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

Dear Mr. Creps:  

The Commission on Water Resource Management received your completed water use permit application (WUPA No. 958) for the Upper and Lower Makakilo Quarry Wells (Well No. 2103-06 & 2104-01 on June 6, 2012). Your application should be processed within ninety (90) days from the date of receipt unless there are objections to your application.

Enclosed is a copy of the public notice for your water use permit application which will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012. You will be required to pay for the cost of the public notice, (about $800). We will send you an invoice shortly after your notice is published.

Please be aware that there may be objections to your application. If objections are made, the objector is required to file such objections with the Commission and is also required to send you a copy of the objections.

You, or any other party, may respond to objections by filing a brief in support of your application with the Commission within ten (10) days of the filing of an objection. You, or the other party, must also send a copy of the response to the objector.

If you have any questions, please contact Ryan Imata at 587-0255.

Sincerely,

WILLIAM M. TAM  
Deputy Director
PUBLIC NOTICE

Application for Water Use Permit
Ewa-Kunia Ground Water Management Area, Oahu

The Commission on Water Resource Management received the following water use permit application. Public Notice is given pursuant to Hawaii Administrative Rules, Section 13-171, "Designation and Regulation of Water Management Areas."

WUPA No. 958 Upper and Lower Makakilo Quarry Wells (Well No. 2103-06 & 2104-01)

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

Landowner: Same

Date Application Filed as Complete: June 6, 2012
Hydrologic Unit: Aquifer Areas: Ewa-Kunia System, Pearl Harbor Sector, Oahu
Water Source: Upper and Lower Makakilo Quarry Wells (Well No. 2103-06 & 2104-01) at Makakilo Drive, Oahu, Tax Map Key (1) 9-2-003:082 and (1) 9-1-016:004
Quantity Requested: 0.601 million gallons per day.
Existing/New Use: new/existing dust control / renaturalization
Place of Water Use: Makakilo Quarry at Tax Map Key: (1) 9-2-003:074,082

Written objections or comments on this application may be filed by any person who has property interest in any land within the hydrologic unit of the source of water supply, any person who will be directly and immediately affected by the proposed water use, or any other interested person. Written objections must (1) state the property or other interest in the matter (provide TMK information); (2) set forth questions of procedure, fact, law, or policy, to which objections are taken; and (3) state all grounds for objections to the proposed permit. Written objections must be received by July 20, 2012. Objections must be sent to 1) the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809 and 2) the applicant at the above address.

COMMISSION ON WATER RESOURCE MANAGEMENT

WILLIAM M. TAM, Deputy Director for
WILLIAM J. AILA, JR., Chairperson

Dated: June 25, 2012

Publish in: Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012
June 27, 2012

TO: Aquatic Resources
    Forestry and Wildlife/Natural Area Reserve System
    Historic Preservation
    State Parks

FROM: William M. Tam, Deputy Director
      Commission on Water Resource Management

SUBJECT: Request for Comments
         Water Use Permit Application
         Ewa-Kunia Ground Water Management Area, Oahu

Transmitted for your review and comment is a copy of a water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01. Public notice of this application will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012.

We would appreciate your review of the attached application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your division only. Please respond by returning this cover memo form by July 20, 2012, which is the legal deadline for objections. If we do not receive your comments by this date, we will assume you have no objections to this application.

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.

Response:

( ) We have no objections or comments
( ) Objections attached
( ) Only comments attached

Contact person: ___________________________ Phone: ___________________________

Signed: ___________________________ Date: ___________________________
TO: Russell Tsuji, Administrator  
Land Division  

FROM: William M. Tam, Deputy Director  
Commission on Water Resource Management  

SUBJECT: Request for Comments  
Water Use Permit Application  
Ewa-Kunia Ground Water Management Area, Oahu  

Transmitted for your review and comment is a copy of a water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01. Public notice of this application will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012.  

We would appreciate your review of the attached application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your division only. Please respond by returning this cover memo form by July 20, 2012, which is the legal deadline for objections. If we do not receive your comments by this date, we will assume you have no objections to this application.  

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.  

RI:ky  
Attachment(s)  

Response:  

( ) A water lease/permit is required of this applicant and an application for such will be requested by our division.  
( ) A water lease/permit is not required of this applicant.  
( ) A water lease/permit has been obtained by the applicant through lease no.  
( ) Other relevant Land Division rules/regulations, information, or recommendations are attached.  
( ) No objections  
( ) Other comments:  

Contact person: ______________________ Phone: ______________________  
Signed: ______________________ Date: ______________________
TO: Honorable Jobie Masagatani, Chair Designate  
Department of Hawaiian Home Lands  
Honorable Loretta J. Fuddy, A.C.S.W., M.P.H., Director  
Department of Health  
Attn: Acting Chief, Wastewater Branch  
Attn: Mr. Stuart Yamada, Chief, Safe Drinking Water Branch  
Dr. Kamana’opono Crabbe, Chief Executive Officer  
Office of Hawaiian Affairs  
Mr. Ernest Lau, P.E., Manager and Chief Engineer  
Honolulu Board of Water Supply  
Attn: Mr. Glenn Oyama  
Attn: Mr. Barry Usugawa

FROM: William J. Aila, Jr., Chairperson  
Commission on Water Resource Management

SUBJECT: Water Use Permit Application  
**Ewa-Kunia Ground Water Management Area, Oahu**

Transmitted for your review and comment is a copy of a water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01. Public notice of this application will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012.

We would appreciate your review of the proposed use that is described in the attached application for any conflicts or inconsistencies with the land use designations, plans, policies, programs, or objectives specific to your organization or department only. **Please respond by returning this cover memo form by July 20, 2012, which is the legal deadline for objections.** If we do not receive your comments by this date, we will assume you have no objections to this application.

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.

RI:ky  
Attachment(s)

Response:

( ) We have no objections or comments  
( ) Objections attached  
( ) Only comments attached

Contact person: ___________________________ Phone: ___________________________

Signed: ___________________________ Date: ___________________________
TO: Mr. Dan Davidson, Executive Officer  
Land Use Commission  

FROM: William J. Aila, Jr., Chairperson  
Commission on Water Resource Management  

SUBJECT: WATER USE PERMIT APPLICATION  
Ewa-Kunia Ground Water Management Area, Oahu  

Transmitted for your review and comment is a copy of a water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01. Public notice of this application will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012.

We would appreciate your review of the proposed use that is described in the attached application (i.e. line item 6 or Table 1). Specifically, we request that you inform us of the current state land use designation for the TMK parcel, or portion thereof, for the proposed use area(s) and, secondly, whether the current state land use designation is appropriate for the proposed project.

We have attached a TMK map(s) that covers the proposed use area(s). Where water is proposed for use on only a portion of a TMK parcel, or on parcels with multiple zoning, the proposed use area(s) has been clearly delineated on the attached map. Please respond by returning this cover memo along with your review comments by July 20, 2012, which is the legal deadline for objections. If we do not receive your comments by this date, we will assume you have no objections to this application.

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.

Response:

( ) We have no objections or comments  
( ) Objections attached  
( ) Only comments attached

Contact person: ____________________  Phone: ____________________

Signed: ____________________________  Date: ______________________
TO:  Mr. David Tanoue, Director  
Department of Planning and Permitting  
City and County of Honolulu

FROM:  William J. Aila, Jr., Chairperson  
Commission on Water Resource Management

SUBJECT: WATER USE PERMIT APPLICATION  
Ewa-Kunia Ground Water Management Area, Oahu

For your review and record, we are forwarding a copy of the application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01, for confirmation of the zoning designation for the proposed uses on the attached application, confirmation of the consistency of the proposed projects with the current zoning designation, and any special management area issues.  
Public notice of this application will be published in the Honolulu Star Advertiser issues of June 29, 2012 and July 6, 2012.  Please respond by returning this cover memo form by July 20, 2012, which is the legal deadline for objections.  If we do not receive your comments by this date, we will assume you have no objections to this application.

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.

RI:ky  
Attachment(s)

Response:

( ) The proposed water use(s) is consistent with the current zoning designation(s).

( ) This well project ( ) requires ( ) does not require a SMA.  If a SMA is required it ( ) has ( ) has not been approved and ( ) is ( ) is not currently active.

( ) Comments attached

Contact person:  _______________________________  Phone:  _______________________________

Signed:  _______________________________  Date:  _______________________________
Honorable Peter Carlisle, Mayor  
City & County of Honolulu  
City Hall  
Honolulu, HI 96813

Dear Mayor Carlisle:

Notice of an Application for Water Use Permit  
Ewa-Kunia Ground Water Management Area, Oahu

The Commission on Water Resource Management (Commission) is sending you a copy of the public notice and water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01 pursuant to Hawaii Administrative Rules. § 13-171-17(a). It will be published in the Honolulu Star Advertiser.

Hawaii Administrative Rules, § 13-171-13(b), states:

"Within sixty days after receipt of notice of a permit application, the county shall inform the commission if the proposed use is inconsistent with the county land use plans and policies."

In accordance with the procedure established between the City’s Department of Planning and Permitting (DPP) and the Commission staff, copies of the application were sent to DPP and the Board of Water Supply for their review and comments. We look forward to receiving the City’s review comments from DPP and BWS within the next sixty (60) days, on whether this water use is consistent with the City’s plans, policies, land use designations and zoning.

Sincerely,

William J. Aila, Jr.  
Chairperson

RI:ky
Enclosures
TO: Other Interested Parties

FROM: William M. Tam, Deputy Director
Commission on Water Resource Management

SUBJECT: Request for Comments
Water Use Permit Application
Ewa-Kunia Ground Water Management Area, Oahu

In addition to serving you notice as required by Hawaii Revised Statutes § 174C-52 (a), the Commission on Water Resource Management transmits for your review and comment a copy of a water use permit application (WUPA No. 958) for Grace Pacific Corporation for Well No. 2103-06 & 2104-01. Public notice of this application will be published in the Honolulu Star Advertiser on June 29, 2012 and July 6, 2012.

We would appreciate your review of the attached application for any conflicts or inconsistencies with the programs, plans, and objectives of the organization or agency that you represent. Written objections should be made in accordance with Hawaii Administrative Rules, Section 13-171-18, and must be filed by the July 20, 2012 deadline. If we do not receive your comments by this date, we will assume you have no objections to this application.

If you have any questions, require additional information, or would like to request an extension of the review period for this application, please contact Ryan Imata at 587-0255.

RI:ky
Attachment(s)

Response:

( ) We have no objections or comments
( ) Objections attached
( ) Only comments attached

Contact person: _______________________________ Phone: ________________
Signed: ____________________________________ Date: ________________
COMMISSION ON WATER RESOURCE MANAGEMENT
ROUTE SLIP FOR NEW APPLICATIONS

FROM: RYAN
-----------------
FUJII, N.
HARDY, R.
HOAGBIN, S.
ICE, C.
IMATA, R.

DATE: 22-May-12
SUSPENSE DATE: 29-May-12

TO:
INIT.
TO:
INIT.
FOR:
PLEASE:

KUNIMURA, I.
TAM, W.
NAKAMA, L.
UYENO, D.
YODA, K.
YOSHINAGA, M.

1 Approval
3 Signature

See Me
1 Review & Comment
Take Action

2 Type Draft acknowledgment letter
Type Final, label file folder, update People.db

4 File & Input Issue Date
Xerox copies

WELL NUMBER 210-06&2104-01
WELL NAME Upper&Lower Makakilo Quarry
WUP Number Old= 205&664 New=958

WELL CONSTRUCTION PUMP INSTALLATION WUPA WUP Transfer DEC-ADM97-A1 Modification

ATTACHMENTS FOR APPLICATION PROCESSING - Both applicant & staff generated
1 TRANS. LETTER
2 Permit PROCESS TABLE
3 CWRM MAPS
4 APPL. FORM (11 COPIES)
5 USGS MAPS (11 COPIES)
6 TAX MAPS (11 COPIES)
7 PARCEL OWNER VERIF.
8 CONTRACTOR VERIF.
9 ALL INFO FILLED IN
10 BACKGROUND CHECK
11 $25 FEE DEPOSIT SLIP
12 DHP/CDUP/SMA pre-screen

(SMA map printout http://gis.hicentral.com/website/parcelzoning/viewer.htm, or INGRID'S SMA/CD MAP)
(LUC map printout http://luc.state.hi.us/luc_maps.htm, or INGRID'S SMA/CD MAP)

13 EA 343 5(a) triggers?

NO
YES - trigger identified is:
(if triggered, exemption analysis memo and/or OEOC Environmental Notice Documents must be attached before accepting)

FOLDER:
☑ MADE NEW FILE FOLDER, ATTACHED
☐ FILE FOLDER ALREADY MADE, IN FILE CABINET

INCOMPLETE ACTION DATES:

DATE ACTION

* need to check Q requested

* need to consolidate 205 & 664 once:
  got through
  they wanted to be separate?
  yes.

new check come in 6/19/12 = acc. date
Hello Ryan - Please use the TMK that is listed in the GWUP application (9-2-03:082). No change is planned. Thank you, Sara

Sara Thomas
Environmental Compliance Specialist
Grace Pacific Corporation
Phone: (808) 203-2805
Fax: (808) 674-9230
Mobile: (808) 348-4895
### Search Results

Search criteria: TMK Taxkey 1-9-2-3-82

<table>
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<tr>
<th>Taxkey</th>
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<th>Owner/Lessee</th>
<th>Bds</th>
<th>Bths</th>
<th>Land area</th>
<th>Liv area</th>
<th>Last Sale Instr</th>
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<td>0</td>
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<td>175.07 ac</td>
<td>4,536</td>
<td>10/9/2009 DEED $10,000,000</td>
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This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed. **Copyright ©6/7/2012**
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<th>Taxkey</th>
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<th>Owner/Lessee Bds Bths Land area Liv area</th>
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<td>GRACE PACIFIC 0 0 54.49 ac 9,243</td>
<td>10/9/2009 DEED $10, FARRINGTON CORPORATION HWY</td>
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This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed. Copyright ©6/7/2012
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<th>Inv No.</th>
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<th>Disc Amt</th>
<th>Payment Amount</th>
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Vendor - SOHOLNR STATE OF HAWAII

riba - 92-26

$25.00

CK# 00074675
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<th>APP</th>
<th>D</th>
<th>OBJ</th>
<th>CTR</th>
<th>PROJECT</th>
<th>PH</th>
<th>ACT</th>
<th>AMOUNT</th>
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<td>1026</td>
<td>0752</td>
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<td>Grace Pacific Corporation</td>
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**TOTAL**: $25.00

**REMARKS**: LINE (1) WUPA for Well Nos. 2103-06 and 2104-01
LINE (2)
LINE (3)
LINE (4)
LINE (5)
LINE (6)
LINE (7)
LINE (8)
LINE (9)
LINE (10)
May 21, 2012

Hand Delivered – Receipt Requested
(Article number: 20120521)

Mr. William Tam
Deputy Director
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Application for Ground Water Use Permit
Applicant/Land Owner: Grace Pacific Corporation
Well Names: Upper Quarry/Lower Makakilo
Well Numbers: 2103-06/2014-01

Dear Mr. Tam:

Grace Pacific Corporation (GPC) respectfully submits the enclosed Application for Ground Water Use Permit, 15 copies of the application form and all attachments, and the filing fee of $25.00. GPC understands that it is responsible for paying the cost of publishing any required public notices associated with this application and will await instructions regarding payment of these costs.

