891	1,886	2,949	2,969	2,064

Table 8. The projected daily irrigation requirements (in gallons per day) as a function of age of the rehabilitated areas (Area Yr1, Area Yr2, Area Yr3) of Makakilo Quarry during the duration of the rehabilitation period, 2012-2035.

4. Summary

In summary, irrigation water requirements for Makakilo Quarry were calculated using long-term site specific weather data (61 years), soil physical properties, and plant cover (native shrubs and grasses) parameters. The calculations included three major land uses: dust control, renaturalization, and processing. Daily water demands are projected to increase from 215,533 gallons per day in 2009 to 417,454 gallons per day in 2035. Irrigation water used for renaturalization represents 10% of all water use by the operation or 26,439 gpd in 2012; however, it represent 100% of the water used by the operation during the last three years of the project 2032-2035.

TMK : 174.05757192913
 SOILS: Ewa(0.054), Ewa(0.072), Helemano(0.021), Kawaihapai(0.021), Mahana(0.095), Mahana(0.102), Molokai(0.035), Molokai(0.067), waiialua(0.059), waiialua(0.035), Stony steep land(0.439)

ANNUAL IRRIGATION REQUIREMENT (INCHES)

WATER BUDGET COMPONENTS												
NIR	GIR	GAL_A	G_RAIN	N_RAIN	ER	ER21	RO	INT	ET0	ET	DR	
52.1	74.4	2021.6	18.5	14.5	12.8	11.3	3.6	0.4	65.2	65.2	1.7	

GIR STATISTICS

ACRES	UNIT	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%
	inch/acre	74.448	77.796	85.547	58.566	75.020	83.968	88.090	91.247
	Thou. gpd/acre	5.539	5.788	6.364	4.357	5.581	6.247	6.553	6.788
2.00	Total thou. gpd	11.077	11.575	12.729	8.714	11.162	12.494	13.107	13.577

NIR STATISTICS

ACRES	UNIT	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%
	inch/acre	52.114	54.457	59.883	40.996	52.514	58.778	61.663	63.873
	Thou. gpd/acre	3.877	4.051	4.455	3.050	3.907	4.373	4.587	4.752
2.00	Total thou. gpd	7.754	8.103	8.910	6.100	7.814	8.746	9.175	9.504

Note:- Irrigated area for the selected SPRINKLER, LARGE GUNS irrigation system is 1.0 of the total area

MONTHLY IRRIGATION REQUIREMENT (INCHES)

WATER BUDGET COMPONENTS												
MO	NIR	GIR	GAL_A	G_RAIN	N_RAIN	ER	ER21	RO	INT	ET0	ET	DR
1	1.4	2.0	54.7	3.3	2.6	2.3	1.9	0.6	0.0	3.6	3.6	0.4
2	2.9	4.2	112.9	1.8	1.3	1.0	1.0	0.5	0.0	4.3	4.3	0.4
3	3.3	4.7	127.0	2.0	1.8	1.7	1.4	0.2	0.0	5.2	5.2	0.1
4	4.4	6.2	169.5	0.8	0.7	0.7	0.6	0.0	0.0	5.6	5.6	0.0
5	5.1	7.3	197.2	1.1	0.9	0.9	0.8	0.1	0.0	6.2	6.2	0.0
6	6.1	8.7	235.7	0.4	0.4	0.4	0.3	0.0	0.0	6.5	6.5	0.0
7	6.5	9.2	250.8	0.4	0.4	0.4	0.2	0.0	0.0	7.0	7.0	0.0
8	6.3	9.1	246.2	0.7	0.6	0.6	0.5	0.1	0.0	6.9	6.9	0.0
9	5.9	8.4	228.7	0.4	0.4	0.4	0.3	0.0	0.0	6.3	6.3	0.0
10	4.4	6.3	171.3	1.8	1.5	1.5	1.2	0.2	0.0	5.5	5.5	0.0
11	3.2	4.6	125.2	3.8	2.3	1.6	2.0	1.4	0.0	4.3	4.3	0.6
12	2.6	3.8	102.3	2.0	1.6	1.4	1.1	0.4	0.0	3.9	3.9	0.2