If you have any questions regarding this application, please feel free to contact me at (808) 348-4895.

Sincerely,

Sara L. Thomas
Environmental Compliance Specialist

"An Equal Employment Opportunity Employer"
### 11. TABLE 1: LAND USE CONSISTENCY / EFFICIENCY OF USE (Attach additional copies, if necessary.)

#### USES THAT REQUIRE POTABLE (DRINKING) WATER

<table>
<thead>
<tr>
<th>zone</th>
<th>sector</th>
<th>plat</th>
<th>parcel</th>
<th>Yes, date approved:</th>
<th>No</th>
<th>Yes, date approved:</th>
<th>No</th>
<th>Yes, date approved:</th>
<th>No</th>
<th>Yes, date approved:</th>
<th>No</th>
</tr>
</thead>
</table>

#### USES THAT DO NOT REQUIRE POTABLE WATER

| IRROTH | 9  2  03 | 082 | AG    | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | 109.3 | 2969 | 325,000 |
| IRROTH | 9  2  03 | 074 | AG    | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | 92.8 | 2969 | 276,000 |
| INDMI   | 9  2  03 | 082 | AG    | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | 24.0 | 0 | 0 |
| INDMI   | 9  2  03 | 074 | AG    | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | Yes, date approved: | No | 79.0 | 0 | 0 |

#### TOTAL QUANTITY OF WATER REQUESTED (sum of total potable use and total non-potable use) =

- L 601,000 GPD
- M 601,000 GPD

Please explain if there are any limitations (e.g., legal, contractual) on the proposed water use(s) described in Table 1. Ref. HRS § 174C-51(5).
### 11. TABLE 1: LAND USE CONSISTENCY / EFFICIENCY OF USE (Attach additional copies, if necessary.)

#### USES THAT REQUIRE POTABLE (DRINKING) WATER

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sector</th>
<th>Plat</th>
<th>Parcel</th>
<th>Yes, date approved</th>
<th>Yes, not acquired</th>
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<tbody>
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</table>

#### USES THAT DO NOT REQUIRE POTABLE WATER

**INDOTH**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sector</th>
<th>Plat</th>
<th>Parcel</th>
<th>Yes, date approved</th>
<th>Yes, not acquired</th>
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</tbody>
</table>

Quantity reflects discontinued quarry operation in max water usage year (2034). During years 2012 through 2032, industrial water use is expected to average 84,000 GPD annually.

**TOTAL QUANTITY OF WATER REQUESTED** (sum of total potable use and total non-potable use) = **601,000** GPD

Please explain if there are any limitations (e.g., legal, contractual) on the proposed water use(s) described in Table 1. Ref. HRS § 174C-51(5).
12. **TABLE 2: IRRIGATION INFORMATION**  
List all crops that will be grown, including landscape and golf course irrigation uses. Copy Table 2 and attach additional sheets to complete your list, if necessary.

<table>
<thead>
<tr>
<th>9 - 2 - 03 - 082</th>
<th>Mix. See Attachment 3, Renaturalization Plan Submittal.</th>
<th>109.3</th>
<th>109.3</th>
<th>Jan</th>
<th>Dec</th>
<th>TRICKLE, DRIP, SPRINKLER, LARGE GUNS</th>
<th>IRRIGATE TO FIELD CAPACITY</th>
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<tr>
<td>9 - 2 - 03 - 074</td>
<td>Mix. See Attachment 3, Renaturalization Plan Submittal.</td>
<td>92.8</td>
<td>92.8</td>
<td>Jan</td>
<td>Dec</td>
<td>TRICKLE, DRIP, SPRINKLER, LARGE GUNS</td>
<td>IRRIGATE TO FIELD CAPACITY</td>
</tr>
</tbody>
</table>

Comments (continued from Column I): Please clearly indicate the crop (i.e., the row in table) these comments relate to.
### TABLE 3: ALTERNATIVES ANALYSIS

<table>
<thead>
<tr>
<th>Municipal sources</th>
<th>Wastewater reuse</th>
<th>Ditch system</th>
<th>Desalination</th>
<th>Surface water</th>
<th>Conservation Measures</th>
<th>Other (specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
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<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**A. Analysis of potable alternatives**
Attach additional sheets if necessary.

- GPC has investigated the feasibility of using R-1 reclaimed water from the Honouliuli Wastewater Reclamation Facility. This option is not feasible, however, because of the limited hours of water availability and the distance to the R-1 supply. Details are provided in Attachment 4.

- Grace Pacific is actively investigating the feasibility of purchasing and installing a filter press to reuse industrial wastewater from the wash plant; however, that equipment is not currently installed and is not locally available to lease.

- On January 24, 2011, Grace Pacific withdrew its request for allocation of 750,000 gpd from Waiahole Ditch.

**B. Analysis of non-potable alternatives**
Attach additional sheets if necessary.

- Not feasible based on distance of facility to salinated water source.

- Not feasible based on distance of facility to nearest surface water body.

### 14. PUBLIC INTEREST

§174C-2(C), HRS states: 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 propagation 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.

Explain how the proposed new use(s) in your application are consistent with the public interest.

The use of water for renaturalization of the quarry will minimize the visual impact of the quarry from off-site locations.

### 15. INTERFERENCE WITH THE RIGHTS OF THE DEPARTMENT OF HAWAIIAN HOME LANDS

Explain how the proposed new use(s) of water will not interfere with the rights of the Department of Hawaiian Home Lands, as provided in section 221 of the Hawaiian Homes Commission Act.

Department of Hawaiian Home Lands has no reservation for water allocation in the Ewa-Kunia Aquifer.

### 16. INTERFERENCE WITH ANY EXISTING LEGAL USES

Explain how the proposed new use(s) of water will not interfere with any other existing legal use(s) of water.

The proposed new use of water is within the available allocation of the Ewa-Kunia Aquifer System.

### 17. PUBLIC WATER SYSTEM INFORMATION

Check the appropriate box or boxes.

- PUC-Regulated Private System
- Non-PUC-Regulated Private System
- Not a Public Water System
- Intended dedication to Honolulu Board of Water Supply or to County of Maui, Department of Water Supply
Figure 1
Well Site on USGS Quadrangle
Figure 1
Grace Pacific Corporation
State Well No. 2103-06
Well Site on USGS Quadrangle

EWAA QUADRANGLE
HAWAII-HONOLULU CO.
7.5-MINUTE SERIES (TOPOGRAPHIC)
Figure 2
Well Site on Tax Map Key
Figure 2
Grace Pacific Corporation
State Well No. 2103-06
Well Site on Tax Map
Figure 3
Well Site Photo
Figure 3
Grace Pacific Corporation
State Well No. 2103-06
Well Site Photograph
Figure 4
Site Plan Delineation Key Map
For the Water Usage of the Makakilo Quarry
APPROVED SPECIAL USE PERMIT AREA "MAUKA" OF H-1 IS 482.8 ACRES.

- EXISTING USE OF RESIDENTIAL BUILDING
- PERMISSION TO INSTALL RADIO TOWER
- TWO-LOT Parcel "AP" & "BP" (482.8 Acres)
- DEFINITION OF EXISTING QUARRY
- EXISTING QUARRY 42.2 ACRES.

AUGUST 15, 2011
SITE PLAN DELINATION KEY MAP
FOR THE WATER USAGE OF THE MAKAKILO QUARRY
Attachments
Attachment 1
Irrigation Water Requirements for
Makakilo Quarry, Hawaii
Irrigation Water Requirements for Makakilo Quarry, Hawaii

Prepared by:

Dr. Ali Fares,

Email: alifares@yahoo.com

HydroNoor Environmental Consulting

Honolulu, Hawaii

April 19, 2012
CONTENT

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      ii. Irrigation Requirements
      iii. Evapotranspiration
      iv. Surface Water Runoff
   b. Input Data for the Analysis
3. Result Analysis
   a. Monthly Irrigation Water Requirements for the Renaturalized Areas
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1. Introduction

Accurate irrigation water requirements are determined based on site specific long-term rainfall, evapotranspiration, and plant water use parameters. Soil physical properties and irrigation method characteristics are also needed in this regard. This report details the process that was used to determine the irrigation water requirements for the plants used in the naturalization of Makakilo quarry along the outer rim (latitude 21.35213; longitude – 158.065).

The goal of this report is to determine irrigation water requirements for Makakilo Quarry renaturalization plan (2009-2035). The methodology we used in this report uses a daily water budget approach based on site specific long-term daily weather data (rainfall, air temperature, and evapotranspiration), crop water uptake parameters (leaf area index, root distribution, and crop coefficient) and soil physical properties (water holding capacity and curve number). The report gives detailed overview of the water balance approach used to calculate irrigation water requirements. The water budget includes the irrigation requirements, rainfall, evapotranspiration, surface water runoff, and excess water losses below the rootzone. The result of the analysis included the following parts: i) monthly irrigation water requirements for the renaturalized areas, ii) land use projection for renaturalization, and dust control, iii) daily irrigation requirements per acre for different land uses, iv) daily irrigation water for dust control, processing, and renaturalization, v) summary, and vi) the list of references used.

2. Methodology

   a. Water Balance Approach

      i. Water Budget
Changes of soil water storage for a specific plant root zone, $\Delta S$, are calculated as a function of all water inputs and outputs in and out of the rootzone as follows:

$$\Delta S = P + G + IRR_{net} - Q_{GW+Runoff} - ET_c,$$

(1)

where $P$ (in) is the rainfall, $G$ (in) is the groundwater contribution, $IRR_{net}$ (in) is the net irrigation requirement, $Q_{GW+Runoff}$ (in) is summation of water losses as groundwater drainage and surface runoff, and $ET_c$ (in) is the plant evapotranspiration. The root zone soil water storage capacity ($S$) (in) is expressed as the product of the available soil water holding capacity (ASWHC) (in) in the plant root zone and the plant root zone depth ($z$) (in). The ASWHC is the water stored between the soil field capacity and its permanent wilting point. These irrigation calculations assume that irrigation is triggered once the available water is depleted by 50%; this allowable water deficit level (AWD) is specific to the type of plant or crop used. Calculated irrigation water replaces the depleted available water from the rootzone to allow the water content to reach field capacity.

ii. Irrigation Requirements

Using equation (1), the gross irrigation requirement (IRR) is calculated for a planted area as follows:

$$IRR = \frac{ET_c - R_e - G}{F_i \cdot LF},$$

(2)

where $R_e$ is the effective rainfall which is represents the portion of the gross rainfall that remains in the root zone for plant use after canopy interception and excess drainage of rainfall below the rootzone; it is equal to $R_e = P - Q_{GW+Runoff}$. $F_i$ is the irrigation efficiency, and $LF$ is the leaching fraction. Leaching is applying irrigation water in excess of the soil moisture depletion level to
prevent salt build up in the root zone especially for salt sensitive plants under arid semi-arid conditions.

### iii. Evapotranspiration

There are different reliable methods for calculating daily crop evapotranspiration (ET_c). The two most commonly used methods are based on either pan evaporation (PE) data or weather data. For the PE approach, ET_c is the product PE, pan coefficient (K_p), and crop coefficient (K_c). Long-term PE data for Hawaii have been used based on the work of Eckren and Cheng, (1980). ET_c for each plant cover is calculated as follows based on PE data:

\[ ET_c = K_c \times K_p \times PE \]  

(3)

The second approach of calculating ET_c, which is based on weather data include different methods, i.e., Penman-Monteith (Monteith, 1965), Hargreaves and Samani (1982), Priestley and Taylor (1972). We calculated ET_c based on Hargreaves and Samani method as follows:

\[ ET_c = 0.0135 \times K_c \times K_T \times R_a \times T_D^{0.5} \times (T_c + 17.8) \]  

(4)

where TD = Tmax-Tmin (°C), T_c is the average daily temperature (°C), R_a is the extraterrestrial radiation (mm/day) calculated based on the latitude of Honolulu International airport location (21.33208), and K_T is an empirical coefficient; it’s equal to 0.162 for "interior" regions and 0.19 for coastal regions such as Hawaii.

### iv. Surface Water Runoff

Runoff was calculated using SCS curve number method using the following equation:

\[ Q_{runoff} = \frac{(P - 0.25)^2}{P + 0.8S} \]  

(6)
where \( P \) is daily rainfall (in), \( S \) is potential maximum retention which is related to curve number as:

\[
S = \frac{1000}{CN} - 10
\]

(7)

CN is the curve number which is related to the imperviousness of the surface. For impervious and water surfaces \( CN=100 \), for natural surfaces \( CN \) is less than 100. \( CN \) is determined based on hydrologic soil group and land use type. The \( CN \) used for this project is equal to 76.

b. Input Data for the Analysis

The native shrubs and grasses used for the re-naturalization of Makakilo are native and drought resistant. This will help the integration of the re-naturalized area with its surrounding and secure the long-term survival of these plants. These plants are subject to very harsh conditions as they only have 8 to 12" of soil in their rootzone. The average soil depth and rootzone used is 10 inches. The average leaf area index of a shrub and grass mixture is 2.0. In order to achieve good coverage and assure a success of the grass and shrubs, a full coverage of the renaturalized area will be assured with irrigation system. Thus, a multi-sprinkler system with 100% coverage and 0.75% efficiency was selected. The soil selected was the Honouliuli soil series of the hydrological soil group C, a common soil of the surrounding area of the quarry with a water holding capacity of 0.14 in/in. The \( CN \) for Honouliuli under grass and shrub plant community is equal to 76.

The daily weather data used were based on the long-term database (1950-2011) from the weather station of Honolulu international airport (Latitude: 21.332, Longitude: -157.9348, and Altitude: 3m). The airport rainfall and evapotranspiration data were adjusted using scaling up factors of
1.16 and 1.06 to match the rainfall and evapotranspiration data at the Makakilo Quarry, respectively.

3. Results of the Analysis

The summary of the major water budget elements is detailed in Table 1.

Table 1. Summary of the major water budget elements for Makakilo Quarry based on the long-term weather data (1950-2011), plant characteristics, and site specific soil physical properties.

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<td>56.6</td>
<td>10.0</td>
<td>62.2</td>
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<tr>
<td>11.4</td>
<td>4.3</td>
<td>0.2</td>
<td>4.7</td>
<td>2.9</td>
<td>3.1</td>
<td>5.5</td>
</tr>
</tbody>
</table>

a. Monthly Irrigation Water Requirements for the Renaturalized Areas

Daily water requirements for the renaturalized area were calculated for 61 years. The summary of these water requirements are shown in Table 2. This monthly data are expressed in inches and also in thousands of gallons per acre. As expected, the summer months (May-August) have the highest irrigation water requirements and the winter months have the lowest irrigation water requirements.
The plan of renaturalization projects to naturalize 4.91 acres per year between 2012 and 2032, and 49.55 acres each year for 2033 and 2034. The following approach was used in calculating the irrigation requirements, (IRRs):

- Areas planted every year during 2012-2032 (AreaYr1) will be irrigated the entire year,
- Areas 2-year-old (AreaYr2) during 2013-2034 will be irrigated six month per year, during the dry period (May-October), and
- Areas 3-year-old and more (AreaYr3) during 2014-2035, will be irrigated during the three driest month of the year, June-August.

b. Makakilo Quarry Land Use Projection for 2009-2035

i. Renaturalization Land Projection

Table 3 below shows the projection of the renaturalization plan for Makakilo Quarry between 20012 and 2035. In 2012, the renaturalization started and will continue until 2035. The plan is to renaturalize 4.91 acres every year until 2032; however, during 2033 and 2034 49.6 acres will be renaturalized every year to reach 202.2 acres in 2035.
Table 3. The projected renaturalized areas of Makakilo Quarry at different growth stages: 1-year, 2-year, and 3-year old and more.

### ii. Dust Control and Renaturalization Land Projection

The yearly areas of the quarry that are irrigated for dust control, renaturalized, and their total acreages as projected are detailed in Table 4.

<table>
<thead>
<tr>
<th>AreaYr1 (acres)</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
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<tbody>
<tr>
<td>AreaYr3 (acres)</td>
<td>0.0</td>
<td>0.0</td>
<td>4.9</td>
<td>9.8</td>
<td>13.7</td>
<td>19.6</td>
<td>24.6</td>
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<table>
<thead>
<tr>
<th>AreaYr1 (acres)</th>
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<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
<th>4.9</th>
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</thead>
<tbody>
<tr>
<td>AreaYr3 (acres)</td>
<td>34.4</td>
<td>39.3</td>
<td>44.1</td>
<td>49.1</td>
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<tbody>
<tr>
<td>AreaYr3 (acres)</td>
<td>73.7</td>
<td>78.6</td>
<td>83.5</td>
<td>88.4</td>
<td>93.3</td>
<td>98.2</td>
<td>103.1</td>
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</table>

Table 4. The acreages of the irrigated areas of Makakilo Quarry for dust control and renaturalization during the duration of the project (2009-2035).

### c. Daily Irrigation Requirements Per Acres For the Different Land Uses
1. Renaturalized Areas

The daily irrigation requirements per acre of the renaturalized areas are shown in Table 5. This water requirement ranges between 1,704 and 5,394 gallons per acre per day. The high rate is for the first year renaturalized areas which are irrigated the whole year. The medium rate is for the second year renaturalized areas which will be irrigated during the 6 months of the year, during the dry season (May-October). The low rate of 1,704 is for the renaturalized areas 3-year and more plants of the quarry which will be irrigated only during the driest months of the year, June-August. This complementary irrigation will supply the renaturalized area with irrigation during those months to assure their survival.

<table>
<thead>
<tr>
<th>AreaYr1</th>
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<th>5,394</th>
<th>5,394</th>
<th>5,394</th>
<th>5,394</th>
<th>5,394</th>
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<tr>
<td>AreaYr3</td>
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<td>1,704</td>
<td>1,704</td>
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<td>1,704</td>
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<tr>
<td>AreaYr4</td>
<td>5,394</td>
<td>4,285</td>
<td>3,425</td>
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<td>2,736</td>
<td>2,564</td>
<td>2,441</td>
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<td>AreaYr4</td>
<td>2,277</td>
<td>2,220</td>
<td>2,173</td>
<td>2,124</td>
<td>2,101</td>
<td>2,072</td>
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<td>1,704</td>
<td>1,704</td>
<td>1,704</td>
<td>1,704</td>
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<tr>
<td>AreaYr4</td>
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<td>1,990</td>
<td>1,975</td>
<td>1,962</td>
<td>1,950</td>
<td>2,481</td>
<td>2,969</td>
</tr>
</tbody>
</table>

5. The projected daily irrigation requirements per acre (in gallons per acre per day) as a function of the age of the rehabilitated areas (AreaYr1, AreaYr2, AreaYr3) of Makakilo Quarry during the duration of the rehabilitation period, 2012-2035.

ii. Daily Irrigation Water for Dust Control and Renaturalization
Table 6. Daily irrigation water requirements, in gallons per acre, for dust control, and renaturalization of Makakilo area.

d. Daily Total Irrigation Water Demands for the Different Land Uses

i. Renaturalization

The daily total water required for the naturalization areas is the product of the values in Table 3 and Table 5; it is detailed in Table 7. This type of irrigation water demand starts low in 2012 and increases as the renaturalized acreage increases with time to reach 202.2 acres in 2033. In 2012, this irrigation requirement is 26,485 gallons per day and reaches 417,484 gallons per day in 2035. This reflects the growth of the renaturalized areas.
Table 7. The projected yearly irrigation requirements (in millions of gallons per year) as a function of the age of the rehabilitated areas (AreaYr1, AreaYr2, AreaYr3) of Makakilo Quarry during the duration of the rehabilitation period, 2012-2035.

**ii. Dust Control, Processing, Renaturalization, and Total Areas**

The total daily irrigation water demands for the quarry is the sum of water used for dust control, renaturalization, and processing. Table 8 shows the irrigation water demand for dust control, processing, renaturalization, and their total as a function of years. Due to the stable processing starting 2012, water use for this activity stays at a constant level of 84,000 gdp until 2032 when the production ends.
Table 8. The projected daily irrigation requirements (in gallons per day) as a function of age of the rehabilitated areas (AreaYr1, AreaYr2, AreaYr3) 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.
5. References


Attachment 2
Makakilo Quarry
Predicted Water Usage
2009 - 2035
Makakilo Quarry
Predicted Water Usage
2009 - 2035

Average Annual Water Usage (mgd)

Calendar Year

5/16/2012
Attachment 3
Renaturalization Plan Submittal
Makakilo Quarry, Hawaii
Renaturalization Plan Submittal

Makakilo Quarry, Hawaii

Prepared By:
Grace Pacific Corporation
Belt Collins Hawaii Ltd.
(Aaron A. Akau Director of Landscape Architecture)

11/5/2009
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1.0 INTRODUCTION

S.U.P. Decision and Order # 2 (docket # SP73/147 November 7, 2008)

Within one (1) year of the Land Use Commission's Decision and Order approving the Special Use Permit, the Applicant shall submit to the Director of Planning and Permitting for review and approval a renaturalization plan in coordination with the proposed Closure Grading Plan for the quarry site and buffer area mauka of the H-1 Freeway showing landscaping details including plant types, sizing and spacing, irrigation facilities, and distribution systems.

The following sections are for submittal and review in response to the S.U.P Decision and Order # 2 above. (See Appendix A for a copy the Proposed Closure Grading Plan for the Quarry Site).

1.0.1 PURPOSE

This report outlines the necessary steps for the renaturalization of Makakilo quarry along the outer rim, with the end goal of visually integrating the quarry with the surrounding hillside by the time the quarry ceases operation. Obtaining this goal will be by the process of establishing designated planting areas at one end of the quarry and as these plots become established and self-sufficient, additional plots will be constructed adjacent to these until the entire site is complete. In order to plant in the designated areas, multiple steps will be needed to construct an environment conducive to plant growth and health. These steps will include the importation of topsoil, installation of irrigation, installation of erosion control devises, and the planting of native shrubs.

1.1 SOILS

A soil analysis will be performed for all potential soil sources before it is acquired. This will insure that the soil will be free from any contaminants that it will inhibit plant growth, and that the amount of any amendments needed to be added will be economically feasible.

1.1.1 ANALYSIS

All potential imported soil shall be tested for nutrient deficiencies prior to being brought on-site. Soil samples shall be submitted to either C. Brewer...
Analytical Laboratory or the University of Hawaii, College of Tropical Agriculture and Human Resources, for testing. After testing, soil shall be brought on-site and amended per the soil analysis' recommendations. See Appendix D for a guide to soil testing in Hawaii.

1.1.2 PLACEMENT

After the imported soil has been amended, it shall be placed at the designated planting areas (The maximum number of planting areas in operation at one time will be determined by the available water supply). The soil will be evenly spread across the site to a depth of 8"-12" after settlement (Figure 1).

1.2 EROSION CONTROL

Erosion control will be implemented in planting areas to reduce soil movement. It will be implemented by the placement of fiber netting logs and the application of hydromulch.

1.2.1 FIBER NETTING LOGS

Fiber netting logs will reduce loss of soil caused by water runoff, but will allow water to pass through (See Appendix E for further details of Fiber netting products). The logs will be laid out perpendicular to the slope and the spacing will be determined in the field to effectively deal with varying slopes in the terrain and the manufacture instructions. Examples of a steep grade
condition (Figure 2) and a mild slope condition (Figure 3) have been given for reference.

**Figure 2: Steep Slope Conditions**

**Figure 3: Mild Slope Conditions**

### 1.2.2 HYDROMULCH

The hydromulch is a slurry mixture combination of straw, cotton fibers, seeds, fertilizer and soil tackifiers which is sprayed onto the newly laid topsoil. This application promotes the rapid growth and establishment of grasses for renaturalization (See Appendix F for further details of hydromulch products).
1.3 **IRRIGATION**

Temporary irrigation will be supplied for the start of each planting area until the vegetation has established itself to the point that it is self-sufficient and no longer requires supplemental water for survival. Two types of systems will be needed for each planting area. Spray rotors will be used to irrigate the grass mix, and a drip system will be used to water the native shrub groups (see Figure 4 for graphic example). As the plants grow and become established the amount of water will be cut back to start the process of "weening off". Eventually the plants will be established enough that they will no longer need irrigation, and at this point both irrigation systems for that plant area can be removed for re-use at the next planting area.

![Figure 4: Irrigation System](image-url)
1.3.1 **IRRIGATION MATRIX**

Table 1 below provides the plant palette for Makakilo Quarry used in the renaturalization plan along with essential irrigation details.

**Table 1: Irrigation Matrix**

<table>
<thead>
<tr>
<th>Type</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Description</th>
<th>Operating Pressure (PSI)</th>
<th>Flow Range (GPM)</th>
<th>Coverage Ratio</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose</td>
<td>Toro</td>
<td>TL-101-NPT</td>
<td>Gas style sprinkler</td>
<td>40-95</td>
<td>42-240 GPM</td>
<td>90'-178'</td>
<td>Cannot use effluent water supply</td>
</tr>
<tr>
<td>Rose</td>
<td>Rain bird</td>
<td>2045-PJ Rain Bird</td>
<td>Rose mounted impact head</td>
<td>25-60</td>
<td>1.3-4.4 GPM</td>
<td>22'-45'</td>
<td></td>
</tr>
<tr>
<td>Drip</td>
<td>Toro</td>
<td>T-HD25057-050A</td>
<td>4&quot; poly/lineliner head</td>
<td>59 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer</td>
<td>Toro</td>
<td>HDD304-1</td>
<td>Pressure compensating emitter</td>
<td>10-50</td>
<td>1 LPH</td>
<td></td>
<td>Two emitters per shrub</td>
</tr>
<tr>
<td>Backflow</td>
<td>Toro</td>
<td>IRC WP</td>
<td>8-circuit battery operated controller</td>
<td>90-130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate Valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quick Cou</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Valve Box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.4 PLANTING

The planting of drought resistant native shrubs, in addition to the hydromulch grasses, will occur on approximately 11.5 acres of enclosed planting areas where slope is suitable as shown in Appendix B. By utilizing these shrubs water demands will be reduced in addition to creating visual integration with the surrounding area.

1.4.1 PLANT MATRIX

Table 2 below provides the plant palette for Makakilo Quarry used in the renaturalization plan along with essential planting details for determining layout and patterns.

Table 2: Plant Matrix

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
<th>Descriptive Notes</th>
<th>Seed Source</th>
<th>Propagation Techniques</th>
<th>Establishment Type</th>
<th>Average Coverage %</th>
<th>Recommended Planting Quantity per Acre</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Ohia&quot;</td>
<td>Dendroica viscosa</td>
<td>&quot;Wild populations on Oahu&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
<tr>
<td>&quot;Nani&quot;</td>
<td>Myoporum sandwicense</td>
<td>&quot;Wild populations in Kapoho and Kualoa&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
<tr>
<td>&quot;Ma&quot;</td>
<td>Geonoma monstrosa</td>
<td>&quot;Wild populations in Kawaihae&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
<tr>
<td>&quot;Kekaha&quot;</td>
<td>Vatica microphylla</td>
<td>&quot;Wild populations in Wahiawa&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
<tr>
<td>&quot;Kapa&quot;</td>
<td>Sida fallax</td>
<td>&quot;Wild populations in Kauai&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
<tr>
<td>&quot;Lemo&quot;</td>
<td>Malaxis uncinata</td>
<td>&quot;Wild populations on Oahu&quot;</td>
<td>Kauai Seed &amp; Supply Co., Inc.</td>
<td>Nursery stock</td>
<td>1&quot; bareroot seed</td>
<td>50&quot; 150</td>
<td>High production of well-developed seed</td>
<td></td>
</tr>
</tbody>
</table>

Photos of recommended native shrubs and also grasses for hydromulch mixture can be found in Appendix C.
1.4.2 **LAYOUT**

The placement of the native shrubs groups will be random across the planting area to give more of the desired naturalistic look (see Figure 2 & Figure 3 for examples of two different slope conditions). Two methods will need to be tried to find the best overall success of the grass mix and native shrub combination.

Method "A": will consist of applying the hydromulch mix across the entire planting area, with no planting of native shrubs at this time. After the grass mix has been well established and growth is healthy, native shrubs will then be planted in groupings.

Method "B": native shrub groupings will be installed first, then immediately afterward the hydromulch mix will be sprayed across the entire planting area.

For both methods the size of the native plant groupings will be an area approximately 10'x45'.
APPENDIX A: PROPOSED CLOSURE GRADING PLAN FOR THE QUARRY SITE
Appendix C: Plant Images
APPENDIX D: SOIL ANALYSIS
(Hue, Uchida, & Ho, 2009)

Rx for Soils and Crops

A Guide To Soil Testing For Hawai‘i’s Residents

N. V. Hue, R. Uchida, and M. C. Ho
Department of Tropical Plant and Soil Sciences and
Agricultural Diagnostic Service Center
College of Tropical Agriculture and Human Resources
University of Hawai‘i at Manoa

Why have a soil tested?
Having a soil tested is an integral part of good farm management because it will let you know if your soil needs any fertilizer, what kind and how much so that your crop can grow better. In this text, we will show you how to obtain a good soil test. Because laboratory analyses are performed on a small sample of soil from an entire field or parent, the analytical results are useless if the sample submitted does not represent the soil you intend to grow your plants in. A properly collected sample makes test results valid, and will produce correct recommendations that enhance yields, make efficient use of resources, and/or preserve quality of the environment.