GIR STATISTICS

MO	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%
1	2.0	2.2	4.8	0.0	2.1	3.5	4.4	4.8
2	4.2	4.2	6.7	1.9	4.0	6.0	6.1	6.1
3	4.7	4.4	8.4	0.3	4.6	6.8	7.4	7.4
4	6.2	6.4	7.6	3.6	6.4	7.1	7.4	7.6
5	7.3	6.8	10.5	4.6	7.2	8.8	8.8	8.8
6	8.7	8.7	10.8	6.8	8.7	9.2	9.3	9.3
7	9.2	9.3	10.8	6.9	9.4	10.0	10.0	10.0
8	9.1	9.2	11.7	6.5	9.0	9.9	9.9	9.9
9	8.4	8.5	10.6	6.4	8.5	9.0	9.0	9.0
10	6.3	6.4	8.3	3.8	6.4	7.6	7.8	7.8
11	4.6	4.8	8.7	0.1	4.9	6.2	6.2	6.2
12	3.8	3.4	8.3	0.0	3.2	5.5	5.5	5.5

Quarry 92003074.txt

30	1.8	1.6	0.54	3.5	0.0	0.00	0.68	1.7	2.1	2.1	2.1
31	2.0	1.6	0.37	3.2	1.5	0.00	0.73	1.9	2.1	2.1	2.1
32	1.6	1.6	0.66	3.2	0.0	0.00	0.73	1.6	2.1	2.1	2.1
33	2.1	1.7	0.51	3.2	0.0	0.00	0.82	2.0	2.1	2.1	2.1
34	1.8	1.6	0.50	3.2	0.0	0.00	0.64	1.8	2.0	2.0	2.0
35	1.9	1.6	0.33	3.1	1.5	0.00	0.64	1.8	2.0	2.0	2.0
36	2.3	1.7	0.39	3.6	1.5	0.00	0.79	2.2	2.2	2.2	2.2
37	1.9	1.5	0.55	3.3	0.0	0.00	0.75	1.8	2.0	2.0	2.0
38	1.7	1.6	0.51	3.2	0.0	0.00	0.74	1.7	1.8	1.8	1.8
39	1.3	1.5	0.54	1.9	0.0	0.00	0.93	1.5	1.8	1.8	1.9
40	1.4	1.6	0.35	1.7	0.0	0.00	0.96	1.6	1.6	1.6	1.6
41	1.6	1.6	0.48	3.2	0.0	0.00	0.54	1.6	1.9	1.9	1.9
42	1.1	1.5	0.69	1.6	0.0	0.00	0.96	1.5	1.5	1.5	1.5
43	1.2	1.5	0.79	3.1	0.0	0.00	0.60	1.4	1.6	1.6	1.6
44	1.1	1.5	0.69	1.7	0.0	0.00	0.99	1.4	1.4	1.4	1.4
45	1.1	1.4	0.97	3.1	0.0	0.00	0.69	1.2	1.4	1.4	1.4
46	0.9	1.5	0.86	1.7	0.0	0.00	0.91	1.4	1.4	1.4	1.4
47	1.3	1.5	0.83	3.4	0.0	0.00	0.61	1.3	1.3	1.3	1.3
48	0.6	0.0	1.30	1.7	0.0	0.00	0.81	1.3	1.3	1.3	1.3
49	0.6	0.0	1.29	1.6	0.0	0.00	1.00	1.3	1.3	1.3	1.3
50	1.1	1.5	0.69	1.7	0.0	0.00	0.92	1.2	1.2	1.2	1.2
51	0.6	0.0	1.29	1.6	0.0	0.00	0.95	1.2	1.2	1.2	1.2
52	0.8	0.7	1.06	1.6	0.0	0.00	0.73	1.2	1.2	1.2	1.2

 * SUMMARY *

TMK : 314.628376595263

SOILS: Helemano(0.165), Mahana(0.338), Mahana(0.086), Molokai(0.011), Molokai(0.020), Stony steep land(0.379)

ANNUAL IRRIGATION REQUIREMENT (INCHES)

WATER BUDGET COMPONENTS												
NIR	GIR	GAL_A	G_RAIN	N_RAIN	ER	ER21	RO	INT	ET0	ET	DR	
51.8	69.0	1874.4	19.1	14.8	12.9	11.7	3.8	0.4	65.0	65.0	1.9	

ACRES		GIR STATISTICS									
UNIT	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%			
inch/acre	69.028	72.530	78.478	54.423	69.578	77.635	81.337	84.169			
Thou. gpd/acre	5.135	5.396	5.838	4.049	5.176	5.776	6.051	6.262			
2.00 Total thou. gpd	10.271	10.792	11.677	8.098	10.352	11.551	12.102	12.524			