How to take a representative soil sample
When sampling home gardens, one composite sample consisting of 5-10 sub-samples per 100 sq. ft. collected over the planting area should be taken. For larger areas like pastures or tree orchards, first make a grid or map of your area, then divide your map into smaller uniform soil-test areas of a few (1-5) acres each. Label each area clearly on the map by using a combination of latitudes that make sense and that are easy to remember. Each test area should be uniform with regard to soil type or condition. Fields with different slopes, soil color, geologies, apparent texture (for example, heavy, light, or ALO) or cropping history should be sampled separately. A soil-test sample for each area should be a composite of 10-15 sub-samples.

http://www2.ohchr.hawaii.edu/department/research_extensions/soil_soilmap.htm

9/17/2009
specified depth, normally 4 inches for cropland fields or established pasture, 10 inches for bermudagrass, and 6 inches for conventionally tilled fields. For tree crops (forests, nuts, tree fruits), where possible, collect a surface sample to a depth of 4 inches and a sub-soil sample from 8-24 inches deep. Each sample to be tested should be a thorough mix of the cores taken randomly, lay, in a zigzag pattern as shown in Figure 1.

Figure 1. Sampling soil using a zigzag pattern.

Such a sampling technique minimizes the variability that may be present in your field or garden, and allows you to obtain a reasonably representative soil sample.

A specially designed soil probe is often used for collecting soil subsamples (called cores). However, if you do not own a probe, then use a steel or plastic garden spade or shovel to collect soil cores as follows. Dig a hole to the sampling depth, then cut a 1-inch thick slice from the top to bottom of the hole. Tilt a 1-inch wide by 1-inch segment of the slice, and place it in a clean mixing bowl, preferably made of plastic.

Plan to collect soil samples two to three months before planting so you will get your test results in plenty of time to plan your farming and fertilization. Depending on adventitious, the information time the lab can be up to two-three weeks. Soil in fields or gardens should be tested at least once every two years.

Submitting samples and providing relevant information

After collecting the soil samples, take them to the county extension office in your area or send them directly to the Agricultural Diagnostic Service Center (ADSC) in the College of Tropical Agriculture and Human Resources, University of Hawaii (University of Hawaii, Agricultural Diagnostic Service Center, 1990 East-West Road, Airmail, 19a, Honolulu, HI 96822). To get the most accurate recommendations from your soil test, be sure to fill out a soil information sheet, which is available from your county extension office or the ADSC. A blank soil information sheet is shown in Figure 2.

Figure 2. Soil information sheet used by the ADSC, Univ. of Hawaii.

http://www2.ca.hawaii.edu/rtp/research_extension/xrveis/soilsample.htm

9/17/2009
<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>City</td>
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</tr>
<tr>
<td>State</td>
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<tr>
<td>Zip</td>
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<tr>
<td>Phone</td>
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<tr>
<td>Fax</td>
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<tr>
<td>Client ID</td>
<td></td>
</tr>
<tr>
<td>Sample Type</td>
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</tr>
<tr>
<td>Sample Location</td>
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<tr>
<td>Agent</td>
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</tr>
<tr>
<td>Address</td>
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<tr>
<td>City</td>
<td></td>
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<td>Phone</td>
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</tr>
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<td>Fax</td>
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<td>Job Control No:</td>
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<td>Sample ID</td>
<td></td>
</tr>
<tr>
<td><em>Serial No:</em></td>
<td></td>
</tr>
<tr>
<td><em>Date (mm/dd):</em></td>
<td></td>
</tr>
<tr>
<td>Soil or Mud</td>
<td></td>
</tr>
<tr>
<td>Site of assay sq. ft.</td>
<td></td>
</tr>
<tr>
<td>Acres</td>
<td></td>
</tr>
<tr>
<td>Soil Depth (inches)</td>
<td></td>
</tr>
<tr>
<td>Map unit</td>
<td></td>
</tr>
<tr>
<td>Series</td>
<td></td>
</tr>
<tr>
<td>Apparent density: heavy, light, or Ash</td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td></td>
</tr>
<tr>
<td>Annual rainfall (inches)</td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td></td>
</tr>
<tr>
<td>Slope (%)</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td></td>
</tr>
<tr>
<td>Lime used</td>
<td></td>
</tr>
<tr>
<td>Yr.of application:</td>
<td></td>
</tr>
<tr>
<td>Rate</td>
<td></td>
</tr>
<tr>
<td>Type of Lime</td>
<td></td>
</tr>
<tr>
<td>Fertilizer used</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
</tr>
<tr>
<td>Rate</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>Manure type</td>
<td></td>
</tr>
<tr>
<td>Rate</td>
<td></td>
</tr>
<tr>
<td>Compost</td>
<td></td>
</tr>
<tr>
<td>Rate of compost</td>
<td></td>
</tr>
<tr>
<td>Has rock phosphate been applied?</td>
<td>Plant grown Plant to be grown</td>
</tr>
<tr>
<td>Can you fill in fertilizer 4-6 indices if necessary?</td>
<td>Bottom land Rolling</td>
</tr>
<tr>
<td>Describe the problem &amp; send copies to:</td>
<td></td>
</tr>
<tr>
<td>Objectives for this sample</td>
<td></td>
</tr>
</tbody>
</table>

http://www2. state.hawaii.edu/agr/research_extension/taxa/soilsoil.htm

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**Ex. for Soils and Crops**

**Page 4 of 6**

<table>
<thead>
<tr>
<th>observations:</th>
<th>NRCB</th>
<th>ASCB</th>
<th>Diagnosis only</th>
</tr>
</thead>
</table>

Complete information will provide you with the best possible recommendation. Fertilizer and lime requirements vary with soils and crops. Therefore, the soil's apparent density, texture, history (such as Hawaiian soils), light (volcanic ash-derived soils on the Big Island) or A/Ca land (regular pieces of lava), crop to be grown and crop previously grown are among the most important items of information needed to make correct recommendations.

**How are soil samples tested?**

The ADSC provides all residents of Hawaii with a reasonably priced soil and plant tissue testing service. Routine analysis of soils includes

- Soil pH
- Exchangeable phosphorus (P)
- Potassium (K)
- Calcium (Ca)
- Magnesium (Mg)
- Soil organic carbon (organic matter)
- Total nitrogen, extractable aluminum (A), boron (B), and other nutrients (e.g., zinc, manganese, copper) are measured on request. Detailed descriptions of the analytical procedures are given in the Soil Fertility Manual, 1986, published by the College of Tropical Agriculture and Human Resources, University of Hawaii.

Soil test results and fertilizer recommendations

Within two to three weeks after you submit your samples to the ADSC, you should receive the test results for your soil along with fertilizer recommendations for your garden or field. The results should indicate at least the soil's pH and levels of P, K, Ca, and Mg per ton (or kg per kg). A brief interpretation of the levels of these nutrients is also provided as either very low, low, medium, high, very high, or extremely high. An example of the form for the analytical results and interpretations is shown in the upper half of Figure 3.

---

**Figure 3. ANALYTICAL RESULTS AND FERTILIZER RECOMMENDATIONS PROVIDED BY THE ADSC**

<table>
<thead>
<tr>
<th>Analytical Results / Interpretations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil pH</td>
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<tr>
<td>---------</td>
</tr>
</tbody>
</table>

http://www2.cea.hawaii.edu/ace/research_extension/garden/soiltestsample.htm

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### Fertilizer Recommendation

<table>
<thead>
<tr>
<th>Total nutrient requirement (lbs/A)</th>
<th>Nitrogen (N)</th>
<th>Phosphorus (% P)</th>
<th>Potassium (% K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer/Amaterial options</td>
<td>Fertilizer Amount</td>
<td>Est. Cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lbs/1000 sq ft. crop</td>
<td>lbs/1000 sq ft.</td>
<td>$/1000 sq ft.</td>
</tr>
<tr>
<td>Lime</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer selection</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Micronutrients</td>
<td></td>
<td></td>
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<tr>
<td>Other Fertilizers</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Comments:</td>
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<td></td>
<td></td>
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</tbody>
</table>

[http://www2.ilsan.hawaii.edu/psu/Research_Extension/soiltestexample.html](http://www2.ilsan.hawaii.edu/psu/Research_Extension/soiltestexample.html)  
9/17/2009
Note: The interpretations are based on the Fact Sheet No. 3 "Adequate Nutrient Levels in Soils and Plants in Hawaii".

Did the recommendation help? To help improve future recommendations, please answer the following questions, photocopy this form and return it to above address (ADSC).

1. Did you need to modify the recommendations? If so, how?

2. Did your plants improve? Please give unit area yield before and after the recommendation was applied.

Although these results and interpretations are essential to making fertilizer recommendations, they may not be very helpful to you. That's why we also provide fertilizer recommendations for your garden or field as shown in the lower half of Figure 1. These include amounts of lime (in either lb/1000 sq. ft. or tons/acre), and its estimated cost, fertilizer type (for example, 21-0-0, 21-0-32, 45-30-10), and its amount and cost.

At the bottom of this form, we ask you to give us some feedback in terms of how your crop performed as a result of our fertilizer recommendations. Such information would allow us to fine-tune our recommendations so that we can better serve you in the future.

We hope that with this information you can make your garden or field more productive as well as help protect the quality of our environment.

http://www2.soils.hawaii.edu/gas/research_extension/SoilTestSample.htm

9/17/2009
APPENDIX E: FIBER NETTING LOG

(Green, SedimentSTOP, 2008)
SedimentSTOP combines a polyethylene or polypropylene fiber fabric reinforced with a non-woven biodegradable netting that is rolled from edge to edge to create a seamless, temporary, water-permeable, three-dimensional sediment filtration structure.

A Best Management Practice that reduces and lessens caused by stormwater runoff, SedimentSTOP traps soil particles while allowing water to pass through, protecting waterways, sidewalks, and roads from sediment accumulation.

SedimentSTOP meets engineering, specification and contractor in complying with many NYDES Phase II rules and other environmental regulations.
the SedimentSTOP® ADVANTAGE

SedimentSTOP dramatically reduces surface sheet erosion, and offers significantly greater filtration capabilities and sediment retention than wattles, straw bales or silt fences. And unlike wattles, which use a single netting on the outside to encompass the fiber fill, SedimentSTOP utilizes multiple layers of netting to eliminate the possibility of failure if the outer netting is ever damaged.

SedimentSTOP is more porous than a wattle, allowing it to perform as a buffer strip that slows water and filters sediment. In the event that water does flow over the top, SedimentSTOP has an attached Splash Apron, which reduces soil formation and potential down slope erosion.

Wattles create a dome-like structure that causes water to back up and flow over the top, resulting in potentially severe erosion on the downslope side of the wattles.

SedimentSTOP was put to the test against straw wattles in a research project conducted at Utah State University's Water Research Facility. These 20 ft. long plots of sandy loam soil were set up at a 3.1% gradient. SedimentSTOP wattles with a brewer's barley were planted at the test point and 2 ft. from the bottom of a dirt plot, above moisture of the same barley were similarly planted on a control plot, and one plot was left unplanted as the control. Sediment control was then collected and measured at each plot and was compared to a control of control and a zero-base point.

The sediment control effectiveness of SedimentSTOP versus the wattles was significant. While 20.6 lb of sediment was collected from the plot with spline wattles, only 4.1 lb of sediment was collected from the plot protected by SedimentSTOP. Compared to the bare soil control plot, the control wattles were only 0.6% effective, while the SedimentSTOP was independently proven to be 80% effective at reducing sediment runoff.

EFFECTIVE
SedimentSTOP is an environmentally friendly, cost-biodegradable product. It can be incorporated with a variety of planting techniques such as: live planting, live staking and seed incorporation. The less woven net enables the net straps to move independently of each other, allowing the net openings to expand as necessary. This flexibility combined with the cost biodegradability, minimizes the risk of accidental wildlife entrapment.

Because it leaves absolutely no synthetic residue on site, SedimentSTOP is ideal for use in bioengineering projects, wetland mitigation, riparian area protection, shaded areas, stream bank restorations and environmentally-sensitive areas where synthetic-netted products may pose a threat to wildlife. By eliminating the need to return to the job site to remove the sediment control structure, SedimentSTOP saves you time, money and potential headaches.
SedimentSTOP is easy to install, and features a tow to three-year functional lifespan. The structurally sound, non-reinforced layers prevent failures—even if the outer casting wrap is damaged during or after installation.

SedimentSTOP is easily field fabricated for greater flexibility to specific size requirements. It is extremely flexible and easily conforms to the ground surface, minimizing undercutting. Longer, pre-formed sections reduce the number of overlaps, and the heavy woven natural jute allows easier contouring to the soil. The short, lightweight packaged rolls are easily transported over difficult terrains and to remote areas.

Finished roll diameter can also be increased, if necessary, by simply adding other organic materials such as grass chippings, pine needles, straw, or leaves.

**EASY TO INSTALL**

**HOW'S EASY IT IS INSTALLED:**

**Step 1:**
Dig a 9” deep, 12” wide, narrow trench along the contour of the slope or across the swale.

**Step 2:**
Punch the SedimentSTOP preformed roll perpendicular to the bank or the sloped installation surface. The entire broached and preformed downstream end is back-buried into the trench. (This leaves the Splash Apron® headroom to move the trench.)

**Step 3:**
Secure SedimentSTOP in the sediment trench with a rope stapler, and then secure the downstream edge of the splash apron with another one or two staples 1' apart.

**Step 4:**
Roll the remaining SedimentSTOP towards the upper edge of the sediment trench. If a binder roll is needed, simply slip organic materials across the product with rope stapling.

**Step 5:**
Once the product has been shaped, staple 1” on corners to the soil

**NOTICE:** The manufacturer assumes no greater responsibility for performance of SedimentSTOP.

**UNPACKED EASILY**

Weight: 12.20 lbs (5.52 kg) per 100’

Material: 30% Heavy Grass

Linear: 1,250 ft (380 m) @ (7) kg

**PACKED EASILY**

Design: 1,250 ft (380 m) @ (7) kg

**UNPACKED INSTALLED STRUCTURE**

Dimensions: Approximately 6.00 x 4.00 ft

Length: 50' house front (15.2 m)

Sediment® Splash Apron Length: 1.00 & 2.00 ft

**EASY**
If you are thinking about using wattles, you need to STOP and consider the advantages of using SedimentSTOP.
APPENDIX F: HYDROMULCH

(Green, Hydra MatriCx Series, 2008)
Consider the benefits of HydraMatricX Series products:

- Cost-effective application
- Low waste-to-blank ratio
- One-step application of seed, fertilizers, and mulch
- No synthetic fibers
- Pleasing, deep-green color

In many slope-protection applications, HydraMatricX products can replace temporary erosion control blankets.

**HYDRA CX**
HydraCX™ Extreme Slope Matrix™ is a high-performance hydraulic mulch designed especially for steep to severe slopes, 2:1 to 1:1.

**HYDRA CM**
HydraCM™ Slope Slope Matrix™ is a high-performance hydraulic mulch designed especially for medium-length, moderate to steep slopes, 4:1 to 3:1.
HydroCX® Proven Performance

The porosity, absorbency, and proprietary blend of tackifiers and polymers of HydroCX® deliver exceptional erosion control and fast vegetation establishment.