ACRES		NIR STATISTICS									
UNIT	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%			
inch/acre	51.771	54.398	58.859	40.817	52.183	58.226	61.002	63.127			
Thou. gpd/acre	3.852	4.047	4.379	3.037	3.882	4.332	4.538	4.696			
2.00 Total thou. gpd	7.703	8.094	8.758	6.073	7.764	8.663	9.077	9.393			

Note:- Irrigated area for the selected MULTIPLE SPRINKLER irrigation system is 1.0 of the total area

MONTHLY IRRIGATION REQUIREMENT (INCHES)

WATER BUDGET COMPONENTS												
MO	NIR	GIR	GAL_A	G_RAIN	N_RAIN	ER	ER21	RO	INT	ET0	ET	DR
1	1.6	2.1	56.9	3.4	2.7	2.3	2.0	0.6	0.0	3.6	3.6	0.4
2	2.7	3.6	99.0	1.9	1.3	1.0	1.0	0.5	0.0	4.2	4.3	0.4
3	3.3	4.4	119.2	2.1	1.9	1.7	1.5	0.2	0.0	5.1	5.1	0.2
4	4.4	5.9	159.5	0.8	0.7	0.7	0.6	0.0	0.0	5.6	5.6	0.0
5	5.0	6.7	181.8	1.1	1.0	1.0	0.8	0.1	0.0	6.1	6.1	0.0
6	6.0	7.9	215.6	0.4	0.4	0.4	0.3	0.0	0.0	6.5	6.5	0.0
7	6.5	8.7	236.7	0.4	0.4	0.4	0.2	0.0	0.0	7.0	6.9	0.0
8	6.4	8.5	231.8	0.7	0.6	0.6	0.5	0.1	0.0	6.9	6.9	0.0
9	5.7	7.6	206.1	0.4	0.4	0.4	0.3	0.0	0.0	6.3	6.3	0.0
10	4.4	5.9	160.8	1.8	1.5	1.5	1.2	0.2	0.0	5.5	5.5	0.0
11	3.3	4.4	119.2	3.9	2.3	1.7	2.1	1.5	0.0	4.3	4.3	0.7
12	2.4	3.2	87.8	2.1	1.6	1.4	1.2	0.5	0.0	3.8	3.9	0.2

GIR STATISTICS								
MO	MEAN	MED.	XMAX	XMIN	50%	80%	90%	95%
1	2.1	2.1	4.3	0.0	2.0	3.6	4.5	4.7
2	3.6	3.7	6.1	1.8	3.5	5.1	5.6	5.7
3	4.4	4.1	7.3	0.0	4.4	6.3	6.8	6.8
4	5.9	6.1	7.9	3.6	6.0	7.0	7.4	7.4
5	6.7	6.7	9.7	3.5	6.7	8.2	8.2	8.2



Wells Reviewed in Report

- Island: All
- Well Owner: All
- Aquifer: All
- TMK: All
- Well Use: All

Well No	Well Name	Aquifer	Well Owner	Coordinates(NAD83)			Physical Data			Elevations in feet (msl)				Initial			Pump Test Result	
				Year Drilled	Latitude DD	Longitude DD	Type	Casing Dia in.	Total Depth ft.	Ground	Bottom Solid Casing	Bottom Perf Casing	Bottom of Hole	Static Head	CI	Temp	Spec Cap	Installed Capacity
Island: Oahu																		
30204 EWA-KUNIA																		
3-2103-001	Puu Makakilo	30204	U.S. Navy 1	1942	21.355833	-158.063056	6	210	193	4	16.60	200						OBSWL
3-2103-002	Puu Makakilo	30204	U.S. Navy 1	1942	21.357778	-158.060278	6	140	131	3	16.90	251						OBS
3-2103-003	Barbers Pt Shaft	30204	Navy Public Works Center 1	1943	21.356111	-158.0625	SHF 72	200		-4	14.10							MIL
3-2103-004	Barbers Pt. Mon	30204	U.S. Navy 1	1992	21.355556	-158.0625	ROT 8	146	-79	-344	15.00							OBS
3-2103-005	Barbers Pt Shallow M	30204	U.S. Navy 1	1999	21.355833	-158.061667	ROT 2	148	28	-152	14.75							OBS

Total Installed Pump Capacity in Aquifer in mgd:

Total Number of wells in Aquifer: 5

Total Number of wells on Island: 5

Total Number of Wells in the State: 5

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843



July 26, 2012

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Deputy Manager and Chief Engineer

Mr. William J. Aila, Jr., Chairperson
Department of Land and Natural Resources
Commission on Water Resource Management
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Aila:

Subject: Application to Modify Ground Water Use Permit Application
No. 205/664 - Applicant: Grace Pacific Corporation

Thank you for the opportunity to provide comments on the subject application.

Grace Pacific Corporation (Grace Pacific) has undertaken a responsible approach in its plan to restore quarried area to a renaturalized state — in doing so, expending resources to study how that may occur. While those planning efforts are admirable, we have comments on the proposed increase in permitted use within the Ewa-Kunia hydrologic unit.

- 1) We understand that the requested 0.601 mgd includes the currently assigned total permitted use to Grace Pacific, Inc., of 0.168 mgd: 0.124 under WUP No. 205, and 0.044 mgd under WUP 664. If granted, the request of an additional 0.433 mgd will result in the almost full commitment of the sustainable yield for the hydrologic unit. This may create additional impacts upon the existing adjacent ground water sources, which are already experiencing sensitive transition zone water quality conditions as explained in items 2 and 3.
- 2) The two-year capture zone of the Navy Barbers Point Shaft falls within the pumping influence of the proposed upper quarry well. Chloride concentrations in the second half of 2011 were in the 180 ppm to 190 ppm range but have historically exceeded 230 ppm.
- 3) The ten-year capture zone of the Board of Water Supply (BWS) Makakilo Well falls within the pumping influence of the proposed upper quarry well. Chloride concentrations for this well are typically in excess of 250 ppm and are blended with lower chloride water to provide a suitable composite chloride level.
- 4) Testing of the proposed upper quarry well should be designed and monitored to determine impacts upon the adjacent Navy Barbers Point Shaft. Impacts that are evident to the shaft will likely also result in long-term impacts to Makakilo Well.

- 5) The most current BWS data of the existing Grace Pacific Well 2104-01 pumpage extends to the year 2005. It is derived from field readings which indicate pumpage rate averages ranging from 0.085 mgd to 0.110 mgd for the periods between field visits. Note that meter readings were subsequently halted by BWS when the meter could not be located. In lieu of current data, it is assumed that the 0.109 mgd average for the years 2004 and 2005, reported to Commission on Water Resource Management (CWRM), reflect current usage. Grace Pacific needs to provide current usage so that an assessment of the requested additional allocation fairly reflects current consumption conditions.
- 6) Table 8 of the HydroNoor Environmental Consulting study on irrigation water requirements, indicates that renaturalization will initiate in the year 2012, and that total water usage will rise from 0.215 mgd in that year, to 0.600 mgd in 2034. The table also lists that from 2009 to 2011, the total daily requirements are 0.155 mgd to 0.167 mgd. If the 2009 to 2011 requirements indicate pre-renaturalization conditions, then the estimates may overstate the current requirement. Using a 12-month moving average that ended in December 2005, ground water pumpage of 0.119 mgd occurred. An accurate assessment of the current usage is therefore required to reconcile actual usage versus conceptual uses.
- 7) Grace Pacific has stated they evaluated R-1 recycled water from the BWS Honouliuli Water Recycling Facility to meet projected demands. They found that it is not feasible due to limited hours of water availability and the distance to the nearest R-1 pipeline point. On-site storage will mitigate pump operation constraints and a pipeline extension from the Kapolei Golf Course will shorten the required distance and also bring R-1 Water to Department of Hawaiian Home Lands projects along Farrington Highway.

Given the preceding comments, we suggest the following:

- that the CWRM impose a monitoring plan to assess the impact of the proposed upper quarry well upon existing adjacent ground water sources;
- that the request for what amounts to an additional 0.433 mgd in permitted use be deferred until Grace Pacific provides pumpage data from 2006 onward, and an updated assessment on future projections can be made;
- that consideration be given to phasing permitted use in incremental periods of 4 years pursuant to Chapter 174C-58(4). Approval should be contingent upon monitoring results to verify the stability of the downgradient ground water resources; and
- that Grace Pacific provide a report on the feasibility of using recycled water for their renaturalization project. If CWRM determines that recycled water is not feasible, we then recommend the standard condition of converting to recycled water when it becomes available in the future.

Mr. William J. Aila, Jr., Chairperson
July 26, 2012
Page 3

Please contact Barry Usagawa at 748-5900 or Glenn Oyama at 748-5934, if you have any questions. Thank you for allowing us to comment on this application.

Very truly yours,



ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

GO/BU:ko
cc: Glenn Oyama
12-0776

EXHIBIT 6