San Diego State University Slope Testing

<table>
<thead>
<tr>
<th>Cover Factor</th>
<th>ASTM D-6459 Test</th>
<th>Percent Efficiency</th>
<th>Vegetation Established</th>
<th>ICTC Test Method #4</th>
<th>Percent Efficiency</th>
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</thead>
<tbody>
<tr>
<td>(1.04 and 4.36 bars</td>
<td>0.002”</td>
<td>ASTM D-6459”</td>
<td>99.9%</td>
<td>ICTC Test Method #4</td>
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</tbody>
</table>

Modified ASTM D-6459 Standard Test Method for Determination of Water-Column Retention (WCRT) Performance in Preserving Erosion-Resistant Rice Erosion-Retardant Material. Laboratory WCRM tests are done in a 1,000 psf, 24”-deep, 24”-wide, 20”-long test cell with an application rate of 1,000 gallons per hour. The modified test cell includes a permeable, geotextile base that prevents water from infiltrating the soil. The test cell is 10 feet long and 10 feet wide. The test area is a square area of 10 feet long and 10 feet wide. The slope of the plot was a 3:1 slope to a running grade of 12” per inch, 6” below the test area and 6” per hour for 20 minutes. The percent efficiency was determined as a 24-hour runoff with a 24-hour rain at 0.002” per hour.

To push HydroCX® to its performance extensive, one of the test beds received an extended rain event:

<table>
<thead>
<tr>
<th>Slope</th>
<th>Rainfall</th>
<th>Extended</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>30”/hr</td>
<td>2, 4, and 6 inches per hour</td>
<td>30 minutes</td>
<td>6 inches per hour</td>
</tr>
</tbody>
</table>

This extended rainfall test reached 10 inches of rain over a two-hour time period (an average of 5 inches of rain per hour). The data from this event showed that HydroCX® can reduce sediment loss by as much as 99.7% compared to a non-protected plot.

TRP Environmental Slope Testing

<table>
<thead>
<tr>
<th>Cover Factor</th>
<th>ASTM D-6459 Test</th>
<th>Percent Efficiency</th>
<th>Vegetation Established</th>
<th>ICTC Test Method #4</th>
<th>Percent Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0.004”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentage per ASTM D-6459 Standard Test Method for Determination of Water-Column Retention (WCRT) Performance in Preserving Erosion-Resistant Rice Erosion-Retardant Material. Laboratory WCRM tests are done in a 1,000 psf, 24”-deep, 24”-wide, 20”-long test cell with an application rate of 1,000 gallons per hour. The modified test cell includes a permeable, geotextile base that prevents water from infiltrating the soil. The test cell is 10 feet long and 10 feet wide. The test area is a square area of 10 feet long and 10 feet wide. The slope of the plot was a 3:1 slope to a running grade of 12” per inch, 6” below the test area and 6” per hour for 20 minutes. The percent efficiency was determined as a 24-hour runoff with a 24-hour rain at 0.002” per hour. HydroCX® was determined as a 24-hour runoff with a 24-hour rain at 0.002” per hour.

HydroMax/Cx Series products achieve maintenance performance once the matrix has dried.
Cost-Effective Application
- One-step application
- Low water-to-mulch ratio
- Ready to apply instantly
- Time consuming, spray-on technology
- Easy to clean up

Low Water-to-Mulch Ratio
Hydrolawn and Hydrolawn require a maximum of only 100 gallons of water per 50 pounds of mulch. Water-to-mulch ratio is important when you consider the cost of water and the time, labor, and fuel consumption for trips to and from the water source.

One-Step Application
Hydrolawn/Ca products can be applied in one step together with seed and fertilizer. Consumer will appreciate the convenience and the quick, easy touch loading and one-step application of Hydrolawn/Ca products.

No Synthetic Fibers
Hydrolawn/Ca contains no synthetic fibers.

In an acute toxicity study conducted according to EPA-421-K-01-021 Methods for Measuring Acute Toxicity of Effluents, the Crotalus atrox (broadhead crotalus), Diplopoda magna, and Phalemon protrusus tests of Hydrolawn/Ca showed no significant toxicity in any of the tests, and control performance criteria were met.

In addition, Hydrolawn/Ca contains beneficial nitrogen, phosphorus, and potassium nutrients that are important for plant growth.
Pleasing, Deep-Green Color
HydroC supposed to be a color that looks deep and green. The color gives a pleasing appearance to the applied HydroMat/C Series products.

Award-Winning Hydraulic Erosion Control
HydroC was recognized by Business Day as one of the Top 50 Innovations of 2007. The edition ranked more than 500 new product introductions, and selected HydroC® as one of the 50 with the greatest significance to highway and bridge professionals.

Source: Business Day, December 2007

Performance Comparison

<table>
<thead>
<tr>
<th>HydroMat/C Series</th>
<th>High-Performance Wood and Wood Synthetic</th>
<th>Hydromat Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating conditions</td>
<td>Suitable for many applications on both hydraulic and hydrostatic systems</td>
<td>Suitable for many applications on both hydraulic and hydrostatic systems</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Requires regular maintenance and periodic inspection</td>
<td>Requires regular maintenance and periodic inspection</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low temperature extremes</td>
<td>Can handle high and low temperature extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low pressure extremes</td>
<td>Can handle high and low pressure extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low RPM extremes</td>
<td>Can handle high and low RPM extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low speed extremes</td>
<td>Can handle high and low speed extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low torque extremes</td>
<td>Can handle high and low torque extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low flow extremes</td>
<td>Can handle high and low flow extremes</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Can handle high and low resistance extremes</td>
<td>Can handle high and low resistance extremes</td>
</tr>
</tbody>
</table>
HydraCX² and HydraCM Mixing & Application

Consult Installation and Application Guide for complete instructions.

Mixing
1. Consult application and loading charts to determine the proper application rates. Continue hydraulic mixing until equipment manufacturer.
2. Fill tank of a mechanically agitated hydraulic mixing machine with sufficient water to suspend read and fillers.
3. Add all self-estimating (sand, limestone, etc.)
4. Continue adding water slowly, while adding HydtaMC material (HydraCX or HydraCM) at a steady rate. Add at least 10 pounds of HydtaMC material per 1,000 gallons of water. All HydtaMC material should be in the tank by the time the tank is one-thousandth full of water.
5. Add for a minimum of 15 minutes after adding the last material amount of HydtaMC material.
6. For machines with variable-speed agitation, bring agitator to a speed of 100 revolutions per minute.

Application
1. Apply HydtaMC material in a uniform layer from two opposing directions to ensure complete self-sealing. Regular surfaces may need slightly higher application rates to achieve adequate coverage.
2. Apply material at the following minimum application rates.

<table>
<thead>
<tr>
<th>Slope</th>
<th>Application Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>4,500 lb/acre (1,000 lb/ha)</td>
</tr>
<tr>
<td>2%</td>
<td>6,000 lb/acre (1,400 lb/ha)</td>
</tr>
<tr>
<td>4%</td>
<td>7,000 lb/acre (1,750 lb/ha)</td>
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<tr>
<td>6%</td>
<td>8,000 lb/acre (2,000 lb/ha)</td>
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<tr>
<td>8%</td>
<td>9,000 lb/acre (2,200 lb/ha)</td>
</tr>
<tr>
<td>10%</td>
<td>9,500 lb/acre (2,400 lb/ha)</td>
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</tbody>
</table>

HydtaCM Minimum Application Rates

<table>
<thead>
<tr>
<th>Slope</th>
<th>Application Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>1,000 lb/acre (500 lb/ha)</td>
</tr>
<tr>
<td>14%</td>
<td>1,500 lb/acre (750 lb/ha)</td>
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<tr>
<td>18%</td>
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<tr>
<td>24%</td>
<td>3,000 lb/acre (1,500 lb/ha)</td>
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<tr>
<td>34%</td>
<td>4,000 lb/acre (2,000 lb/ha)</td>
</tr>
<tr>
<td>50%</td>
<td>6,000 lb/acre (3,000 lb/ha)</td>
</tr>
</tbody>
</table>

3. Material should not be applied in channels, intertidal, or other areas where contaminated flows are anticipated, unless installed in conjunction with temporary erosion control blanket or permanent (e.g. reinforcement) and HydtaCM material only be applied to treated soils.

Curing and Protection
Clean equipment property of the use of HydraCX or HydraCM to ensure that the material is returned back to the pump, tank, or hose. Clean all equipment properly. Allow the traffic or grading to treated areas until the cures at the top of the surface while applying. Waiting: Do not allow more than one pass/time or less source. Use caution when starting units.
WORKS CITED


Attachment 4
Makakilo Quarry
R-1 Line
Bob and Eric:

Attached for your review and comments is a preliminary sketch showing the alignment of the proposed R1 line.

As shown in the attached sketch, the new R1 water line would connect to the existing BWS R1 water line located within Kapolei Golf Course access road. It would then travel in the northerly direction along Kapolei Golf Course access road towards Farrington Highway and through the Lower Quarry. Once in the Lower Quarry, the new line would then follow the alignment of the Conveyor Tunnel towards the Upper Quarry, crossing under the H1 Freeway. To avoid crossing drainage areas and aggregate piles, the new R1 line would need to make a "u turn" back towards the H1 Freeway, where it would then follow the alignment of the dirt road up towards the hilltop.

In addition to confirming the proposed alignment, we would appreciate your thoughts on the capacity of the proposed reservoir. Based on discussion at our meeting with BWS, it seemed that about 400,000 gpd is required. Assuming half is for irrigation and the other half is for dust control, the reservoir would need to have a capacity of at least 200,000 gallons. If BWS allowed R-1 to fill the tank for 10 hours each day, that equals to a flow rate of about 350 gpm.

Please confirm the reservoir size and we will ask BWS to provide an estimate of hours the R-1 water will be available. FYI, BWS has not yet provided plans of the existing R-1 line within the Kapolei Golf Course, nor have they provided the pressure at the connection point.

Upon receipt of your comments on the alignment and reservoir size, we will can continue with the requested study.

Please contact us if you have any questions.

Thanks,
Jon

2010331400 20100621 Concept Alignment.pdf
Bob and Eric:

My initial comment is that the time the water is available is very short - only 5 hours. If the design was to fill a 200,000 gallon tank in that period, the flow rate would be 1,700 gpm.

Jon

-----Original Message-----
From: MICHAEL MATSUO [mailto:MMATSUO@hbws.org]
Sent: Monday, June 28, 2010 11:04 AM
To: Jon Young
Cc: RCreps@gracepacificcorp.com; eric@tapestrypartners.net; BARRY USAGAWA; 'fred.layi@veoliawaterna.com'
Subject: RE: Makakilo Quarry - R-1 Line

Hi Jon. My apologies for not responding to your earlier email. Anyway, here's what information I have that you might be able to use:

First, attached are maps that show where the BWS-owned R-1 main is and ends. As you can see, the BWS R-1 main ends just near the brackish wells in the southern portion of the property. Thus, the R-1 main that you would be connecting to to serve the Grace Pacific Makakilo quarry is privately-owned. I can give you the plans for our main, but since it isn't near your connection point, I'm not sure how much good that would do you. You may have to contact the golf course to see if they have the plans for their portion of the R-1 system. Let me know if you still want our plans.

Second, according to Fred Layi of Veolia, who runs our R-1 distribution system, Kapolei Golf Course has a back pressure setting of 28 psi. Basically, Veolia uses this pressure setting to balance water flow to all the various users. If all the customers are using water, Veolia uses this pressure as a means to control flow and ensure that all users are getting an equal amount of water. So, it is possible that the golf course might be getting more pressure, depending on the demand of the system.

Third, as for when Grace Pacific would be allowed access to the R-1 water, I would think during the same time that Kapolei Golf Course is using water. This is typically between 12 midnight and 5 a.m.

Call or email me if you have any questions. Mahalo!

Mike

-----Original Message-----
From: Jon Young [mailto:jyoung@beltcollins.com]
Sent: Saturday, June 26, 2010 3:32 PM
To: MICHAEL MATSUO
Cc: RCreps@gracepacificcorp.com; eric@tapestrypartners.net
Subject: RE: Makakilo Quarry - R-1 Line

Hi Michael:

Would you be able to provide an estimate of the hours that Grace Pacific would be allowed to access to the R-1 water?

Please advise.

Thanks,

Jon

From: Jon Young
Sent: Thu 6/17/2010 6:58 AM
To: Michael I. Matsuo P.E. (mmatsuo@hbws.org)
Cc: 'RCreps@gracepacificcorp.com'; eric@tapestrypartners.net
Subject: Makakilo Quarry - R-1 Line

HI Michael:

This is a follow-up to our meeting last week. As discussed, we are looking for the R-1 line plans for the section of line within the Kapolei Golf Course and also the approximate pressure at the end the line.

Your assistance in providing these items would be appreciated.

Thanks,

Jon

Jon M. Young, PE, LEED AP | Project Manager/Civil Engineer
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
T: 808.521.5361 | F: 808.530.7819 | www.beltcollins.com
<http://www.beltcollins.com/>

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**COMMISSION ON WATER RESOURCE MANAGEMENT**

**ROUTE SLIP FOR PERMIT ISSUANCE 3/9/11**

**FROM:** RYAN  
**DATE:** 3/19/12  
**TO:** INIT.  
**INIT. FOR:** PLEASE:

<table>
<thead>
<tr>
<th>TO</th>
<th>INIT.</th>
<th>TO</th>
<th>INIT.</th>
<th>FOR</th>
<th>PLEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHONG, R.</td>
<td></td>
<td>KIMURA, J.</td>
<td></td>
<td>Approval</td>
<td>See Me</td>
</tr>
<tr>
<td>DANBARA, S.</td>
<td></td>
<td>OHYE, L.</td>
<td></td>
<td>Signature</td>
<td>1 Review &amp; Comment</td>
</tr>
<tr>
<td>FUJII, N.</td>
<td></td>
<td>TAM, B.</td>
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<td>Information</td>
<td>Take Action</td>
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<td>UYENO, D.</td>
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</tbody>
</table>

**WELL NUMBER** 2103-06  
**WELL NAME** Upper Quarry

**APPLICATION TYPE** WELL

<table>
<thead>
<tr>
<th>WELL</th>
<th>CHECK PRINTOUT</th>
<th>PROPOSED WELL SECTION ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 WCP COVER LETTER</td>
<td>✗</td>
<td></td>
</tr>
<tr>
<td>2 PIPE</td>
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<td></td>
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<tr>
<td>3 WELL CHECK</td>
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<td></td>
</tr>
</tbody>
</table>

**COMMENTS:**

| 4 PIP COVER LETTER | X well only, not necessary |
| 5 PIP | X well only, not necessary |

**NOTES:**

| DRILLER | Valley Well Drilling  
|---------|----------------------|
| TMK | 9-2-003:082  
| PUMP CAPACITY | 500 |
| WELL OWNER | Grace Pacific Corporation |
| LAND OWNER | Grace Pacific Corporation  
| COMMENT DEADLINE | 1/0/00 |
| 90-DAY DEADLINE | 3/30/00 |

* Glenn Oyama said they won't get comments in to us, but he understands this well is a trade-off for existing well, and if they ask for follow-up, they will not review new WUP application.
March 28, 2012

Ms. Tracie Sober
Valley Well Drilling
91-235 Oihana Street, Suite A
Kapolei, HI 96707

Dear Ms. Sober:

Well Construction Permit
Upper Quarry Well (Well No. 2103-06), Oahu, Island of Makakilo

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s) that authorize well construction activities but excludes installation work for a permanent pump. As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 17:

Special Conditions

1. Attached for your information are copies of the Department of Health's (DOH) review comments. Please note DOH's requirements related to discharge of effluent from well drilling and testing activities. Also, please contact the Noise Radiation and Indoor Air Quality Branch at 586-4700 to check compliance with construction noise permit requirements for this project.

2. The grouting depth shall be in compliance with Section 2.6(c) of the Hawaii Well Construction and Pump Installation Standards.

Please refer to the Permit Processes Worksheet (transmitted with your acknowledgement letter) for further information regarding the process of drilling a well and installing a pump.

No withdrawal of water shall be made other than for testing purposes until a certificate of pump installation completion has been issued by the Commission.

Please sign both permit originals and return one copy to the Commission office for our files. For copies of the aquifer pump test worksheet, please call staff or visit www.state.hi.us/dlnr/cwrm/forms.htm.

IMPORTANT - Drilling work shall not commence until a fully signed permit is returned to the Commission. The permit shall be prominently displayed or made available at the construction site during construction. Be advised that you may be subject to fines of up to $5,000 per day for any violations of your permit conditions starting from the permit approval date.

If you have any questions, please call Ryan Imata of the Commission staff at 587-0255 or toll-free at 974-4000 (Hawaii), 274-3141 (Kauai), 984-2400 (Maui), or 1-800-468-4644 (Lanai & Molokai), extension 70255.

Sincerely,

WILLIAM J. AILA, JR.
Chairperson

Enclosures

c: Grace Pacific (with applicable comments – DOH SDWB, WWB, CWB)
WELL CONSTRUCTION PERMIT

Upper Quarry Well, Well No. 2103-06

Note: This permit shall be prominently displayed at the construction site until the work is completed.

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management’s Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of Upper Quarry Well (Well No. 2103-06) at TMK (19)-2-003:082, Island of Makakilo, subject to the Hawaii Well Construction & Pump Installation Standards (HWCPIS - February 2004) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules (HAR).

2. This permit shall be prominently displayed, or made available, at the site of construction work until work is completed.

3. The well construction permit shall be for construction and testing of the well only. The permittee shall coordinate with the Chairperson and conduct a pumping test in accordance with the HWCPIS (the latest pump test worksheet can be obtained by contacting Commission staff or at www.hawaii.gov/dlnr/cwrm/resources_permits.htm). The permittee shall submit to the Chairperson the test results as a basis for supporting an application to install a permanent pump. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson. No withdrawal of water shall be made for purposes other than testing without a Certificate of Pump Installation Completion. The permitted pump capacity described on the pump installation permit may be reduced in the event that the pump test does not support the capacity.

4. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson. If it can be shown that the well does not tap basal ground water then this condition may be waived after consultation with and acceptance by Commission staff. However, in no instance can the well be drilled deeper than one-half (1/2) of the theoretical thickness without Commission approval.

5. The permittee shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

6. If the work proposed in the well construction permit application shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit may be extended by the Chairperson after consultation with and acceptance by Commission staff. However, in no instance can the well be drilled deeper than one-half (1/2) of the theoretical thickness without Commission approval.

7. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit may be extended by the Chairperson after consultation with and acceptance by Commission staff. However, in no instance can the well be drilled deeper than one-half (1/2) of the theoretical thickness without Commission approval.

8. The Well Completion Report Part I shall be submitted to the Chairperson within sixty (60) days after completion of work (please contact staff or visit www.hawaii.gov/dlnr/cwrm/resources_permits.htm for current form).

9. The permittee shall comply with all applicable laws, rules, and ordinances; non-compliance may be grounds for revocation of this permit.

10. The well construction permit application and, if relevant, any related staff submittal approved by the Commission are incorporated into this permit by reference.

11. If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result.

12. Any variances from the HWCPIS shall be approved by the Chairperson prior to invoking the variance.

13. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than the date the permit expires.

14. If the well is not to be used it must be properly capped. If the well is to be abandoned during the course of the project then the permittee must apply for a well abandonment permit in accordance with §13-168-12(f), HAR, prior to any well sealing or plugging work.

15. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

16. This permit shall apply to the location shown on the application only. If the well is to be relocated, the permittee shall apply for a new well construction/pump installation permit in accordance with §13-168-12(f), HAR.

17. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: March 5, 2012
Expiration Date: March 5, 2014

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed and understand that I shall not commence work until I have signed, dated, and returned the permit to the Commission. I understand that this permit is not to be transferred to any other entity. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $5,000 per day starting from the permit date of approval.

WILLIAM J. AILA, JR., Chairperson
Commission on Water Resource Management

Driller’s Signature: ___________________________ C-57 License #: ___________________________ Date: ___________________________

Printed Name: Tracie Sober Firm or Title: Valley Well Drilling

Please sign both copies of this permit, return one copy to the Commission office, and retain the other for your records.

Attachment
### Well Check Program

4/1/04 - Revised for update to Well Standards (February 2004)

#### Data Input

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<th>Value</th>
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</tr>
<tr>
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#### Results

**Well Depth**
- Theoretical Thickness of Aquifer: 574
- 1/4 Aquifer Thickness: 143.5
- Depth of Well below Sea Level: -55 okay Section 2.2

**Well Casing**
- Minimum Wall Thickness Material: steel
- Minimum Thickness per standards: 0.25
- Wall Thickness Provided: 0.375 no standard Section 2.4(b)
- Minimum Length of Solid Casing: 216.9
- Length of solid casing Provided: 260 okay Section 2.4(c)
- Casing Material: ASTM A53 in compliance Section 2.4(d)
  - (for pvc only - check for 200' limit) okay Section 2.4(d)

**Annular Space**
- Depth of Grouting: 168.7
- Depth of Grouting provided: 0 not enough Section 2.6(c)
- Minimum Annular Space required: 2
- Thickness of Annular Space: 3.5 okay Section 2.6(d)
February 9, 2012

TO: Honorable Loretta J. Fuddy, A.C.S.W., M.P.H., Director
Department of Health
Attention: Acting Chief, Wastewater Branch
Joanna L. Seto, Chief, Safe Drinking Water Branch
Alec Wong, Chief, Clean Water Branch
Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

FROM: William J. Aila, Jr., Chairperson
Commission on Water Resource Management

SUBJECT: Well Construction/Pump Installation Permit Application
Upper Quarry Well (Well No. 2103-06) TMK (1) 9-2-003:082
Well address: Makakilo Drive

Transmitted for your review and comment is a copy of the captioned Well Construction/Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by March 9, 2012. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

RI:ss
Attachment(s)

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive a Director of Health approval before it can be used to comply with Hawaii Administrative Rules (RAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §§11-20-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source licenses to meet the public water system definition, then Director of Health approval is required before implementation.

If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely inspected and tested.

It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

For the applicant's information, a source of possible wastewater contamination [ ] [ ] is not located near the proposed well site (information attached).

An NPDES permit is required.

Other relevant DOH regulations, information, or recommendations are attached.

In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

No comments/objections.

Contact Person: Michael Mihara
Phone: 808-425-8
Date: 2/13/12

Signed: [Signature]
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

February 9, 2012

TO: Honorable Loretta J. Fuddy, A.C.S.W., M.P.H., Director
    Department of Health
    Attention: Acting Chief, Wastewater Branch
              Joanna L. Seto, Chief, Safe Drinking Water Branch
              Alec Wong, Chief, Clean Water Branch
              Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

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Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

RI:ss
Attachment(s)

RESPONSE:

1] This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

2] This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition, then Director of Health approval is required prior to implementation.

3] If the well is used to supply both potable and non-potable purposes in a single system, the user shall eliminate cross-connections and backflow connections by physically separating potable and non-potable systems by an air gap or an approved backflow preventer, and by clearly labeling all potable spigots with warning signs to prevent inadvertent consumption of non-potable water. Backflow prevention devices should be routinely maintained and tested.

4] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

5] For the applicant's information, a source of possible wastewater contamination is not located near the proposed well site (information attached).

6] An NPDES permit is required.

7] Other relevant DOH rules/regulations, information, or recommendations are attached.

8] In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

Contact Person: Johnny Ong, Eng. on Oahu 586-4294
Signed: 586-4294
Date: 2-10-2012 10904
Subject: National Pollutant Discharge Elimination System Regulations for the Well Construction/Pump Installation Permit Application(s) for the Subject Well(s)

The Department of Health, Clean Water Branch (CWB) has the following comments for the subject well:

1. For Well-Drilling Activities

Any discharge to State waters of treated process wastewater effluent associated with well drilling activities is regulated by Hawaii Administrative Rules (HAR), Title 11, Chapter 55, Appendix I, effective October 22, 2007, and compiled June 15, 2009. Treated process wastewater effluent covered by this general permit includes well drilling slurries, lubricating fluids wastewater, and well purge wastewater. This general permit does not cover well pump testing. The applicable Notice of Intent (NOI) Forms and filing fee shall be submitted at least 30 calendar days before the start of discharge to the:

Department of Health
Clean Water Branch
919 Ala Moana Boulevard, Room 301
Honolulu, Hawaii 96814-4920

The CWB-NOI Forms are available online at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html. Inquiries may be directed to the CWB at (808) 586-4309 or by fax (808) 586-4352.

2. For Well Pump Testing

The discharger shall take all measures necessary to prevent the discharge of pollutants from entering State waters. Such measures shall include, if necessary, containment of initial discharge until the discharge is essentially free of pollutants. If the discharge is entering a stream or river bed, best management practices shall be implemented to prevent the discharge from disturbing the clarity of the receiving water. If the discharge is entering a storm drain, the discharger must obtain written permission from the owner of the storm drain prior to discharge. Furthermore, best management practices shall be implemented to prevent the discharge from collecting sediments and other pollutants prior to entering the storm drain.

3. For Construction Activities Disturbing One (1) or More Acres of Total Land Area

By HAR, Title 11, Chapter 55, Appendix C, effective October 22, 2007, and compiled June 15, 2009, an NPDES permit or Notice of General Permit Coverage is required before the start of the construction activities that result in the disturbance of one (1) or more acres of total land area, including clearing, grading, and excavation. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NOI (see Comment No. 1, above) shall be submitted 30 calendar days before the start of construction activities.
COMMISSION ON WATER RESOURCE MANAGEMENT
ROUTE SLIP FOR NEW APPLICATIONS

FROM: RYAN
DATE: 22-Sep-11
SUSPENSE DATE: 29-Sep-11

TO: 
INIT: 
TO: 
INIT: 
FOR: 
1 Approval
3 Signature

PLEASE:
See Me
1 Review & Comment
Take Action
Type Draft acknow letter
Type Final, label file folder, update People.db
4 File & Input Issue Date
Xerox _ copies

WELL NUMBER 2103-06
WELL NAME Upper Quarry
WUP Number Old= 205 & 664/New= ?

☑ WELL CONSTRUCTION ☑ RUMP INSTALLATION ☐ WUPA
☐ WUP Transfer ☐ DEC-ADM97-A1 Modification

ATTACHMENTS FOR APPLICATION PROCESSING - Both applicant & staff generated
1 TRANS. LETTER
2 PERMIT PROCESS TABLE
3 CWRM MAPS
4 APPL. FORM (11 COPIES)
5 USGS MAPS (11 COPIES)
6 TAX MAPS (11 COPIES)
7 PARCEL OWNER VERIF.
8 CONTRACTOR VERIF.
9 ALL INFO FILLED IN
10 BACKGROUND CHECK
11 $25 FEE DEPOSIT SLIP
12 DHP/CDUP/EMA pre-screen

☑ 13 EA 343 5(a) triggers?

☑ NO

☑ NOT IN CD or SMA
(SMA map printout http://gis.hicentral.com/website/parcelzoning/viewer.htm., or INGRID'S SMA/CD MAP)
(LUC map printout http://luc.state.hi.us/luc_maps.htm., or INGRID'S SMA/CD MAP)

INCOMPLETE ACTION DATES:
DATE ACTION

PER Sarah Thomas

if well is successful, then will transfer SUWP 061 to 01 but then don't want to do it until they find wt. So if successful, PIP + WUP transfer.

\{should clarify what's happening with PIP\}

W.R.T. PIPA.
Ms. Tracie Sober  
Valley Well Drilling  
91-458 Komohana Street  
Kapolei, HI 96707  

Dear Ms. Sober:

Well Construction/Pump Installation Permit Application for  
Well No. 2103-06, Makakilo, Island of Oahu  

On January 6, 2012, the Commission on Water Resource Management (Commission) received your completed Well Construction permit application and filing fee for the Upper Quarry Well (Well No. 2103-06). Your application will be processed within ninety (90) days from this date.

With regards to the pump installation permit portion of your application, pursuant to the State Water Code, HRS §174C-84(a), the Commission on Water Resource Management can only issue a pump installation permit to contractors who hold valid a C-57, C-57a, or A license issued by the State of Hawaii, Department of Commerce and Consumer Affairs, Professional and Vocational Licensing Division. Because you have not identified a qualifying contractor, your pump installation portion of your application will not be accepted as complete until a qualifying contractor signs and completes sections 24 & 25 on the application form.

If the review warrants the issuance of a permit, we will send such notice to you and give you the option to receive a letter of assurance in lieu of the permit. A letter of assurance, if issued, will state that we will issue the permits after your contractor signs the original application, subject to the following conditions: (a) the contractor has no outstanding issues with the Commission; (b) there have been no significant changes to the application, proposed well site or well construction plan; (c) there have been no significant changes to applicable laws, rules, regulations; and (d) there have been no significant changes to hydrologic conditions at the proposed well site.

Further, the applicant will need to either request a new water use permit, or a transfer of existing water use permit no. 664 for well no. 2104-01 to this proposed well, in order to obtain a pump installation permit. If a licensed contractor signs the application, all the conditions in the previous paragraph are met, and the review warrants the issuance of a new water use permit, we will then issue a pump installation permit.
Ms. Tracie Sober  
Page 2  
February 9, 2012

The attached table describes the process, responsible parties, and deadline requirements for drilling or modifying a well and installing, modifying, or replacing a pump.

By this acceptance letter, we are also notifying the well operator/landowner that no water may be pumped other than for testing until a certificate of well construction/pump installation completion letter is issued to the well operator and landowner.

The permitted pump capacity described on the pump installation permit may be reduced if the pump test does not support the capacity. No certificate of pump installation will be issued until the Commission determines that the pump capacity will not have adverse effects on the aquifer, other nearby wells, or streams. Thus, you may need to remove the pump and install a smaller pump if the Commission decides a smaller pump is required to protect water resources before you can withdraw water for purposes other than testing.

If you have any questions about your permit application, please contact Ryan Imata of the Commission staff at 587-0255.

Sincerely,

WILLIAM M. TAM  
Deputy Director

RI:ss  
Attachment

c: Grace Pacific
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

February 9, 2012

TO:                Honorable Loretta J. Fuddy, A.C.S.W., M.P.H., Director
                    Department of Health
                    Attention: Acting Chief, Wastewater Branch
                    Joanna L. Seto, Chief, Safe Drinking Water Branch
                    Alec Wong, Chief, Clean Water Branch
                    Dr. Keith Kawaoka, Office of Hazard Evaluation and Emergency Response

FROM:              William J. Aila, Jr., Chairperson
                    Commission on Water Resource Management

SUBJECT:           Well Construction/Pump Installation Permit Application
                    Upper Quarry Well (Well No. 2103-06) TMK (1) 9-2-003:082
                    Well address: Makakilo Drive

Transmitted for your review and comment is a copy of the captioned Well Construction/Pump Installation permit application.

We would appreciate your comments on the captioned application for any conflicts or inconsistencies with the programs, plans, and objectives specific to your department. Please respond by returning this cover memo form by March 9, 2012. If we do not receive comments or a request for additional review time by this date, we will assume that you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

RESPONSE:

This well qualifies as a source which will serve as a source of potable water to a public water system (defined as serving 25 or more people at least 60 days per year or has 15 or more service connections) and must receive Director of Health approval prior to its use to comply with Hawaii Administrative Rules (HAR), Title II, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29.

This well does not qualify as a source serving a public water system (serves less than 25 people or more people at least 60 days per year or 15 service connections) and if the well water is used for drinking, the private owner should test for bacteriological and chemical presence before initiating such use and routinely monitor the water quality thereafter. However, if future planned use from this source increases to meet the public water system definition then Director of Health approval is required prior to implementation.

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An NPDES permit is required.

Other relevant DOH rules/regulations, information, or recommendations are attached.

In the event that the location of the well changes but is still within the parcel described on this application, our division considers the comments to still be applicable, and we do not need to review the new location.

No comments/objections

Contact Person: ____________________ Phone: _____________

Signed: _________________________ Date: _____________
Transmitted for your review and comment is a copy of the captioned Well Construction/Pump Installation permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by March 9, 2012. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Ryan Imata of the Commission staff at 587-0255.

RESPONSE:

[ ] A water lease/permit is required of this applicant and an application for such will be requested by our division.

[ ] A water lease/permit is not required of this applicant.

[ ] A water lease/permit has been obtained by the applicant through lease no. ________________

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ____________________________ Phone: __________

Signed: ____________________________ Date: __________
February 9, 2012

Mr. Ernest Lau, Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Lau:

Well Construction/Pump Installation Permit Review
Well Construction/Pump Installation Permit Application
Upper Quarry Well (Well No. 2103-06)

Transmitted for your review and comment is a copy of the captioned Well Construction/Pump Installation permit application. If you have any comments on this application, please submit them by March 9, 2012. If we do not receive comments we will assume you have no comments.

If you have any questions about this permit application, please contact Ryan Imata of the Commission staff at 587-0255.

Sincerely,

[Signature]

WILLIAM J. AILA, JR.
Chairperson

RI:ss
Attachment
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This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed. Copyright ©2/3/2012
### Professional and Vocational Licensing (PVL) Search - General Licensee

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Click here to enter search criteria for prior complaints history ->
For prior complaints and disciplinary history, contact licensing and business information center at (808) 587-3295.

License information on this site reflects information in the Professional and Vocational Licensing Division as of February 3, 2012; however, applications and forms are subject to standard processing time, and the information here does not reflect pending changes which are being reviewed. The site is updated daily, Monday through Friday, except holidays. The State of Hawaii makes no guarantees as to the accuracy of the information accessed, the timeliness of the delivery of transactions, delivery to the correct party, preservation of the privacy and security of users and makes no warranties, including warranty of merchantability and fitness for a particular purpose. User is advised that if the information obtained herein is to be reasonably relied upon, user should confirm the accuracy of such information with the provider thereof.
08/15/11 Department of Land and Natural Resources
Commission on Water Resources Management $25.00
Application for a Well Construction/Pump permit
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**TOTAL** $25.00

**REMARKS:**
LINE (1) Upper Quarry Well
LINE (2)
LINE (3)
LINE (4)
LINE (5)
LINE (6)
LINE (7)
LINE (8)
LINE (9)
LINE (10)
September 13, 2011

Certified Mail – Return Receipt Requested
(7010-1670-0002-1387-5668)

Mr. William Tam
Deputy Director
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Application for a New Well
Grace Pacific Makakilo Quarry
TMK: 9-2-03:082

Dear Mr. Tam:

Grace Pacific Corporation respectfully submits the enclosed original and 10 copies of an application for a well construction permit with attachments and the filing fee of $25.00. The new well is intended to replace the existing State Well No. 2104-01.

Upon approval of this application, Grace Pacific Corporation intends to construct the well and conduct a pump test to determine whether the well is capable of achieving the desired yield. An application to transfer WUPs 205 and 604 to the new well and increase their amounts will be submitted subsequently.

If you have any questions regarding this application, please feel free to contact me at (808) 348-4895.

Sincerely,

Sara L. Thomas
Environmental Compliance Specialist
Application for a Well Construction/Pump Installation Permit
Upper Quarry
TMK: 9-2-03:082

September 2011
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR A WELL CONSTRUCTION / PUMP INSTALLATION PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 821, Honolulu, Hawaii 96809. Application must be accompanied by 10 copies and a non-refundable filing fee of $28.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-682-2225. For further information and updates to this application form, visit http://www.hawaii.gov/dlnr/cwm.

WELL LOCATION INFORMATION

1. STATE WELL NO. (if already assigned)

2. WELL NAME

Upper Quarry

3. ISLAND

Oahu

4. TIN

zone 674-082

The following must be attached before this application is accepted as complete:
- Portion of 7.5-Minute series USGS topographic map (scale 1:24,000) with well location labeled and include the name of the quad map
- Property tax map, showing well location referenced to established property boundaries
- Photograph of the proposed well site
- A schematic diagram showing the well site, access road and proposed well infrastructure

- For dug wells, attach a grading plan with cross section profiles showing existing and fresh profiles

5. WELL OPERATORS NAME/COMPANY

Grace Pacific Corporation

6. LANDOWNER'S NAME/COMPANY

Grace Pacific Corporation

Robert Creps

Robert Creps

Well Operator's Mailing Address

P.O. Box 78, Honolulu, HI 96810

Landowner's Mailing Address

P.O. Box 78, Honolulu, HI 96810

Well Operator's Phone

674-8383

Well Operator's Fax

674-1040

Landowner's Phone

674-8383

Landowner's Fax

674-1040

Robert Creps, Grace Pacific Corporation

Robert Creps, Grace Pacific Corporation

PROPOSED WELL CONSTRUCTION

7. Proposed Work

- Conduit New Well
- Modify Existing Well
- Abandon/Seal Well

8. Construction Type

- Drillfield
- Dug
- Shaft
- Tunnel

9. Is this well part of a battery of wells? 

☐ Yes ☐ No

10. Proposed Work

- Install New Pump
- Replace Pump

11. Proposed Pump Capacity, gpm (gallons per minute)

500 gpm

12. Proposed Amount of Withdrawal, gpd (gallons per day)

800,000 gpd

13. Method of flow measurement

- Flowmeter
- Other (explain)

14. Projected Groundwater Level

- Baseline
- Economic

15. Municipal (water systems serving greater than 25 individuals or 15 service connections)

☐ Yes ☐ No

16. Domestic

- Number of units to be served: _______

17. Industrial (describe)

For operation of wash plant, water sprays on conveyors and dust control

18. Irrigation (describe crop and no. of acres)

Renaturalization of 202 acres of quarry site

19. Military (describe)

☐ Yes ☐ No

20. Other (describe)

☐ Yes ☐ No

OTHER LEGAL REQUIREMENTS

If required, items 21. and 22. must be obtained before the Commission can legally issue a permit:

21. Conservation District Use Permit (CDUP)

- Well is in Conservation District
- CDUP Application date approved
- Expired

22. Special Management Area Permit (SMA) and/or

- Required, SMA # date approved
- Not Required (attach documentation from applicable County agency)
- I have not checked with the County about whether or not an SMA Permit is required.

23. State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources

- I have consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I have attached applicable documentation from the SHPD.

- I have not consulted with the SHPD regarding potential impacts of well construction activities on historic sites.

24. Chapter 347

- An Environmental Assessment was completed, and
- An Environmental Impact Statement was required and has been accepted (attach letter of acceptance). Publication date in The Environmental Notice:

- A Finding of No Significant Impact has been determined (attach letter). Publication date in The Environmental Notice:

This project proposes:

- Use of state or county lands, or use of state or county funds
- Use within a state conservation district
- Use within a state wilderness area
- Use within a natural area
- Use within the Wilds Special District
- The construction, expansion or modification of a helicopter facility

- A wastewater treatment unit
- Waste-to-energy facility
- Landfill
- Oil refinery
- Power-generating facility

None of the above 11 items

25. Water Use Permit No. (if applicable): WUP Nos. 205 & 864

Additional remarks, explanations, etc. (attach additional sheet if more space is needed)

NOTE: Signing below indicates that the signatories understand and swear that the information provided is accurate and true to the best of their knowledge. Further, the signatories understand that upon that permit approval: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the completion of the permit application with the Commission is a well completion/bandonment report within 60 days after the completion date of the permitted work; 3) in the event that the application is not completed correctly, any permit may be suspended until the item is brought into compliance, and any work done while the permit is in suspension may result in fines of up to $5000/day.

26. WELL DRILLER (must be filled out if application is for Well Construction)

Valley Well Drilling, LLC

24947

Michael Sober

9/2/2011

Signature

Print

Date

91-458 Kamohana Street, Kapolei, HI 96707

Address

808 682-1768 808 682-1768 mikes@vwdhli.com

Phone Fax

E-mail

Licensee business name

C-57 License No.

C-57C-57A Licensee No.

27. PUMP INSTALLED (must be filled out if application is for Pump Installation)

Signature

Print

Date

Address

Phone Fax

E-mail

WP 08/31/2010

Application Form

For Official Use Only:

2011 SEP 15 AM: 17
PROPOSED WELL SECTION (Please attach schematic if different from diagram provided below)

Elevation at top of casing: 257 ft., msl*

Cement Grout: ft.
(min. 70% of distance from ground elevation to top of water surface or 500 ft., whichever is less.)

Annular space between hole and casing (1.5" for positive displacement, 3" for other methods):

3 in.

Rock or Gravel Packing:

none ft.

Material:

☐ Crushed Basalt

☐ Rounded Gravel

Estimated Water Level Elevation: 14 ft., msl*

Minimum of 2' Radius & 4" Thick Concrete Pad (to contain benchmark surveyed to nearest 0.01 ft.)

Ground Elevation: 255 ft., msl*

Solid Casing: (≥ 90% x (Ground Elev. - Water Level Elev!))

Total Length: 260 ft.

Nominal Diameter: 12 in.

Wall Thickness: 3/8 in.

Bottom Elevation: -5 ft., msl*

Open Casing: ☐ Perforated ☐ Screen

Total Length: 50 ft.

Nominal Diameter: 12 in.

Wall Thickness: 5/16 in.

Bottom Elevation: -55 ft., msl*

note: Neither bentonite nor mud should be used in saturated zone during drilling

Open Hole:

Length: none ft.

Diameter: _____________ in.

Bottom Elevation: _____________ ft., msl*

Solid Casing Material:

Carbon Steel: compliant with (check one or more):

☐ ANSI/AWWA C200

☐ API Spec. 5L

☐ ASTM A53

☐ ASTM A139

And compliant with (check one or more):

☐ ASTM A242 (or A606)

☐ Type E

☐ Type S

☐ Grade B

☐ Other

Stainless Steel: (check one):

☐ ASTM A409 (production wells)

☐ ASTM A512 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one):

☐ Schedule 40

☐ Schedule 80

PVC Plastic conforming to ASTM F840 and ASTM D1785 or ASTM D2241: (check one):

☐ Schedule 40

☐ Schedule 80

☐ Schedule 120

Thermoset Plastic: (check one):

☐ Filament Wound Resin Pipe conforming to ASTM D2996

☐ Centrifugally Cast Resin Pipe conforming to ASTM D2997

☐ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517

☐ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950

☐ PTFE Fluorocarbon Tubing conforming to ASTM D3296

☐ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:

Carbon Steel: compliant with (check one or more):

☐ ANSI/AWWA C200

☐ API Spec. 5L

☐ ASTM A53

☐ ASTM A139

And compliant with (check one or more):

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Stainless Steel: (check one):

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☐ Schedule 80

PVC Plastic conforming to ASTM F840 and (ASTM D1785 or ASTM D2241): (check one):

☐ Schedule 40

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☐ Schedule 120

Thermoset Plastic: (check one):

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☐ FEP Fluorocarbon Tubing conforming to ASTM D3296

* The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

For non-salt water Basal Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or,

Bottom Elevation of Well Limit = (Water Elevation - 0.01 x Elev of Level Limit) / 4

Example: Estimated + 2 ft. Water Level Elev. = Bottom Elevation of Well Limit = (2 - 0.01 x 255) / 4 = 18.5 ft.

Solid Casing: compliant with (check one or more):

☐ ANSI/AWWA C200

☐ API Spec. 5L

☐ ASTM A53

☐ ASTM A139

And compliant with (check one or more):

☐ ASTM A242 (or A606)

☐ Type E

☐ Type S

☐ Grade B

☐ Other

Stainless Steel: compliant with (check one):

☐ ASTM A409 (production wells)

☐ ASTM A512 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one):

☐ Schedule 40

☐ Schedule 80

PVC Plastic conforming to ASTM F840 and ASTM D1785 or ASTM D2241: (check one):

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Thermoset Plastic: (check one):

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Stainless Steel: (check one):

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WCPI Application Form 08/31/2010
Figures 1 thru 5
Figure 2
Grace Pacific Corporation
State Well No. 2104-01
Well Site on Tax Map
Figure 5
Grace Pacific Corporation
State Well
No. 2104-01
Well Site Photograph
BEFORE THE LAND USE COMMISSION
OF THE STATE OF HAWAI'I

In The Matter Of The Application Of

GRACE PACIFIC CORPORATION
(Formerly Pacific Concrete & Rock Co., Ltd.)

To Extend The Life Of The Makakilo Quarry Resource Extraction And Aggregate Processing Operations To 2032 And To Expand The Resource Extraction And Buffer Areas Of The Quarry On Approximately 541.5 Acres Of Land Within The State Land Use Agricultural District At Pu‘u Makakilo, 'Ewa, O‘ahu, Hawai‘i, Tax Map Keys: 9-1-16: 4 And 9-2-03: Por. 74 And Por. 82

DOCKET NO. SP73-147

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DECISION AND ORDER APPROVING WITH MODIFICATIONS THE RECOMMENDATION OF THE CITY AND COUNTY OF HONOLULU PLANNING COMMISSION TO (1) EXTEND THE LIFE OF THE MAKAKILO QUARRY RESOURCE EXTRACTION AND AGGREGATE PROCESSING OPERATIONS TO 2032; AND (2) EXPAND THE RESOURCE EXTRACTION AND BUFFER AREAS OF THE QUARRY

This is to certify that this is a true and correct copy of the document on file in the office of the State Land Use Commission, Honolulu, Hawaii.

[Signature]
Executive Officer

[Nov 19, 2008]
DESCRIPTION OF THE PROPERTY

9. The Makakilo Quarry is located at Pu’u Makakilo, ‘Ewa, O’ahu, Hawai’i. The existing quarry, including the berming and buffer areas, and the proposed expansion areas are located on Tax Map Keys (“TMKs”): 9-2-03: por. 74 and por. 82, while the processing site and a portion of the tunnel are located on TMK: 9-1-16: 4 (a portion of the tunnel is also located beneath the H-1 Freeway and is not assigned a TMK parcel) (collectively “Property”). The Property consists of approximately 541.5 acres.

10. The Property is located within the State Land Use Agricultural District.

11. The ‘Ewa Development Plan designates the Property as Low and Medium Density Residential, Golf Course, Agricultural and Preservation, and Highway. The Property is further designated within the Urban Growth Boundary.

7 An existing 1.4-acre offsite stilling basin on TMK: 9-1-16: por. 108 related to the quarrying operations is not included herein as it will be abandoned and was not originally included in the special use permit.

As part of the Planning Commission’s recommendation, an approximately 1.5-acre portion of an access road, owned by D.R. Horton-Schuler Homes, LLC (“Horton-Schuler”), and located on TMK: 9-2-02: por. 6, was included in the special use permit area. Since the Applicant had not included this access road in its request, there is no written authorization from Horton-Schuler in the record concerning its inclusion. At the October 2, 2008, meeting, the Applicant clarified that it did not include that portion of the access road on TMK: 9-2-02: por. 6 in its request because the Applicant only has a non-exclusive easement for the use of that road. Others who utilize the Horton-Schuler lands also have access to the road and the Applicant reserved the right to dedicate further access to others for use of the road. According to the Applicant, farmers and ranchers currently utilize the road. Based on the Applicant’s explanation for excluding the road from its request, the DPP stated that it had no objections to the road’s exclusion. The Applicant also provided Table I which clarified the approximate acreages of the existing quarry operations and the proposed expansion area. The DPP had no objections to the acreages as clarified by the Applicant in Table I.

In response to the DPP’s concerns about possible encroachment upon State and U. S. Navy lands by uses associated with the processing site, the Applicant stated that it removed the stockpiled material in question from the area along the H-1 Freeway and will survey the area near the U. S. Navy well located to the north and east of the processing site. The Applicant represented that if there is any encroachment in this area by uses associated with the processing site, the Applicant will remove it.
2012 at which time it will be available for agricultural uses should the City and County's development plan policies for 'Ewa designate the site for agriculture.

Archaeological and Historical Resources

31. A surface archaeological reconnaissance was conducted in 1988 for Finance Realty, Ltd.'s, 18-hole golf course that was proposed on the mauka portion of the Property where the expansion of the quarry is now proposed. No surface remains were found and it was concluded, with the concurrence of the State Historic Preservation Division, that subsurface testing was not needed. Based on the archaeological reconnaissance and the ongoing use of the Property, there are no known archaeological and historical resources on the Property. Therefore, it is not anticipated that the quarry expansion will adversely impact such resources.

Flora and Faunal Resources

32. A limited variety of floral species have been identified on the Property, including guinea grass (*Panicum maximum*), buffel grass, feather fingergrass (*Chloris radiata*), 'uala (Waltheria indica), kiawe (*Prosopis pallida*), and klu (*Acacia farnensis*). Introduced fauna such as mongoose, rat, zebra dove, common mynah, house sparrow and finch, bulbul, and Java finch are also present on the Property. There are no known endangered or threatened native species of flora and fauna on the site, and therefore the quarry expansion is not anticipated to adversely impact such species.
Application for a Well Construction/Pump Installation Permit
Upper Quarry
TMK: 9-2-03:082

September 2011
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR A WELL CONSTRUCTION / PUMP INSTALLATION PERMIT

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Application must be accompanied by 10 copies and a non-refundable filing fee of $20.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 808-587-0225. For further information and updates to this application form, visit http://www.hawaii.gov/dlnr/wrm.

WELL LOCATION INFORMATION
1. STATE WELL NO. (If already assigned)
   Upper Quarry
   3. ISLAND
   Oahu
   4. TMTK
   9
   5. STATE
   acre
   6. TMTK
   2
   7. STATE
   ft
   8. TMTK
   03
   9. ZONE
   062
   The following must be attached before this application is accepted as complete:
   • Portion of 7.5-Minute Series U.S.G.S. topographic map (scale 1:24,000) with well location located and include the name of the quard map
   • Property tax map showing well location referenced to established property boundaries
   • Photograph of the proposed well site
   • A schematic diagram showing the well site, access road and proposed well infrastructure
   • For dual wells, attach a grading plan with cross section profiles showing existing and fresh grades

5. WELL OPERATOR'S NAME/COMPANY
Grace Pacific Corporation
6. LANDOWNER'S NAME/COMPANY
Landowner's Contact
Robert Creps
P.O. Box 78, Honolulu, HI 96810
Well Operator's Phone
674-3383
Well Operator's Fax
674-1040
Well Operator's E-mail
rofred.gracepacific.com
Landowner's Mailing Address
P.O. Box 78, Honolulu, HI 96810
Landowner's Phone
674-1040
Landowner's Fax
674-3383
Landowner's E-mail
rofred.gracepacific.com

PROPOSED WELL CONSTRUCTION
7. Proposed Work
   Construct New Well
   Modify Existing Well
   Abandon/Seal Well
   Photograph of the proposed project
   Photograph of existing project
   Photograph of the property
   Photograph of the shoreline setback
   Photograph of the historic site
   Photograph of the proposed waste-to-energy facility
   Photograph of the proposed power-generating facility
   Photograph of the proposed oil refinery
   Photograph of the proposed wildlife special district
   Photograph of the proposed construction
   Photograph of the proposed modification of helicopter facility
   Photograph of the proposed method of flow measurement
   Photograph of the proposed flowmeter
   Photograph of the proposed other (explain)

8. Construction Type
   • Drilled
   • Dug
   • Shaft
   • Tunnel

10. Proposed Work
   • Install New Pump
   • Replace Pump

11. Proposed Pump Capacity
   gpm (gallons per minute)
   500 gpm

12. Proposed Amount of Withdrawal
   gpd (gallons per day)
   300,000 gpd

13. Method of flow measurement
   • Flowmeter
   • Other (explain)

14. Proposed Surveyor name and license number (a surveyor is required for all Well Construction Permits and may be required for some Pump Installation Permits)
Ryuan Suzuki, R M Towill Corp, License No. 10069

PROPOSED PUMP INSTALLATION
15. Municipal (water systems serving greater than 25 individuals or 15 service connections)
   Yes
   No

16. Domestic
   Number of units to be served:

17. Industrial (describe)
   For operation of wash plant, water sprays on conveyors and dust control

18. Irrigation (describe crop and no. of acres)
   Renaturalization of 202 acres of quarry site

19. Military (describe)

20. Other (describe)

OTHER LEGAL REQUIREMENTS
If required, Items 21. and 22. must be obtained before the Commission can legally issue a permit:

21. Conservation District Use Permit (CDUP)
   • Well is in Conservation District
     • Required, CDUP # date approved
     • Not Required (attach documentation from OGC)
     • I have not checked with OGC about whether or not a CDUP is required

22. Special Management Area Permit (SMA)
   • Required, SMA # date approved
   • Not Required (attach documentation from applicable county agency)
   • I have not checked with the county about whether or not an SMA Permit is required

23. State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources
   • I have consulted with the SHPD regarding potential impacts of well construction activities on historic sites. I have attached applicable documentation from the SHPD.
   • I have not consulted with the SHPD regarding potential impacts of well construction activities on historic sites.

24. Chapter 433
   An Environmental Assessment was completed, and
   An Environmental Impact Statement was required and has been accepted (attach letter of acceptance). Publication date in The Environmental Notice:
   Publication date in The Environmental Notice:
   This project proposes:
   • Use of state or county lands, or use of state or county funds
   • Use within a state conservation district
   • Use within a shoreline setback area
   • Use within a nationally or Hawaiian registered historic site
   • Use within the World's Special District
   • The construction, expansion or modification of helicopter facility
   • A wastewater treatment unit
   • Waste-to-energy facility
   • Landfill
   • Oil refinery
   • Power-generating facility
   • None of the above 11 items

25. Water Use Permit No. (If applicable)
   WUP Nos. 205 & 664

26. WELL DRILLER (must be filled out if application is for Well Construction)
   Valley Well Drilling, LLC
   24947
   Licensee business name
   C-57 License No.
   Michael Sober
   9/2/2011
   Signature
   Print
   Date
   Address
   91-458 Komohana Street, Kapolei, HI 96707
   Phone
   808 682-1767
   Fax
   808 682-1768
   E-mail
   mlite@wwdlh.com

27. PUMP INSTALLER (must be filled out if application is for Pump Installation)
   Signature
   Print
   Date
   Address
   Phone
   Fax
   E-mail
   WCP Application Form 08/31/2010
**PROPOSED WELL SECTION** (Please attach schematic if different from diagram provided below)

**Solid Casing Material:**
- Carbon Steel: compliant with (check one or more): [ ] ANSI/AWWA C200  [ ] API Spec. 5L  [ ] ASTM A53  [ ] ASTM A139
- And compliant with (check one or more): [ ] ASTM A242 (or A606)  [ ] Type E  [ ] Type S  [ ] Grade B  [ ] Other

**ABS Plastic:** (check one): [ ] ASTM A406 (production wells)  [ ] ASTM A312 (monitor wells)

**PVC Plastic** conforming to ASTM F480 and ASTM D1785 or ASTM D2241: (check one):  [ ] Schedule 40  [ ] Schedule 80  [ ] Schedule 120

**Thermoset Plastic:** (check one)
- Filament Wound Resin Pipe conforming to ASTM D2996
- Centrifugally Cast Resin Pipe conforming to ASTM D2997
- Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
- Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
- PTFE Fluorocarbon Tubing conforming to ASTM D3296
- FEP Fluorocarbon Tubing conforming to ASTM D3296

**Open Casing Material:**
- Carbon Steel: compliant with (check one or more): [ ] ANSI/AWWA C200  [ ] API Spec. 5L  [ ] ASTM A53  [ ] ASTM A139
- And compliant with (check one or more): [ ] ASTM A242 (or A606)  [ ] Type E  [ ] Type S  [ ] Grade B  [ ] Other

**ABS Plastic:** conforming to ASTM F480 and ASTM D1527: (check one):  [ ] Schedule 40  [ ] Schedule 80

**PVC Plastic** conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one):  [ ] Schedule 40  [ ] Schedule 80  [ ] Schedule 120

**Thermoset Plastic:** (check one)
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*The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

For non-salt water Basal Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or, Bottom Elevation of Well Limit = \( \left( \frac{\text{Water Elevation} - \text{Ground Elevation}}{4} \right) \)

Example: Estimated + 2 ft. Water Level Elev. \( \frac{\text{Bottom Elevation of Well Limit}}{4} \) = -18.5 ft.
Figures 1 thru 5
Figure 1
Grace Pacific Corporation
State Well No. 2104-01 Well Site on USGS Quadrangle

EWA QUADRANGLE
HAWAII-HONOLULU CO.
7.5-MINUTE SERIES (TOPOGRAPHIC)
Figure 2
Grace Pacific Corporation
State Well No. 2104-01
Well Site on Tax Map
Figure 5
Grace Pacific Corporation
State Well
No. 2104-01
Well Site Photograph
Documentation from State Historic Preservation Division
BEFORE THE LAND USE COMMISSION OF THE STATE OF HAWAI’I

In The Matter Of The Application Of

GRACE PACIFIC CORPORATION
(Formerly Pacific Concrete & Rock Co., Ltd.)

To Extend The Life Of The Makakilo Quarry Resource Extraction And Aggregate Processing Operations To 2032 And To Expand The Resource Extraction And Buffer Areas Of The Quarry On Approximately 541.5 Acres Of Land Within The State Land Use Agricultural District At Pu’u Makakilo, ‘Ewa, O’ahu, Hawai’i, Tax Map Keys: 9-1-16: 4 And 9-2-03: Por. 74 And Por. 82

DOCKET NO. SP73-147

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DECISION AND ORDER APPROVING WITH MODIFICATIONS THE RECOMMENDATION OF THE CITY AND COUNTY OF HONOLULU PLANNING COMMISSION TO (1) EXTEND THE LIFE OF THE MAKAKILO QUARRY RESOURCE EXTRACTION AND AGGREGATE PROCESSING OPERATIONS TO 2032; AND (2) EXPAND THE RESOURCE EXTRACTION AND BUFFER AREAS OF THE QUARRY

This is to certify that this is a true and correct copy of the document on file in the office of the State Land Use Commission, Honolulu, Hawaii.

[Signature]
Executive Officer

Nov 16, 2008
DESCRIPTION OF THE PROPERTY

9. The Makakilo Quarry is located at Pu‘u Makakilo, ‘Ewa, O‘ahu, Hawai‘i. The existing quarry, including the berming and buffer areas, and the proposed expansion areas are located on Tax Map Keys ("TMKs"): 9-2-03: por. 74 and por. 82, while the processing site and a portion of the tunnel are located on TMK: 9-1-16: 4 (a portion of the tunnel is also located beneath the H-1 Freeway and is not assigned a TMK parcel) (collectively “Property”). The Property consists of approximately 541.5 acres.

10. The Property is located within the State Land Use Agricultural District.

11. The ‘Ewa Development Plan designates the Property as Low and Medium Density Residential, Golf Course, Agricultural and Preservation, and Highway. The Property is further designated within the Urban Growth Boundary.
2012 at which time it will be available for agricultural uses should the City and County's development plan policies for 'Ewa designate the site for agriculture.

Archaeological and Historical Resources

31. A surface archaeological reconnaissance was conducted in 1988 for Finance Realty, Ltd.'s, 18-hole golf course that was proposed on the mauka portion of the Property where the expansion of the quarry is now proposed. No surface remains were found and it was concluded, with the concurrence of the State Historic Preservation Division, that subsurface testing was not needed. Based on the archaeological reconnaissance and the ongoing use of the Property, there are no known archaeological and historical resources on the Property. Therefore, it is not anticipated that the quarry expansion will adversely impact such resources.

Flora and Faunal Resources

32. A limited variety of floral species have been identified on the Property, including guinea grass (*Panicum maximum*), buffel grass, feather fingergrass (*Chloris radiata*), 'uhaloa (*Waltheria indica*), kiawe (*Prosopis pallida*), and klu (*Acacia farnensisana*). Introduced fauna such as mongoose, rat, zebra dove, common mynah, house sparrow and finch, bulbul, and Java finch are also present on the Property. There are no known endangered or threatened native species of flora and fauna on the site, and therefore the quarry expansion is not anticipated to adversely impact such species.